Volume 4, Issue 6 – January – June – 2017

E C O R F A N

Journal-Bolivia

ISSN-On line: 2410-4191

ECORFAN®

ECORFAN®-Bolivia

Indexing

- Google Scholar
- Research Gate
- REBID
- Mendeley
- RENIECYT

ECORFAN Journal-Bolivia, Volume 4, Issue 6, January - June 2017, is a journal edited four-monthly by ECORFAN-Bolivia. Loa 1179, Cd. Sucre. Chuquisaca, Bolivia. WEB: www.ecorfan.org, revista@ecorfan.org. Editora en Jefe: RAMOS-ESCAMILLA, María. PhD, Co-Editor: IGLESIAS-SUAREZ, Fernando. BsC. ISSN-On line: 2410-4191. Responsible for the latest update of this number ECORFAN Computer Unit. ESCAMILLA-BOUCHÁN, Imelda. PhD, LUNA SOTO-Vladimir. PhD. Loa 1179, Cd. Sucre. Chuquisaca, Bolivia., last updated June 30, 2017.

Editorial Board

Arbitration Committee

MTT, PhD
Universidad de Granada, Spain

AH, PhD
Simon Fraser University, Canada

AG, PhD
Economic Research Institute - UNAM, Mexico.

MKJC, MsC
Universidad San Francisco Xavier de Chuquisaca, Bolivia

MRCY, PhD
Universidad de Guadalajara, Mexico

MEC, PhD
Universidad Anáhuac, Mexico

AAB, PhD
Universidad Autónoma de Sinaloa, Mexico

EDC, MsC
Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico

JRB, PhD
Universidad Panamericana, Mexico

AGB, PhD
Instituto de Biotecnología UNAM, Mexico

ACR, PhD
Universidad Nacional Autónoma de México, Mexico

ETT, PhD
CICATA-Instituto Politécnico Nacional, Mexico

FVP, PhD. GHC, PhD. JTG, PhD. MMG, PhD
Instituto Politécnico Nacional-Escuela Superior de Economía, Mexico

FNU, PhD
Universidad Autónoma Metropolitana, Mexico

MTC, PhD
Instituto Politécnico Nacional -UPIICSA, Mexico

MZL, MsC
Universidad del Valle de México, Mexico

MEC, PhD
Universidad Autónoma de San Luis Potosí, Mexico

NGD, PhD
UDLA Puebla, Mexico

NAL, MsC
Universidad Politécnica del Centro, Mexico

OSA, PhD
Universidad Tecnológica Emiliano Zapata del Estado de Morelos, Mexico

OGG, PhD
Universidad Autónoma Metropolitana, Mexico.

PVS, PhD
Universidad Politécnica de Tecámac, Mexico.

MJRH, PhD
Universidad Veracruzana, Mexico.

SCE, PhD
Universidad Latina, Mexico.

SMR, PhD
Universidad Autónoma Metropolitana, Mexico

VIR, PhD
Instituto Mexicano del Transporte, Mexico

WVA, PhD
Universidad Politécnica Metropolitana de Hidalgo, Mexico

YCD, PhD
Centro Eleia, Mexico

ZCN, MsC
Universidad Politécnica de Altamira, Mexico

Presentation

ECORFAN Journal-Bolivia is a research journal that publishes articles in the areas of:

Engineering **C**hemestry **O**ptical **R**esources **F**ood Technology **A**natomy and **N**utrition.

In Pro-Research, Teaching and Training of human resources committed to Science. The content of the articles and reviews that appear in each issue are those of the authors and does not necessarily the opinion of the editor in chief.

In Number 6 th presented the article *Preventive and Corrective Diagnosis of the Built Infrastructure, Faculty of Engineering of the Universidad Autonoma de Campeche, (Campus V) Second Stage* by BARRERA-LAO, Francisco, CRUZ Y-CRUZ, Andrea and QUEN-AVILÉS, Mauricio with adscription in the Universidad Autónoma de Campeche, in next Section the article *Knowledge of pregnant women on neonatal metabolic analysis. June 5 health center. La libertad 2014-2015* by LASCANO, Carmen with adscription in the Universidad Estatal Península de Santa Elena, in the next Section the article *Necrotic and Apoptotic Activity of the Protein Extract from Mangifera indica Mesocarp in Human Lymphocytes in Culture* by HERBERT-DOCTOR, Luis Alfredo, COUTIÑO-RODRÍGUEZ, Elda Ma. del Rocío PALMEROS-SÁNCHEZ, Beatriz, y SAMPIERI-RAMÍREZ, Clara Luz, with adscription in the Universidad Veracruzana and Instituto de Salud Pública, in the next Section the article *Automotive park, a focus from the environmental tax and vehicular pollution* by FIGUEROA, Ivette J., REYES, Mariela V. and MAZÓN, Luis M. with adscription in the Universidad Estatal Península de Santa Elena, in the next section the article *Risk indicators for dental caries in patients that attend the clinic at the faculty of odontology, U.A.C. in 2016* by ZAPATA-MAY, Rafael, ROSADO-VILA, Graciella, SANSORES-AMBROYESO, Fatima, ACUÑA-GONZÁLEZ, Gladys y OROZCO-RODRIGUEZ, Ruben, with adscription in the Universidad Autónoma de Campeche.

Content

Article ECORFAN-Bolivia Journal
June 2017 Vol. 4 No. 6 1-19

Preventive and Corrective Diagnosis of the Built Infrastructure, Faculty of Engineering of the Universidad Autonoma de Campeche, (Campus V) Second Stage

BARRERA-LAO, Francisco*†, CRUZ Y-CRUZ, Andrea y QUEN-AVILÉS, Mauricio

Universidad Autónoma de Campeche

Received January 15, 2017; Accepted June 10, 2017

Abstract

The present work has as general objective to carry out a deep technical analysis, a pathological diagnosis of the buildings "A", "C", "D", "laboratory of floors and pavements", laboratory of the Center of Training and Technological Development in Refrigeration And Air Conditioning, better known as "CAADETRA", "structures laboratory" and "outdoor areas in general (Field of use, student society, booths, parking and green areas)" Faculty of Engineering (campus V) Of the Autonomous Universidad de Campeche, through a qualitative and quantitative evaluation that allows to determine the deteriorations generated by the continuous use and normal wear and tear of the same, with the purpose of proposing to the university authorities immediate actions of rehabilitation, continuous maintenance, preventive work and Or corrective measures and to carry out them on a regular basis by developing a continuous maintenance program for To preserve and / or protect the infrastructure already installed and in operation, in order to preserve in excellent conditions the spaces for the academic formation of the students who arrive in these spaces year by year, since it is of the utmost importance that the facilities are in Optimal way and thus avoid possible accidents that could arise. In order to ascertain and obtain the expected results, the general methodology used consisted of an eminently field study, detailed visual inspection, field surveys and surveys, field trips, updating of plans, observation and compilation of non-destructive samples of the elements Which constitute the complex, photographic records of the areas, an analysis of the content of the instantaneous taking of samples at a given time that would allow to draw provisional conclusions about the observed phenomena, obtain a documentary record through the evaluation of the current conditions (Plans and catalogs of factories), further investigating and opting for a registry and analysis of the possible causes of deterioration (photographic-descriptive registry of deteriorations), and the general proposal of intervention. The timely implementation of these maintenance actions aims to contribute to create conditions that facilitate the students' school use, this process of identifying the deteriorations found in these buildings and later, the intervention proposal, will allow us to optimize the processes of constant maintenance, with The purpose of increasing its useful life.

Diagnosis, Pathology, Intervention, Deterioration, catalog of factories

Citation: BARRERA-LAO, Francisco, CRUZ Y-CRUZ, Andrea y QUEN-AVILÉS, Mauricio. Preventive and Corrective Diagnosis of the Built Infrastructure, Faculty of Engineering of the Universidad Autonoma de Campeche, (Campus V) Second Stage. ECORFAN Journal-Bolivia 2017, 4-6:1-19.

* Correspondence to Author (email: fjbarrer@uacam.mx)
† Researcher contributing as first author.

General Introduction

The schools of education are the places where students spend most after their home, therefore, for institutions of higher education, such as Campus V of the Faculty of Engineering of the Autonomous Universidad de Campeche, obtain a detailed study on The current technical conditions in which the built infrastructure is located, allows us to obtain an overview for decision making, in order to elaborate an immediate intervention plan and a periodical maintenance of the building, this will help us to look for the best conditions in Each of the spaces dedicated to it. The main characteristic of making a diagnosis is that, when it is done in a timely manner, it contributes to "... reduce failures and increase the availability and useful life of equipment and facilities, and greater efficiency in the use of resources ..." (preventive maintenance plan and Corrective of the physical infrastructure and equipment, 2016, Universidad Veracruzana), to increase the useful life of the infrastructure, to better support the high impact of the levels of occupancy of the school spaces and, above all, to increase the security of the users ; However, many times this diagnosis is carried out when the state of the infrastructure is already critical and influences "school performance" (IDB, 2012).

This study aims to contribute to the awareness of all members of the community (teachers, administrators, students) to collaborate in proposing the implementation of a permanent and timely maintenance program in order to mitigate and combat the Wear of the infrastructure already installed and in operation, to ensure a continuous, reliable and safe operation and operation of the services provided and, above all, to reduce operating costs.

As the number of users using these facilities is decisive, develop a plan for its maintenance on the grounds that "... the use of infrastructure is proportional to the number of users." (Manual of Procedures, Department of Preservation of Facilities, Government of the State of Mexico, 2010)

With this research, we allowed to present the main hypotheses**:**

- Having classrooms and learning spaces in good condition is decisive in the objective of obtaining students the expected academic results.

- A good school infrastructure, with new spaces, makes it possible for young people who live in the interior of the state mainly to study and, in addition, tend to improve the attendance and interest of students.

- Some elements of physical infrastructure are not linked to the development of students' competences, but to their well-being, as they guarantee their stay in safe and healthy environments**.**

The research is distributed in the following sections:

1) It presents the history and background of the Autonomous Universidad de Campeche and the Faculty of Engineering that allows us to know the importance of this institution and its spaces for students; The general description of the areas to be analyzed: buildings "A", "C", "D", laboratories: "soils", "CAADETRA", "structures" and "outside areas"; As well as a photographic record of them.

ISSN:2410-4191

2) It shows the satellite view and location of the Faculty of Engineering and the architectural plans of the buildings.

3) A detailed description of each space is found; the catalogs of factories that were created from the surveys and the plans that allow the location of each object presented in those catalogs.

4) The catalogs of the normal deterioration process are shown, with the respective drawings.

5) The intervention proposal, with its plans and detailed catalog.

It should be noted that the school infrastructure under study, is relatively new, as it was completed and began to use its facilities in 2012.

Criteria used

The research was developed through a methodological study and mainly based on field work, consisting of: surveys and inventories in a qualitative, quantitative, descriptive, transverse and longitudinal way, through a series of non-destructive tests, which gave rise to obtaining a database, taking representative samples and drawing conclusions from observed phenomena.

Social impact expected

It is hoped to create the optimal conditions of the facilities that facilitate and increase the students' school use, in addition, this infrastructure is a condition for the teaching practice, since this is a basic input for the educational processes.

Theoretical or Conceptual Framework

The actions of adequate maintenance of the buildings and their facilities are carried out with the purpose of guaranteeing or extending the useful life of the public assets that the educational establishment has, they are necessary to improve important aspects of a space such as:

Functionality, safety, productivity, comfort, institutional image, health and hygiene, as well as constantly encouraging among its members the care of the environment (Espejel Rodríguez Adelina and Flores Hernández Aurelia, 2012). A program of maintenance of educational facilities must necessarily begin with the evaluation of the same, to determine what is the situation of which is part and what are the most urgent needs to attend; The maintenance starts from the proper use of equipment and installations that goes through a good periodic cleaning through the use of suitable utensils, to the repair and / or replacement of some element. In order of priority, the proposal should be aimed at gradually solving the following criteria:

- Potential impact on user safety & level of involvement in educational activities.
- Negative impact on the environment (waste of water or electricity) and economic losses.
- Possible aggravation of deterioration if not attended to in a timely manner.
- Affection of the well-being and comfort of students and teachers.
- Impaired appearance of the school

ISSN:2410-4191

Adequate maintenance delays investment in corrective maintenance; Therefore, it must be permanent. Also, it is important to carry out a schedule of all maintenance operations with the corresponding periodicities if we want to have a building with minimum levels of quality, safety and comfort, and at the same time save expenses in a medium term, ... to maximize the permanent availability of buildings, equipment and facilities with the highest possible reliability and reasonable cost ... "(NAVAS PORTO, Guillermo, 2010)

We must consider at present, seek to comply with "... the requirements, norms and standards that seek to ensure that new reconditioning projects that are developed, tendered or constructed, comply with the current standards in force, which analysts of different educational levels have considered Must be part of the educational buildings. "(MORALES OREA, Cristina, 2012, p..

Background

Geographical location:

Campus V, building without number by Humberto Lanz Cárdenas Avenue and Environmental Ecological Housing Unit, ex Hacienda Kalá colony. San Francisco de Campeche, municipality of Campeche. Mexico

Figure 1 Macro-location. Faculty of Engineering
Source: Google Earth

Figure 2 Micro-localization. Buildings A, C and D, Laboratories and External Areas. Faculty of Engineering
Source: Google Earth

Figure 3 Architectural Plan. Buildings A, C and D, Laboratories and External Areas. Faculty of Engineering.
Source: Own

ISSN:2410-4191

Historical background

The then Southeast University began its existence in 1965, integrating with two middle schools: the High School (now the "Ermilo Sandoval Campos High School" and the School of Nursing and Obstetrics and three higher level schools (Now Faculty of Law Dr. Alberto Trueba Urbina), School of Engineering and Specialized Technicians (ESITE) (Faculty of Engineering), and the School of Commerce (Faculty of Accounting and Administration).

The idea was to establish a university Mixed with both technological and scientific careers.

ESITE has as its first director of the campus, Ing. Humberto Lanz Cardenas, and acting as Secretary the architect Gabriel Baqueiro Rojas. Since its foundation, it had a building located in Ciudad Universitaria.

If we consider as a reference the University Sports Cultural Center (CCDU), a series of buildings can be observed in Ciudad Universitaria in a row to the right of the land; the second of these buildings is with which originally counted the Faculty of Engineering.

In 1986, this building was expanded in an area of 228 m2, since, with the creation of the Masters in Land Roads, and the Computer Center, new facilities became necessary. The extension consists of two rooms on the ground floor, as well as an auditorium on the first level and two classrooms in the second.

Figura 4 Former Faculty of Engineering
Source: Google Earth

The space needs created by the opening of specialties and new careers, forced this Faculty to extend in the building that is at the limit of the university field with the Juan de la Barrera Avenue. On the ground floor of these facilities was the Materials Testing Laboratory; In the first level, one of the classrooms was assigned to the Electronics Laboratory and, in the second, three classrooms for specialties and masters; Two classrooms for the Degree and a room for the Department of Surveying and Photogrammetry. Following the same line of buildings, at the bottom of the campus comprising the University, there are three workshops: Electromechanical; The Training and Technological Development Program in Refrigeration and Air Conditioning (CADETRAA); and another one for the Workshop of Machines and Tools. Undoubtedly, this first School of Engineering managed to achieve its objectives in full, because it was the determining factor to guide the activities of its students, since its graduates are professionals widely recognized in our state, some currently dedicated to education mainly in the area of Mathematics, And others in the exercise of the profession. In accordance with the requirements of the moment, three intermediate level races are established in the first year of activities:

ISSN:2410-4191

Agricultural Technician, Electrical Technician and Technician in Internal Combustion Machines, each of them with a duration of three years. It is in the following year, that is to say, in 1966, when the first top-level race was instituted, that of Engineer Surveyor and Geodesta, immediately received by the means, before the necessity of professionals who will be in charge of the terrestrial measurements and reference positions in the delimitation of land, implementation of irrigation zones and route of communication.

On February 1, 2011 construction of the V campus was started. Due to the uneven topography of the site, the project was modified so that the original design was lost; The first substantial modification to the project that had been carried out was in an integral "T" form; The second modification was designed integrally in the form of a "pendulum"; The last modification was to disintegrate by module buildings all over the complex, remaining as it currently stands.

Campus V (Faculty of Engineering) was inaugurated on July 20, 2011 with its new location on Ex Hacienda Kalá Avenue (which intersects with the old Campeche-Mérida highway) with electrification, street lighting and gardening.

General Descriptions of the study areas: Buildings: "A", "C", "D", "Soil Laboratory", "CAADETRA Laboratory", "Structures Laboratory""

Figure 5 BUILDING "A", Campus V Faculty of Engineering. Southeast side
Source: Own

Building "A"

The building consists of three levels: The ground floor has an area of 300.24 m2 of construction, with a single access that immediately communicates with the waiting area, information and attention to the public, areas for staff access (secretarial area, EXADES area, file, wine cellar, sitting area, women's and men's bath, boardroom and multipurpose area).

In the same way, there are 4 cubicles destined to each one of the coordination of race; is the academic secretariat, which in turn has a kitchenette, bathroom and archiving area. The first level has an area of 336 m2 has a library where students can consult various bibliographies.

ISSN:2410-4191

In the second level it contemplates a total of 345.91 m2 where mainly the offices of the direction of the faculty are located; has a double front door that communicates to a waiting area, secretarial staff of the director and graduate. Four cubicles for the postgraduate coordinators, administrative coordination area, warehouse, toilets and kitchenette. The floor is made of porcelain vitreous of 60x60 cm sand colored in the whole building.

Figure 6 "C" BUILDING, Campus V Faculty of Engineering. North side
Source: Own

Building C

The building consists of three levels: the ground floor has an area of 247.28 m2 and consists of a living room, eleven cubicles for teachers and professors for consultancy and research, a library, a kitchenette, a warehouse, A boardroom and toilets. The first level has a total area of 247.28 square meters and contains nine cubicles for professors and professors for consultancy, a waiting area, a meeting room, an area for social services or consulting, a printing area, a Dining room and toilets. The second and final level has a total area of 247.28 m 2 and contains thirteen teacher's cubicles, a waiting room, a tutoring area, and sanitary.

Figure 7 "D" BUILDING, Campus V Faculty of Engineering. North side
Source: Own

Building D

The building is composed of three levels: the ground floor has an area of 249.75 m 2, where the sanitary services, the mechatronics laboratory, the basic and advanced manufacturing laboratory are located. In the first level has a total area of 249.75 m ^ 2, there is the basic science laboratory, mechatronics laboratory, equipped with tools and equipment for the development of software and devices used for simulation and practices focused on the career of Mechatronics, computer systems and energy and the hydraulic laboratory. The second level, with an area of 249.75 m ^ 2, are destined for postgraduate students and three classrooms for undergraduate level. Each level has a hallway of 1.4 m wide, aluminum railings on the second and third level. The floor is of vitropiso of porcelain of 60x60 cm color sand in the whole building. This building has 25 air conditioning units.

ISSN:2410-4191

Figure 8 SOIL LABORATORY, Campus V Faculty of Engineering. West Side
Source: Own

Soil laboratory

The total constructed area with the building is 104.50 m2 with a concrete esplanade, has a single level. Each of the areas has specific equipment and necessary for the activities that in this laboratory, are usually carried out.

Figure 9 CAADETRA LABORATORY, Campus V Faculty of Engineering. Northwest side
Source: Own

Caadetra laboratory

(Center for Training and Technological Development in Refrigeration and Air Conditioning)

The total built area of the building is 148.50 m2 including an esplanade, has a single level, which is composed of a laboratory, a warehouse, a tool room, a space for a generating plant, some areas Of machinery or equipment and sanitary equipment

Figure 10 LABORATORY OF STRUCTURES, Campus V Faculty of Engineering. Southwest side
Source: Own

Laboratory of structure

The structure laboratory has a total area of 327.70 m 2. Consists of an advisory area, two offices where the indications are given and the theoretical part of the tests being carried out, a test area with the universal machine and two that serve as cubicles of the professors in charge of the laboratory.

ISSN:2410-4191

Outside areas

Figure 11 MULTIPLE USES COURSE, Campus V Faculty of Engineering
Source: Own

Multiple use court. The indoor court has a dimension of 28 x 16.5 mts, is equipped to play soccer ballroom, basketball and volleyball, has 2 goals and 2 basketball nets. The roof is supported by a steel structure of 4.59 m in height, has an arc-shaped sheet covered with a maximum height of 7.03 mts, has 12 luminaires from 400 w to 220 volts.

Student Society. It has a construction area of 53.28 m 2, is a room divided into 3 areas: warehouse, photocopier and student society. It is located in the southern corner of Campus V, next to the parking lot.

Parking Access Booth. It has three tourniquets, guardhouse and surveillance camera

Figure 12 MAIN ACCESS HOUSE. Campus V Faculty of Engineering
Source: Own

Main Access Booth. It has five tourniquets, guardhouse and surveillance camera.

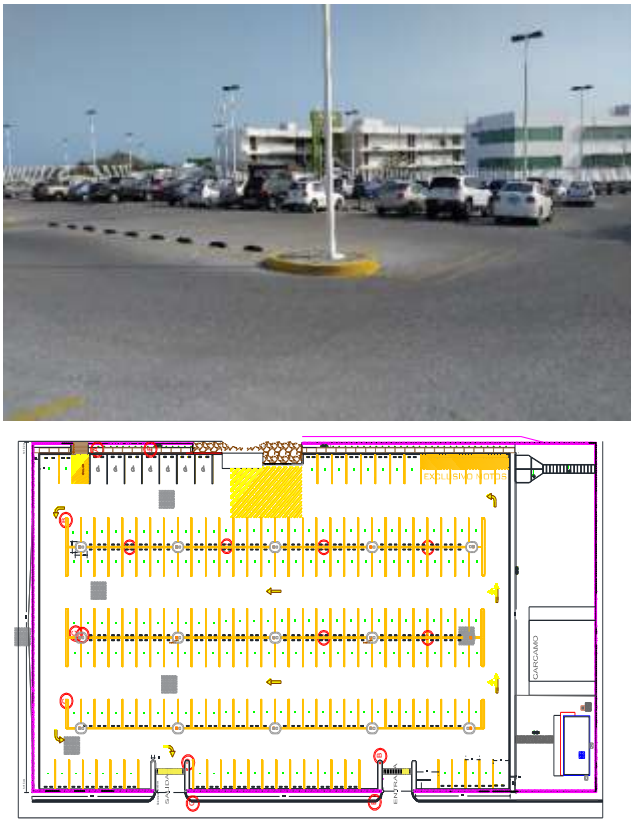


Figure 13 PARKING. Campus V Faculty of Engineering
Source: Own

ISSN:2410-4191

Parking lot. It has an area of 5,600 m ^ 2 of hot asphalt folder of 10 cm of thickness, with 15 cm of hydraulic base, has a perimeter of garrison of concrete prefabricated of 1.0 mt, 184 drawers that serve to park the vehicles for personal personnel, Eight drawers for people with different abilities, a motorcycle area and a bicycle area; Has fifteen luminaires, two poles for surveillance camera.

Figure 14 GREEN AREAS. Campus V Faculty of Engineering
Source: Own

Green areas. These are spaces characterized by the presence of vegetation for a total of 5,396.65 m2, with disabled ramps, twenty-seven stainless steel benches.

We must clarify that "... the school green areas are all those spaces within the school or in its surroundings, occupied by trees, shrubs or plants, which can have different uses, whether recreational, ecological, ornamentation, climate regulation, As well as protection and recovery of the environment ... "(Maintenance Manual, INIFED" National Institute of Physical Educational Infrastructure ", 2013)

Deterioration found in the property

Figure 15 Corrosion in metal structures
Source: Own

ISSN:2410-4191

Figure 16 General damages in painting
Source: Own

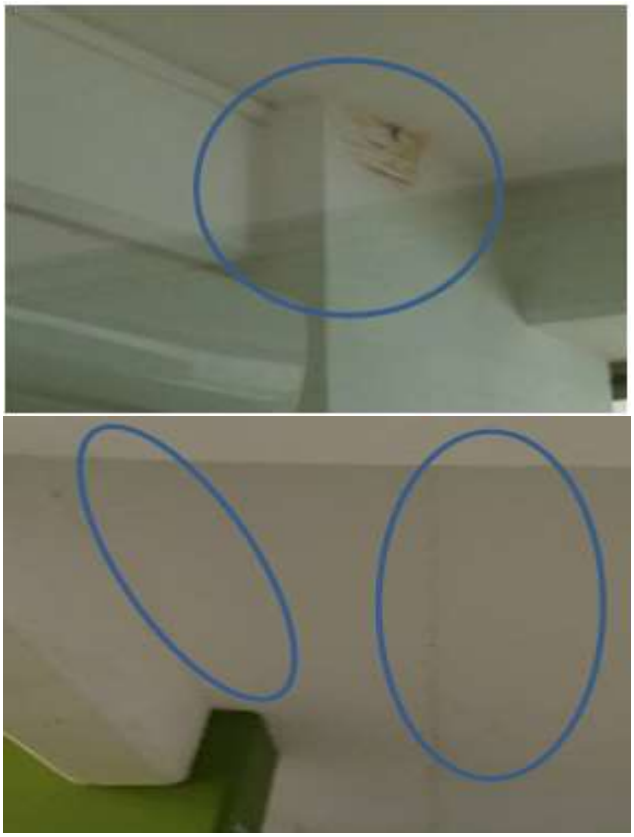


Figure 17 Presence of cracks and dampness
Source: Own

In order to define the intervention process that will be used (either preventive or corrective) in the furniture, equipment or building, it is necessary to know first the causes that caused the deterioration.

The deterioration, is the wear and tear on the component elements of the educational infrastructure, produced by normal use, lack of maintenance, natural wear and tear, accidents, improper use or environmental factors, we can mention that there are different types of deterioration that affect the infrastructure Educational:

ISSN:2410-4191

a) Deterioration due to normal wear. It is the one that presents itself in the educational infrastructure by the daily activity of use, due to the aging of the materials, generally it appears in coatings and movable elements, like doors, windows, endowments by change of technologies, fulfillment of cycles of use. (Eg, factory weathering, water leaks due to defects in facilities, presence of water from the outside by leaks, rain, capillarity, evaporation, defects due to lack of timely maintenance) (GARCÍA CASAS, J. Ignacio and YAÑEZ VELASCO , Igor, 2000)

b) Deterioration due to lack of recurrent, preventive and predictive maintenance. It is the one that appears in the educational infrastructure for the lack of actions for the adequate support in an acceptable level of the educational infrastructure; The omission of these procedures regularly leads to corrective maintenance of greater cost and dimension. (For example: lack of preventive revisions of the use and maintenance of facilities, absence or defect of a continuous maintenance program, immediate repair of injuries or faults found and that, over time, degenerating the elements found).

c) Accident impairment. Caused by third parties where in an out of control event damage to the infrastructure is generated.

d) Deterioration due to inadequate use of infrastructure. Within the normal use of the infrastructure there are situations of misuse by the users caused by ignorance of the operation, malicious actions or vandalism.

e) Deterioration by environmental factors. Deterioration due to environmental factors is recurrent due to rainfall, harmful effects of the sun's rays, high humidity and abrasive effects in desert areas or salinity in coastal areas. This deterioration depends specifically on the geographical areas where the educational establishments are located. (Eg, hygrothermal differences, physical processes of inflections and deformations, thermal differences) (RODRÍGUEZ RODRÍGUEZ, Ventura, 2004)

f) Deficiencies contained in the original project or design (for example: inadequate construction solutions, errors in the sizing of structures or installations, absence or defects in construction details).

It is important to mention that, if we detect any of these deteriorations, we must proceed to its immediate correction, otherwise failure to do so will lead to its aggravation, turning a small fault into a major damage that will require a considerable investment for your attention. (Maintenance Manual, INIFED "National Institute of Physical Educational Infrastructure", 2013). The deterioration in the structure of an element can be caused because the service limit has been met, ie the structure does not present an imminent risk, but there has been loss in its functionality for which it was designed. Another probable element is because the fault limit has been reached, that is, the element has yielded structurally because it is subjected to loads greater than its resistance. However, the definition of two specific situations does not imply that interventions are defined; Since from each one of them different cases are derived, as they are: deformations, cracks, damages in the finishings, corrosion, oxidation, dryness of the materials, etcetera.

ISSN:2410-4191

Which require a certain methodology to be taken care of. In this investigation the reasons that caused the deterioration probably were probably determined by the deficiency in the design, constructive processes adhering to the norms for the case, maintenance and atmospheric factors such as the weathering and the preponderant humidity in this region, They acquire those that are directly related to the constant maintenance that must receive the buildings and outer areas. The main deteriorations found in the facilities were mainly:

I. Cast luminaires and detached cabinet covers, for constant use.

II. Corrosion in metallic structures of the building.

III. Air Conditioners, without constant maintenance.

IV. Worn and hinged wooden doors in hinges and locks.

V. Water leaks in toilets.

VI. General damages in the painting, by the environment, mainly.

VII. Light cracking.

VIII. Presence of humidity in various parts of the infrastructure.

IX. Floating of floors, probably by settlements.

X. Doors and handles of cancellation, deteriorated.

Methodology selected for the proposed intervention of buildings and laboratories.

The proposed methodology was based mainly on the evaluation of quality and educational spaces (MORALES, OREA, María C., 2012) and is the following:

a) Field Research Stage.

b) A detailed visual inspection of each of the areas was initiated by a series of non-destructive tests of the real estate under study and the content analysis of the instantaneous taking of samples detailed at a given time to obtain the expected results.

c) Record of Evidence.

d) Next, we proceed from the evidences found, such as: photographs, operating manuals, guarantees, climatological records, interviews of experts and witnesses, among others, to record all the data.

e) Stage of Analysis and Diagnosis. Factories Survey.

f) Subsequently the catalog of factories was made to know through an inventory of each space the design and composition of the building and its equipment.

g) Stage of Analysis and Diagnosis. Deterioration.

h) Once detailed, we proceeded to analyze and describe the deteriorations caused over time and concentrated on the so-called "deterioration catalog" to know its pathology, are reflected in plans and the catalog of concepts by items.

ISSN:2410-4191

i) Stage of Intervention. Releases, Consolidations, integrations and reintegrations. Each one of these concepts was evaluated until obtaining a proposal of intervention, where, it is detailed a series of preventive or corrective measures by each work item, with the purpose of that they are conserved in optimum form and with a greater time.

j) In the detailed photographic record of intervention are grouped the elements to be conserved by concept, according to the heading that belong, as well as the symbology according to the case of intervention, which are reflected in the plans.

Hypotheses

With this research, we allow the following hypotheses:

1) One of the hypotheses was that the condition of being a young building means that it has an acceptable state in its infrastructure but that it requires permanent attention in all its areas.

2) Another hypothesis argues that the more use is given to the property by the students is more subject to constant deterioration that arise in the spaces intended for it.

3) Another hypothesis tells us that it seems that the indiscriminate use of the equipment in the salons is the main cause of the deterioration of the same.

4) Another hypothesis is that a good school infrastructure, with new spaces, makes it possible for children and young people living in remote areas to get to study, in addition to tending to improve student attendance and interest.

5) A final hypothesis indicates that some elements of the physical infrastructure are not linked to the development of students' competences, but to their well-being, as they guarantee their stay in safe and healthy environments.

The general proposal of intervention of the educational infrastructure.

Since the general objective is to carry out a detailed pathological diagnosis to evaluate the current conditions of the installations by means of specific techniques and to make a proposal of intervention of the existing spaces, the general methodology used consisted of an eminently field study, a detailed visual inspection, Field surveys, updating of plans, observation and compilation of non-destructive samples of the elements that constitute the complex, photographic records of the areas, an analysis of the content of the instantaneous sampling at a given moment that would allow To draw up provisional conclusions about observed phenomena, to obtain a documentary record through the evaluation of the current conditions (plans and catalogs of factories), to investigate further and to register and analyze the possible causes of deterioration Fo Descriptive analysis of impairments), and the general intervention proposal.

ISSN:2410-4191

Findings and Analysis of Results

Analysis of the Results Found for the Effects Caused by the Normal Impairment of the Property

We can analyze several things:

1. That the Faculty of Engineering, is seated in a type of limestone rock hardness type "B".

2. The structure of the building has been designed and built taking into account the type of regional, socio-cultural and anthropic dynamics, to which it will be constantly subjected.

3. The area where the infrastructure is located is subject to strong winds and hurricanes during the year, which must resist the onslaught of nature. There is no need to repeat it: the design of a school must be thought to have the optimum environmental conditions of the place where it will be located, not only in front of the "exceptional" events that can cause a disaster, but also against the normal dynamics of the environment.

4. The school is located outside the floodplain areas, as it is located in high areas.

5. Within the pathological analysis, we find in several areas problems for the physical actions: physical erosion, condensations; Effects by capillarity; Leaks in some ceilings and walls and spills of tinacos by lack of maintenance, this by effect of the rains; Lack of continuous maintenance in the installations and probably some filtration of humidities by the type of terrain "sascab" that absorbs much humidity in times of rains, weathering of the elements and dirt by the presence of animals.

6. Other generic causes of "injuries" found in the installations produced by the mechanical actions: cracks and fissures usually provoked by the differential settlements in the structure to the terrain, loads and overloads; Dilatation cracks; Thermal differences; Hygrothermal differences.

7. We also find that there are physical, chemical and biological processes that influence the pathologies of buildings, such as: discoloration, decapitation or decomposition of coating materials (paints, mortars); Begins to be seen in some areas, processes of corrosion in the reinforcement and degradation of the concrete; There are exfoliations, efflorescences and gradual degradations of the materials caused mainly by the presence of salts, this, very recurrent throughout the peninsula and more because of its proximity to the sea.

8. The elements of wood have degenerative processes by biological actions, still brief, by the lack of continuous maintenance, the deformation and rot of some elements, due to the presence of xylophages, fungi, etc. Which deplete its useful life.

ISSN:2410-4191

Conclusions and recommendations

1.- Based on the first hypothesis, it is concluded that despite being a young building, it does not have a totally acceptable state in terms of its infrastructure, due to the years it has been in service (6 years) presents fault conditions And normal deterioration in some of its elements (structure, equipment and facilities).

2.- Based on another hypothesis, it is concluded that in addition to the constant use of the property and equipment found in the faculty rooms by the students, is more subject to deterioration due to their lack of skills in the management of These elements, which is one of the main causes of its deterioration.

3.- A hypothesis that tells us that a good school infrastructure with renovated spaces, tends to improve the attendance of young people, we can say that the engineering faculty has maintenance, but continuous, yes they have an administrative maintenance plan, which allows Have infrastructure in good condition, but is exceeded by the constant demand of students who come from all over the state to prepare professionally in each of the careers offered by the faculty.

4.- Although the development of skills by the students is not linked to the facilities that they offer, in a comfortable, modern and safe environment, will result in a better school use, which is the Rationale of the built infrastructure.

5.-Recommendation to improve the useful life of the parking pavement.

It is recommended to improve the parking area, consisting of a thin layer applying a uniform asphalt emulsion irrigation that has the purpose of waterproofing the surface rejuvenating it and allows to cover small fissures that prevent rainwater from seeping as well as wrapping or sealing material On the surface, preventing it from being detached, in order to extend the useful life of the existing asphalt layer, increasing the coefficient of friction of the rolling layer, having to be eventually rehabilitated so that the parking lot offers the appropriate conditions of service .

This treatment is relatively inexpensive non-structural, and for its previous application it is necessary to remove the neoprene stops, an energetic sweep to remove the powder and the detached stone material and a watering of impregnation to ensure that the seal irrigation of adhering to The existing asphalt emulsion.

When applying the watering of the seal, the neoprene stops will be replaced and the strips of the vehicle drawers will be painted with yellow retroreflective paint developed with resins of chlorinated rubber and alquidálica resin of high durability to the weather and the wear meets the specifications Of Painting of Traffic of Secretary of Communications and Transportation SCT, as a painting for signaling in streets, roads, urban traffic and road axes. (FT-157 TRAFFIC PAINT, STANDARD SCT 8009, STANDARD 17_NOM-034-SCT-2-2003_01)

To make the quality of the materials, consult N-CTM-4-04 / 08 regarding Asphalt Mixing Stone Materials, N-CTR-CAR-1-04-005 / 00 N-CSV -CAR-3-02-002 / 09 Layers of Rolling of an Irrigation, of the SCT Regulation. (GUIDE OF PROCEDURES AND TECHNIQUES FOR THE CONSERVATION OF ROADS IN MEXICO).

ISSN:2410-4191

6. Recommendation for maintenance in green areas.

The gardens are provided with grass known as Bermuda grass has the peculiarity of not having great height up to a maximum of 16 cm, is a lawn grass of vigorous consistency, very resistant and rapid propagation for this tropical region but very warm, however, Looks pale probably because the grass has not rooted in its entirety, the grass does not die at least for extreme dryness, and stores carbohydrate reserves at its roots waiting for spring, so it is recommended an average irrigation is between 2 and 3 Times a week and the provision of some common fertilizer less frequently (it may be a 24-5-11 fertilizer containing 24% nitrogen, 5% phosphorus and 11% potassium) and a 2.5 cm Have a green and healthy appearance.

"Modern gardening and its great complexity, in which the old concept of" gardener "has no place, since it is essential technical qualifications of the highest level to be able to create and maintain spaces of this type with sufficient guarantees" (Technical Manual Of gardening I Establishment of gardens, parks and green spaces, FERNANDO GIL-ALBERT VELARDE

Finally, it is concluded that although the Faculty of Engineering of the Autonomous Universidad de Campeche, was built six years ago, due to the movement and normal use of the property, the deteriorations have been made visible.

After the analysis of causes and intervention of the faults presented therein, it is established that it is essential to develop a program of continuous, preventive and corrective maintenance on the facilities, in this way it would give an explicit solution on the appearance and existence Of faults.

Also, the elaboration of this program allows savings in the economy destined to the rehabilitation of diverse equipment, furniture and areas of the property. An annual maintenance plan is necessary to summarize the operations and the time at which preventions must be carried out in the facilities in order to achieve a control of the tasks carried out.

The maintenance plan must contain the predestined times To carry out corrective and preventive maintenance work, allowing its control and execution in the established periods. (Norms ISO 9001 - 2015 infrastructures and equipment). In order to comply with the General Law of Physical Educational Infrastructure regarding quality, safety, functionality, timeliness, equity, sustainability and relevance, this standard establishes requirements that supervision must perform in the construction, equipment, Maintenance, rehabilitation, reinforcement, reconstruction and habilitation of buildings and facilities of the physical educational infrastructure of the country. (MEXICAN STANDARD NMX-R-024-SCFI-2015 SCHOOLS - WORK SUPERVISION OF THE EDUCATIONAL PHYSICAL INFRASTRUCTURE - REQUIREMENTS)

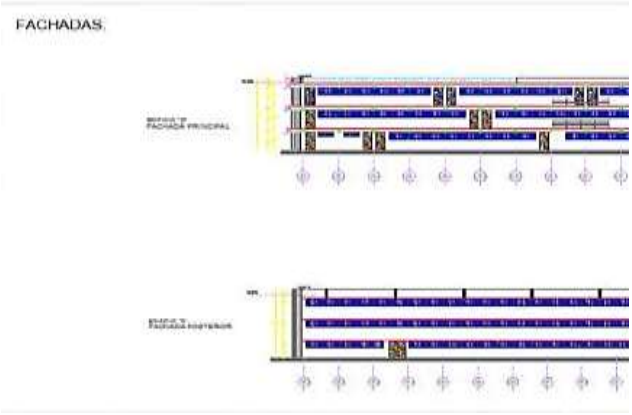


Figure 18 Architectural facades
Source: Own

ISSN:2410-4191

References

ESPEJEL RODRÍGUEZ, Adelina y FLORES HERNÁNDEZ, Aurelia, (2012), *Environmental Education at the High School Level for the School and Community, Puebla-Tlaxcala, Mexico.* RMIE, vol. 17, número 55, octubre-diciembre, México.

GARCÍA CASAS, J. Ignacio y YAÑEZ VELASCO, Igor, (2000), *En torno a la inspección técnica de edificios*, edit. Colegio oficial de aparejadores y arquitectos técnicos de Madrid, 120 págs., En RODRÍGUEZ RODRÍGUEZ, Ventura, et al, *Manual de Patología de la Edificación: Tomo número 1, el lenguaje de las grietas, patologías y recalces en cimentación,* Universidad Politécnica de Madrid, 2004, pág. 22.

LÓPEZ FERNÁNDEZ (2005), *Julio, Manual de Conservación de Infraestructura, CITOP España.*

MORALES, OREA, María C, (2012), *Estudio, diagnóstico y proyecto de rehabilitación de los edificios A, B, C, H, I, del ilustre Instituto Veracruzano, ubicado en la localidad de Boca del Río, Veracruz,* Universidad Veracruzana, Campus Xalapa, tesis.

NAVAS PORTO, Guillermo, (2010), *Desarrollo e implantación de un plan de mantenimiento en edificio de oficinas*, Universidad Carlos III, Madrid.

RODRÍGUEZ RODRÍGUEZ, Ventura, et al, (2004), *Manual de Patología de la Edificación: Tomo número 1, el lenguaje de las grietas, patologías y recalces en cimentación,* Universidad Politécnica de Madrid.

UNESCO-SANTIAGO*,* (1998)*, El mantenimiento, compromiso de todos, Mantenimiento de edificios y Mobiliario escolar Guía No. 1, Ministerio de Educación, República de Chile, febrero.*

FIOL OLIVAN*,* Francisco*,* (2014), *Manual de patología y rehabilitación de edificios, Universidad de Burgos. Edición: 1 (28 de marzo de 2014).*

PONS ACHELL, *Juan Felipe,* (2011), *Informes periciales en edificación, Universitias Edición: 1 (1 de mayo de 2011).*

BENDALA ALVAREZ, Fernando, *Manual Práctico para la Investigación y diagnóstico de las lesiones en las edificaciones, edit. La ley-actualidad, ISBN 9788481264173*

CRUZ Y CRUZ, Andrea*,* (2004), *Propuesta del plan de desarrollo académico para la facultad de Ingeniería de la Universidad Autónoma de Campeche, Campeche, Campeche, agosto.*

Plan de mantenimiento preventivo y correctivo de la infraestructura física y equipo, 2016, Universidad Veracruzana.

Manual de Procedimientos. Departamento de Preservación de Instalaciones, Gobierno del Estado de México, 2010.

Manual de mantenimiento 2013, INIFED "Instituto Nacional de la Infraestructura Física Educativa"

Normas ISO 9001 – 2015 infraestructuras y equipamientos.

NORMA MEXICANA NMX–R– 024–SCFI-2015 ESCUELAS - SUPERVISIÓN DE OBRA DE LA INFRAESTRUCTURA FÍSICA EDUCATIVA – REQUISITOS

NORMA 17_NOM-034-SCT-2-2003_01

ISSN:2410-4191

GUÍA DE PROCEDIMIENTOS Y TÉCNICAS PARA LA CONSERVACIÓN DE CARRETERAS EN MÉXICO

GIL-ALBERT VELARDE, Fernando, *Manual técnico de jardinería. I: Establecimiento de jardines, parques y espacios verdes,* s.f.p.
Mantenimiento y seguridad industrial, http://www.monografias.com/trabajos15/mantenimiento-industrial/mantenimiento-industrial.shtml, (fecha de consulta: 17 de agosto de 2016)

Mantenimiento mundial, http://www.mantenimientomundial.com/sites/mm/ (fecha de consulta: 13 de septiembre de 2016)
http://ediciones-sm.com.mx/?q=blog-como-la-infraestructura-escolar-influye-en-la-calidad-educativa. (fecha de consulta: 16 de mayo de 2017).

ISSN:2410-4191

Article ECORFAN-Bolivia Journal
June 2017 Vol. 4 No. 6 20-27

Knowledge of pregnant women on neonatal metabolic analysis. June 5 health center. La libertad 2014-2015

LASCANO, Carmen*†

Universidad Estatal Península de Santa Elena

Received February 14, 2017; Accepted June 20, 2017

Abstract

This research has as main objective to identify the degree of knowledge that they have pregnant women on newborn metabolic screening Health Center on June 5 Neonatal screening or test called the right heel is to give small heelstick, if the result of the study reveals that the baby has a congenital disease, the family will be informed and oriented for further treatment and care necessary for the case. a methodology for quantitative, descriptive and cross-sectional design was applied. The technique that was used is the survey with a questionnaire that was appointed a universe of 64 pregnant women. In the results it manifests that 61% has a deficit of knowledge about the importance of Neonatal Metabolic Screening due to limited school education of the population, while 16% related it to the prevention of communicable diseases, 14% others, and 12% with disability and early death. 66% do not know the means of diagnosis for metabolic diseases, 20% believe that the best alternative is the test Right Foot, 11% other media and 3% vaccines. 67.2% do not know the consequences of not taking the test, 22% associate it with physical disabilities and 11% other. It is therefore necessary to consider a proposal for the dissemination of the Neonatal Screening in the field of Health Post "on June 5," where talks will provide a specific simple language, to help pregnant women to a better understanding of Right Foot program.

Neonatal metabolic screening, pregnant women, knowledge

Citation: LASCANO, Carmen. Knowledge of pregnant women on neonatal metabolic analysis. June 5 health center. La libertad 2014-2015. ECORFAN Journal-Bolivia 2017, 4-6:20-27.

* Correspondence to Author (email: clascano@upse.edu.ec)
† Researcher contributing as first author.

Introduction

Congenital Metabolic Diseases (CMD) or Congenital Metabolism Errors (CME) are alterations in the DNA coding sequence variation, generating damage that has maladaptive consequences for the individual; they are monogenic diseases due to deficiencies or absence of a protein, that causes metabolic blockades and they are manifested clinically by toxic effect of the accumulated metabolite. At the world-wide level it has been demonstrated that 20 to 30% of the cases of Hospital pediatric mortality is based on a genetic disease. Analyzes of infant morbidity are even more striking; Between 2% and 3% of all newborns are congenital malformations, about 60% of miscarriages are caused by an embryonic genetic disorder, and 1.5% of all admissions to a general university hospital in the United States are Due to genetic diseases (statistics of the OPS_OMS). (1)

It is estimated that the incidence is 1 per 3,000 live births (LB) and 1 per 5,000 LB when there are screening programs. In developed countries, it constitutes 10% of pediatric hospitalizations and 37% of these pathological diseases can manifest in the neonatal period, 95% in the first year of life with slow progression encephalopathy. Neonatal screening in Ecuador takes place from 2011 as a state policy through the program of Neonatal Screening Right foot, under the rectory of the Ministry of Public Health. Which is aimed at early detection and thereby reduce neonatal morbidity and mortality from metabolic diseases. (2) In the province of Santa Elena, from 2011 of the Neonatal Metabolic Screening project to actual days, 12,241 tests for the early identification of metabolic diseases in neonates were carried out in all health centers. In 2013, in Santa Elena have been detected 4 positive cases: 3 of hypothyroidism and 1 of adrenal hyperplasia.

June 5 Health Center is located in La Libertad canton, attending an average of 10 pregnant women weekly, who after childbirth must return to the health post to perform the screening test on their newborn. Pregnant women attending the outpatient clinic of the Health Post June 5 present a lack of knowledge about the National Neonatal Metabolic Screening Program, as well as the deficit in the culture of prenatal care for pregnant women, which downplay this test necessary to assess the health status of newborns.

For this reason, it is necessary to formulate and implement a diffusion program on Neonatal Screening on right foot in order to apply to every newborn through the different media and in the various public sectors of the inflow sector of Health Center and thereby achieve the early detection of disabilities or death.

Neonatal Metabolic Screening

It is a set of studies which are performed in a necessary way to every newborn through obtaining drops of blood from the heel of the right foot of the neonate and collected on the Guthrie card with the aim of preventing, diagnosing and treating errors on time Innate metabolism that can cause over time mental retardation and other diseases that can even lead to death. (3)

Throughout the world, there have been cases of people who developed intellectual disabilities due to a metabolic alteration which, if it was detected from birth of the child, It could be avoided.

ISSN:2410-4191

Neonatal Metabolic Screening Classes

In basic neonatal metabolic screening, the four most prevalent diseases are found in each country. The sample is obtained from the right heel of the newborn foot. The semi-expanded sieve is performed by puncture of the right foot and can identify from six to twenty genetic diseases. The enlarged metabolic screening is carried out in developed countries and it is able to detect diseases such as acylcarnitines innate metabolism errors, organic acidemias, derivatives of the oxidation of the acids Fatty, congenital hypothyroidism, cystic fibrosis, galactocemia, adrenal hyperplasia which together form more than 21 diseases. (4)

Neonatal Metabolic Screening Techniques

Before collecting blood drops from the newborn, informed consent will be needed and the baby will need to be with the mother to perform the test. Extraction should be performed by the designated nursing staff for this function. To take the sample requires the Guthrie card which has 6 circles and asks for the data with the information of the newborn such as: date of birth, name, sex, gestational week in which was born, date of birth, birth weight, hospital where the baby was born, pediatrician, hospital or laboratory in which the study is to be performed, if it is an initial or confirmatory test. (5) The following steps are followed:

1. The baby should be kept upright so that the heel of the right foot is slightly elevated relative to the heart so that blood flow is continuous and clotting of the sample is prevented.

2. Heel puncture of the right foot is the way in which there are few problems to get the blood drops of the newborn, puncture in the lateral portion of the right foot never on the arch of the foot, of the Posterior curvature of the heel, or the central part of the foot. The depth of the puncture should be up to 2.4 mm and also not punctured in a place that has been punctured previously because it could be infected.

3. To obtain a sample of the newborn, warm the puncture site for 3 to 10 minutes with a soft cloth and moistened with warm water. The selected area of the right heel is then cleaned with 70% alcohol and wait until dry, if alcohol is exceeded, it should be dried with sterile gauze. To perform the puncture, hold the heel with the index finger and the left hand, and place the lancet perpendicular and perform the puncture.

4. If the lancet with which you do the puncture will enter a depth of more than 2.4 mm increases the risk of injury to the bone, that is why it is recommended to put the lancet parallel to the baby's heel, and to prick at a low angle since alone It is necessary to reach the capillary blood. The first drop to be removed should be cleaned with a dry sterile gauze and allow to form another large blood drop and place the filter paper allowing this drop to soak in the circle with a single application to a height of 3mm. To achieve more bleeding, it is advisable to press lightly on the puncture site.

ISSN:2410-4191

5. Fill in the remaining circles in the same way as in the previous step. Some substances or materials such as talc, alcohol, fat or dust can cause test results to fail. When all the circles on the card are already present Complete, it is necessary to dry them, in the drying tower alternately and in opposite direction, in a place at room temperature, without excess humidity during a time of two hours and that is when the metabolites are fixed and where they meet the appropriate conditions to be sent to the central laboratory .The card is save after drying in the envelope, checking the contents of the card.

Sample and optimum time

Blood drops should be collected on a filter paper card and indispensable from the fourth day until the 30th day of the newborn, and the card is required to complete the data correctly. The accepted samples are initiated to process and that which does not plasma with the necessary conditions is reported quickly so that a new sampling of blood drops was carried out.

Child (1 to 3 months). Medical assessment and sampling if required.

Child (older than 1 year). medical evaluation. (6)

Diseases detected by neonatal metabolic screening. Through the neonatal metabolic screening test, metabolic alterations can be revealed that, even without presenting symptoms, can affect the development of the child, which is why it is necessary to detect it on time to apply the appropriate treatment for the purpose of avoiding disabilities. The diseases can be detected are detailed below:

Congenital adrenal hyperplasia. It is a group of diseases where one of the causes is the deficiency of the enzymes that are involved in the origin or formation of the steroids reason why it produces an insufficiency in the elaboration of cortisol. This enzymatic bypass causes an increase in the preceding metabolites. The symptoms and signs of the disease are manifested later on the absence of secretion of cortisol and increase of androgens. (7)

Congenital hypothyroidism. It is a disorder of the thyroid gland due to insufficient elaboration of the thyroid hormone, or to a condition in its receptor, this anomaly can appear from the birth, although the signs and symptoms do not appear immediately, but after a time of operation of the thyroid gland, the disease may be "acquired" or caused by congenital defects that appear later. It is a disorder of the thyroid gland due to insufficient elaboration of the thyroid hormone, or to a condition in its receptor,

Galactosemi. It is caused by an alteration of a gene, due to the insufficiency of an enzyme called galactose-1 phosphate uridiltransferase. This is indispensable to transform the galactose of dairy foods into glucose. Usually, the body transforms galactose-1-phosphate uridyltransferase into glucose, which is then used to get energy. In the pathology, galactose is concentrated in the blood, causing changes in some organs such as the liver, kidneys, central nervous system, if this disease is not identified in time can become deadly. (8)

Phenylketonuria. It is a disease that is characterized by a congenital malfunction of the metabolism, which originates from a lack or insufficiency of the enzyme hepatic phenylalanine hydroxylase (PAH), this enzyme is responsible for transforming the phenylamine in tyrosine.

ISSN:2410-4191

Thus, if levels of phenylalanine increase, this protein can affect the nervous system, causing neuropsychiatric complications, and mental retardation.

Nursing care process

It is the way that guides the nursing professional to orderly, scientific, and humanistic work, focused on synchronously analyzing the developments and changes in the course or status of the patient, family and community chosen by the nurse or nurse. It is the method that guarantees quality care and warmth, for those who need care, in order to achieve rehabilitation, maintenance and improvement of health. The process of nursing care consists of five phases:

Assessment: Equivalent to the collection and analysis of information.

Diagnosis: identification of actual and potential problems, and data analysis.

Planning: the objectives are set and a plan of action is determined.

Implementation: means the implementation of the action plan.

Evaluation: detects the effectiveness of the plan and identifies the needs for change

Objectives

Main objective

To determine the level of knowledge that pregnant women have about Neonatal Metabolic Screening "right foot" at the Health Post June 5. La Libertad.

Specific objectives

To identify the knowledge of pregnant women about the importance and diagnostic means of the procedure of Neonatal Metabolic Screening.

To identify the consequences of noncompliance with the neonatal metabolic screening test in newborns.

To determine the knowledge of pregnant women about the metabolic diseases detected by the neonatal screening program.

To determine the knowledge of health personnel about the metabolic screening test.

Design a proposal for the implementation of the neonatal screening program.

Materials and methods

The research was descriptive because it is generally known the degree of knowledge that mothers who attend the June 5 Health Center on the neonatal screening program. It is transversal because the variables were observed and analyzed in a given period. It is quantitative, work with statistical methods it is sought to determine the degree of knowledge that pregnant women have on the test of the neonatal metabolic sieve. The bibliographical was also used because it allowed to gather information from books, magazines, encyclopedias, records and other documents referring to the subject of the Neonatal Metabolic Screening study To carry out this research, 64 pregnant women were taken from "June 5" Health Center. And to measure the variables Knowledge deficit of pregnant women on neonatal metabolic screening was taken as a sample to the same universe of study, being a minimum but demonstrative number, the results and interpretations were made through bars and statistical graphs.

ISSN:2410-4191

Results

You will see the information about level of knowledge of pregnant women and the diagnostic procedure of Neonatal Metabolic Test.

Alternatives	Quantity	Percentage
To prevent transmissible illness	10	16
To prevent disable and death	6	9
Others	9	14
Don´t know	39	61
Total	64	100

Table 1 Importance of neonatal metabolic screening Instrument: Survey

The chart shows that 61% of pregnant women do not know about the importance of screening, while 16% do so to prevent transmissible diseases, 14% answered that for other reasons, and only 9% answered correctly . As it is shown, the knowledge deficit of pregnant women in this subject, that, It is determined that screening is essential to prevent intellectual disability or death, consequently achieve a better prognosis of life, give the appropriate treatment, avoid emotional costs and economic benefits for the family (9).

Alternatives	Quantity	Percentage
Right foot test	13	20
Vaccine	2	3
Ultrasound	0	0
Others	7	11
Don´t know	42	66
Total	64	100

Table 2 Diagnostic means to detect metabolic diseases Instrument: Survey

As can be shown in the above chart, it is estimated that 66% of women who are pregnant do not know the diagnostic means of this test, only 20% know that it is the "Right Foot Test", 11% answered that they know other means, 3% By vaccines and the 0% answered that by ultrasound. Therefore the pregnant women's misunderstanding about this test was determined. It is concluded that it is used to detect metabolic diseases from an early age, it is also known as the right heel test or "right foot", which allows identifying and perform treatment prior to irreversible injuries from childhood or adolescence. (10)

Alternatives	Quantity	Percentage
Physical disability	14	22
Intellectual disability and death	0	0
Others	7	11
Don´t know	43	67
Total	64	100

Table 3 Consequences of not doing the right foot exam Instrument: Survey

The chart shows that 67% of pregnant women do not know the consequences of not doing the right foot exam, 22% say that it is physical disability, 11% other consequences and 0% does not answer the correct answer, it is necessary to inform with a specific and deep language about the consequences of the Metabolic Screening. It is concluded that in this procedure the sample is analyzed, to determine the existence or not of a metabolic alteration in the infant that can be the cause of intellectual disability. For this reason, it is recommended that mothers take their newborn child to the health establishment, from the fourth day of birth to the Neonatal Metabolic Screening test. (11)

ISSN:2410-4191

Conclusions

In the present study, a low level of knowledge of pregnant women was detected on the Neonatal Metabolic Screening procedure due to the limited (primary) school education of the population.

It was determined in the pregnant women, the lack of knowledge about the importance and means of diagnosis of Neonatal Metabolic Screening, although some received the information, did not understand it due to their level of preparation

Pregnant women do not know about the consequences of not doing the "Right Foot" test where it is inferred that this causes intellectual disabilities or the death of the infant or adolescent. Consequently, pregnant women have a low level of knowledge about the main metabolic diseases detected by this test.

Health workers give talks about these diseases, but patients do not consider it important.

Recommendations

To the staff of the Health Center June 5, to improve the information capacity of pregnant women through the planning of talks to pregnant women as part of prenatal care. Include in the lectures of the Neonatal Metabolic Screening test the importance of performing the test on the newborn with specific language specific for pregnant women.

Inform pregnant women of the consequences of Neonatal Metabolic Screening and in this way optimally control metabolic alterations to prevent intellectual disabilities in children and adolescents.

Apply the proposal to train about the National Neonatal Metabolic Screening Program so that they can efficiently inform pregnant women how to motivate them to attend with their newborns to perform the right foot test.

References

1. Caldwell J. Mortality in relation to the development of the Swiss economy: World Health Organization; 2003.

2. Ministry of Public Health. Guide to clinical practice. Retrieved from "Clinical Practice Guide ed .; 2013.

3. Meza A. Clinical significance of the neonatal sieve and methodologies most used in Mexico, group MexLab .; 2002.

4. Cepeda M. Neonatal sieve. 17th ed .; 2010.

5. Hidalgo M. Neonatal research and its incidence in the identification of congenital diseases; 2013.

6. MSP. Neonatal Metabolic Screening. [On-line].; 2012. Available from: HYPERLINK "https://www.vicepresidencia.gob.ec/el-tam-nacion-neonatal-aspira-prevenir-251-casos-de-discapacidad-enlectual-al-año/" https: // www. Vicepresidencia.gob.ec/el-tamizaje-neonatal-aspira-prevenir-251-casos-de-discapacidad-inte-al-año/.

7. Colombo M. Inborn errors in the metabolism of the child. Print: Salesianos, S.A. ed ; 2003.

8. Badash M. Langone NYU Medical Center. [On-line].; 2012. Available from: HYPERLINK "http://www.med.nyu.edu/content?ChunkIID=104041" http://www.med.nyu.edu/content?ChunkIID=104041.

ISSN:2410-4191

9. Villegas J. Importance of neonatal screening, Right to live at a disadvantage; 1997.

10. Noguera R. Manual of Pediatrics. Noguera edition . Costa Rica; 2009.

11. Gomella R. Neonatology. Panamerican Medical Edition; 2009

ISSN:2410-4191

Article ECORFAN-Bolivia Journal
June 2017 Vol. 4 No. 6 28-47

Necrotic and Apoptotic Activity of the Protein Extract from *Mangifera indica* Mesocarp in Human Lymphocytes in Culture

HERBERT-DOCTOR, Luis Alfredo´†, COUTIÑO-RODRÍGUEZ, Elda Ma. del Rocío´´*. PALMEROS-SÁNCHEZ, Beatriz´ and SAMPIERI RAMÍREZ, Clara Luz´´

´ Universidad Veracruzana, Faculty of Biology, Xalapa, Ver, México
´´ Universidad Veracruzana, Institute of Public Health, Xalapa, Ver, México

Received January 25, 2017; Accepted June 10, 2017

Abstract

Mangifera indica, a species of mango in the Anacardiaceae family, in some cases may cause dermatitis and anaphylaxis, in some people who touch the tree or intake the fruit due to its content of allergenic compounds such as polyphenols and proteins with lectin activity. In aim of this study, was to analyze if the protein extract of the *Mangifera indica (mango manila=mango)* mesocarp with lectin activity that recognizes glucose, galactose and glucosamine, has necrotic and apoptotic effect in human lymphocytes in culture by identified proliferation by MTT assay and cytotoxicity by the presence of enzymes involved in necrosis and apoptosis such as, acid sulphatase, phosphatase and caspase-3 and apoptotic bodies in the nuclei by staining with iodide propidium, as well as the quantification of extracellular calcium. Results: Protein extracts of mango at low concentrations showed an increase in proliferation, while at high concentrations was a cytotoxic (necrotic-apoptotic) depending on the time of exposure. At low exposure times increased the activity of sulfatase and acid phosphatase and caspase-3, whereas high exposure times increased caspase-3, the amount of extracellular calcium and the formation of apoptotic nuclear bodies, therefore the results suggest that the protein extract of mango with lectin activity, depending of the concentration and exposure time, have effect on lymphocyte proliferation and cell death by necrosis and apoptosis.

Proteic extracts, lectins, necrosis, apoptosis, acid sulphatase, acid phosphatase, caspase-3

Citation: HERBERT-DOCTOR, Luis Alfredo, COUTIÑO-RODRÍGUEZ, Elda Ma. del Rocío. PALMEROS-SÁNCHEZ, Beatriz and SAMPIERI RAMÍREZ, Clara Luz. Necrotic and Apoptotic Activity of the Protein Extract from *Mangifera indica* Mesocarp in Human Lymphocytes in Culture. ECORFAN Journal-Bolivia 2017, 4-6: 28-47.

* Correspondence to Author (email: ecoutino@uv.mx)
† Researcher contributing as first author.

Introduction

Mangifera indica covers 69 species, which are spread over different geographical areas, determining its genetic variability. It is a species in the Anacardiaceae family, including some poisonous species [1, 2]. The consumption of the fruits of these species causes allergic responses in certain population groups [3, 4], some anaphylactic. One case describes the symptoms of edema, tongue swelling and rash on arms and sides exhibited by a fruit vendor after eating a mango [3, 5]. Cases were children develop dermatitis after climbing mango trees, as well as rashes on the lips and face after eating the fruit have been also reported [3]. On the bark of *Mangifera. indica* the presence of different secondary metabolites, including benzoic acid, methyl gallate, propyl gallate, mangiferin, mangiferol, catechin, epicatechin and propylbenzoate, which are used to prepare medicinal products because their antioxidant, anti-inflammatory and analgesic capacity has also been detected [6, 7]. Furthermore, it has been reported that on leaves, peel and fruit there are proteins possessing lectin activity [8, 9].

Lectins are mainly present in the cotyledons and endosperm of plants; they are widely distributed from bacteria to vertebrates. They are non-immune origin proteins that recognize 20mM of specific free or present carbohydrates on the cell surface and they have the ability to agglutinate cells [8, 9, 10]. Therefore, in order to identify these proteins haemagglutination tests (HA) of erythrocytes are used, among others [9, 10, 11, 12]. The biological activity of the lectins is wide and they play an important role in proliferation and cell adhesion, essential for some viruses and bacteria to develop pathogenicity during the infectious process. They are also involved in cellular transformation, citotoxicity and cellular hypersensitivity [8, 10, 12, 13, 14, 15].

Hypersensitivity to species of the Anacardiaceae family has been investigated in people with a history of sensitivity to pistachio by immunoglobulin-E detection (IgE), type 1hypersensitivity to five proteins 9, 41, 43, 70 and 80kDa (kD) in *Mangifera indica* pulp, identified as allergens was found [1]. The presence of two proteins of 24 and 28 kD lectin activity by an immune blot test of extracts from *Mangifera indica* has also been reported [5].

In leaves, bark and peel of *Mangifera indica*, the presence of three bands of 30kD and 50kD, 15 kD has been reported, as well as an additional 27kD in a graft, in which the 30kD band showed lectin activity and specificity for glucose and N-acetyl glucosamine and N-acetyl galactosamine, sugars present within chitin derivates [9].

In a preliminary study that used type O male blood, lectin activity in various fruits with gastrointestinal activity was found, particularly the protein extract from guava, whereas for mango extract nothing was found [8]. However, in another study with the mature mesocarp of mango, a different human erythrocyte hemagglutination activity depending on sex gender was found [16].

The lectin specificity, in the hemagglutination test, in the case of male gender only recognized the type A blood with 1.24 hemagglutinating units per microgram of protein (UHA/µg protein), whereas in the female case it only recognized the type O with 9.92 UHA/µg. In the same study, a similar recognition for fucose, glucosamine and galactosamine sugars for both female Type O and male Type A was determined.

The molecular weights of the proteins found in the mango extract were 250, 149, 54, 24 and 18 kD [16].

ISSN:2410-4191

Moreover, it is widely known the mitogenic effect on human lymphocytes, most lectins such as phytohemagglutinin [9, 12] as well as the cytotoxic effect of RIP type lectins have the ability to inactivate the ribosome [17]. There are also reports on lytic type cytotoxic effects on neutrophils after being exposed to this type of protein [13]. Other studies have shown that some lectins, like those of the mistletoe (ML-I), with recognition for d-galactose enables a signaling caspase pathway involved in the apoptotic pathway [18]. It is also known that lectins isolated from *Boleptosis Leucomelas* with a molecular weight of 15 kD and recognition for diacetil chitiobiosa a chitin derivates also induce apoptosis [18, 19].

Cytotoxicity by apoptosis.

Apoptosis plays a key role in the survival of organisms and for proper functioning of the immune system, among others [20, 21]. In lymphocytes apoptosis can be induced by two or more different ways. the first one associated with the mitochondrial permeability (intrinsic pathway), which causes the output of various proteins into the cytoplasm, including C cytochrome, which acts as a cofactor of a protein called "apoptosis 1 activating factor" (Apaf 1), involved in the activation of caspase-9, initiating the apoptotic effector pathway comprising degranulation of the core with participation of caspase-3.

The second apoptotic pathway (extrinsic pathway) is triggered by the binding of death receptors such as Fas/CD95, between the target cell and effector cell that induces activation of proteolytic enzymes, caspases [20, 21, 22].

In apoptosis activation via receptor serine/threonine phosphatases or PP1 type phosphomono esterases are involved.

They are transmembrane esterases also known as acid phosphatase or alkaline phosphatase, because of their broad range of pH activity ranging from 5 to 9.5 and they have two binding ions. Thus, they are considered as metalloprotease, which is involved in signal transduction, activated by receptors associated with growth, differentiation and apoptosis [23, 24, 25].

It is noteworthy that these phosphomono esterases are indicators for soil quality and have roles in many organisms from bacteria to plants. In some poisonous species, such as crotalid and elapidae, they are associated with their toxin activity and produce more alkaline phosphatase, whereas in ophidian they produce both enzymes, and in some aphidae they produce acid phosphatase, which is a potent allergen. [23, 25, 26].

Cytotoxicity by necrosis

Necrosis is an acute and massive process comprising the loss of cell viability as a result of pathological conditions due to acute exposure to chemical and physical compounds, microbes and toxins. Necrosis is characterized by alterations in the integrity of the membrane, cell lysis and rupture of cellular organelles, releasing their contents which triggers the immune response and induces inflammatory processes [21, 22]. In necrotic cytotoxicity mediated by lymphocytes the target cell undergoes osmotic imbalance because the input and output of ions, resulting from the formation of pores on the membrane, lead to cell lysis due to the releasing of cytotoxic factors, immersed in granules with acid pH containing *perforin* (proteins that interact with phospholipid membranes, causing pores) and *granzimez* (serine-esterases, carboxypeptidases, cathepsin D, aryl-sulfatases and beta-glucuronidase) [21, 23].

ISSN:2410-4191

The *granzyme* are enzymes located within cytoplasmic granules of T cytotoxic-lymphocytes and natural killer cells (NK cells), which are released as a response upon interaction with a target cell. This family of proteases is involved in the activation of caspases by expression of the Fas/FasL receptor, and also in the formation of pores, a process performed in the necrotic cytotoxic response [21, 23].

The aim of this work is to identify the type of cytotoxic effect of mango protein extracts with lectin activity in lymphocytes culture through the enzymatic activity involved in necrosis and apoptosis death, and calcium realese.

Material and methods

Extraction of total proteins from mango

Four ripe of mangos were macerated in mortar with buffer of 10 Mm pH 7.4 phosphates. The mash was filtered with gauze and stored at 4 ºC. In order to remove the lipid content acetone was added in a 1 to 4 proportion overnight. The acetone extract was centrifuged at 7,000 rpm. for 15 minutes (min.) in a Rotina 35R Hettich centrifuge, while the precipitate was resuspended in 150 mL of phosphate buffer solution that was called protein extract from mango and used to determine protein quantifications, lectin activity by haemagglutination tests [8], identification of bands in sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), evaluate cytotoxic activity in cell culture, or enzymatic activity of enzymes as acid phosphatase, alkaline phosphatase, acid sulfatase, esterase and caspase-3.

Quantification and Visualitation of proteins from mango

Protein quantification

The method of Bradford 1976 [27] was used for protein quantification. The analysis was performed on a 96-well micro plate. Readings were obtained using a Spectramax-190 spectrophotometer with a wavelength of 593 nm. A standard curve of bovine albumin was used.

Electrophoresis analysis

Both proteins and their molecular weights were determined by SDS- PAGE at 10% using a Molecular marker (Dual Color cat.161-307 4BIO-RAD). Two gels were run simultaneously, one to visualize the proteins and the other for carbohydrates. The gels were stained with Coomassie blue and Schiff's reagent respectively.

Lectin activity identification in protein extracts from mango

Lectin activity was qualitatively determined by the ability to agglutinate erythrocytes and lymphocytes. The degree of agglutination was classified as: high (+++), moderate (++), light (+). We also confirmed the specificity of lectin activity by agglutination inhibition using competition of the extract with standard sugars: glucose, glucosamine and galactosa (1mM), which have been reported to recognize m*ango* lectins in Type O erythrocytes [16].

ISSN:2410-4191

Lymphocyte culture

Lymphocytes were extracted by centrifugation at 1,500 rpm, from 10mL of peripheral blood from a male healthy donor of the Rh O^+ type and cultured in 100 mL of McCoy 5A medium with phytohemagglutinin (2 µg/mL) at 37 ºC. After 48 hours of incubation, the medium was distributed into four Falcon type tubes, which were treated with the protein extract from mango at different concentrations: 0.076, 0.771 and 3.804 µg/mL using the phosphate buffer solution as control (500 µL). After aliquot sampling at 30 minutes, 2 and 24 hours, the culture was centrifuged at 1,500 rpm/10 min., and the cell pellet was washed with saline solution and re-suspended in 500 mL of buffer solution for the several tests.

Cell proliferation

To determine the cell proliferation induced by the mango protein extract, in lymphocytes. The Methylthiazolyldiphenyl-tetrazolium bromide (MTT) (cat. 465002 Roche 1465526) cell proliferation kit was used on a 96-well micro plate, where each well contained 25 µL of the treated culture; 25 µL of saline solution (0.9 %) and 10 µL of MTT reagent. After four hours of incubation at temperature with or without stirring, 500 mL of solubilizing solution was added. According to provider, abs at 500 and 690 nm (OD) was determined on a Spectra Max 190.

Enzymatic analysis

For determination of activity enzymatic 10 µL of the sample from the treated lymphocyte culture were placed in micro plates, as well as 10 µL of substrate and 130 µL of the appropriate buffer solution for each enzyme and their respective reaction controls (Table 1).

This mixture was incubated for 30 at 37ºC min. Then the absorbance ratio was determined at 410 nm for substrates coupled with p-nitrophenol chromophore and 415 nm for p-nitroaniline. Enzymatic activity was determined using the extinction coefficient for each substrate used according to the following equation:

$$U = Do / Ɛ * T * V \quad (1)$$

Units (U) = µM of the substrate converted by min^{-1} = specific activity per µg of $protein^{-1}$

Where: Ɛ = extinction coefficient, T = time and V =volume. Ɛ of p-nitrophenyl=10.8. Ɛ of p-nitroaniline = 18

Enzyme	Buffer	Substrate
Acid phosphatase	Acetate buffer 20 mM pH5	p-Nitrophenyl-phosphate 20 mM
Alkaline phosphatase	Sodium bicarbonate buffer 20 mM pH 8	p-Nitrophenyl-phosphate 20 mM
Sulfatase	Acetate buffer 20 mM. pH 5	p-Nitrophenyl-sulphate 20 mM
Caspase-3	Assay buffer20 mM HEPES, CHAPS 0.1%, DTT 5 mM y EDTA 2 mM pH 7.4	N-acetyl-asp-glu-val-asp-p-nitroanilide 15 mM
Esterase	Phosphate buffer 20mM + 0.1% triton pH 7.4	p-Nitrophenyl-acetate 20 mM

Table 1 Substrate and buffer solution used for determining the activity of every enzyme studied

The enzymatic activity was also conducted in the extract from mango to rule out they were involved in lymphocyte response.

ISSN:2410-4191

Quantifying extracellular calcium

The Calcium Arsenazo (ELITECH 08-3327) kit was used to determine the extracellular calcium concentration of lymphocytes exposed to the extract from mango . The assay was performed on an ELISA micro plate, where 10 µL of the supernatant of the cell sample of the exposed lymphocytes (previously centrifuged at 2,000 rpm) and 150 µL of Arsenazo were added. The plate was read at a wavelength of 650 nm after 75 seconds of incubation. A target with 10 µL of water and 150 µL of Arsenazo, and a standard with 10 µL of Ca^{+2} with a concentration of 100 mg/L or 100 µg/µL and 150 µL of Arsenazo was placed as controls. The Ca^{+2} concentration was quantified using a standard curve according to provider.

The calcium concentration was identified in the protein extract from the mango mesocarp.

Nuclei staining

The lymphocytes treated with the extract from mango were fixed on a slide and permeabilized for 5 minutes using cold acetone. Then they were stained for 10 min., with propidium iodide solution (1µg/mL). The morphology of nuclei was observed using a NIKON H55OL fluorescence microscopy at 100x and 40x.

Statistical analysis

For analysis of the results the T-test was conducted to compare groups regarding the control values. A Pearson correlation was also performed, for normally distributed variables, using the SPSS statistical software version 18. The values with a $P \leq 0.05$ were considered as significant.

Results

Characterization of the protein extract from mango

The protein extract from mango was characterized regarding the basal content of proteins, and calcium (Table 2) and the activity of the enzymes studied in order to rule out they were involved in the response of the exposed lymphocytes (Table 3).

Extract	Protein	Calcium
Mango	188.2 µg/mL	5.6 µg/mL

Table 2 Basal calcium and protein concentration in the mango extract

In 1 mL of protein extract from mango there is 188.2µg of protein and in this one 5.6 µg of calcium based on protein concentrations used: 0.076, 0.71 and 3.6 µg/mL. The amount of added calcium does not interfere in the results.

The values of enzyme activity in the protein extract from the mesocarp of mango are below the values of the growth medium used to seed lymphocytes.

Units $x10^{-3}$	ACP	ALP	ACS	CAS-3	ES
Medium	2.03	41	4.97	0.66	59
*9.41 µg/mL	0.47	0.40	0.55	0.24	0.25

Table 3 Basal enzymatic activity in the medium and within the protein extract from mango, Acid phosphatase (ACP), Alkaline phosphatase (ALP) Acid sulphatase (ACS), Caspase-3 (CAS-3), Estarease (ES). *p-ext Mango

ISSN:2410-4191

Determining the presence of lectins in the protein extract from mango

In the following microscopic photographs the presence of protein with lectin activity in the protein extract of mango is corroborated. It was an increased agglutination in lymphocyte test in the extract with a concentration of 0.771µg (Figure 1) was observed.

Figure 1. A). Lymphocytes in the absence extract from mango. B). Cells agglutinated in the presence of extract from mango. Last seen at 100X and stained with propidium iodide 40X in presence of mango extract.

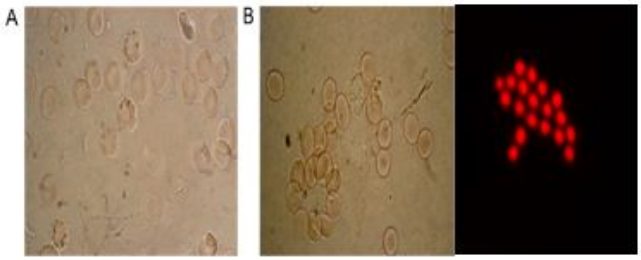


Figure 1

When the protein extract competes with different sugars, a greater specificity for galactose was observed; as the agglutination of both erythrocytes and lymphocytes decreased compared with other sugars (Table 4).

cells	Saline solution	Extract	Glucose	Glucosamine	Galactose
LYM	-	xxxx	xx	xx	x
ERY	-	xxx	xx	x	x

Table 4 Degree of agglutination for both erythrocytes and lymphocytes in the presence of protein extract from mango competing with different sugars. A greater number of "X" determines a greater agglutination, High (+++), moderate (++), light (+) agglutination. Lymphocytes (LYM), Erythrocytes (ERY)

Detecting protein bands by electrophoresis

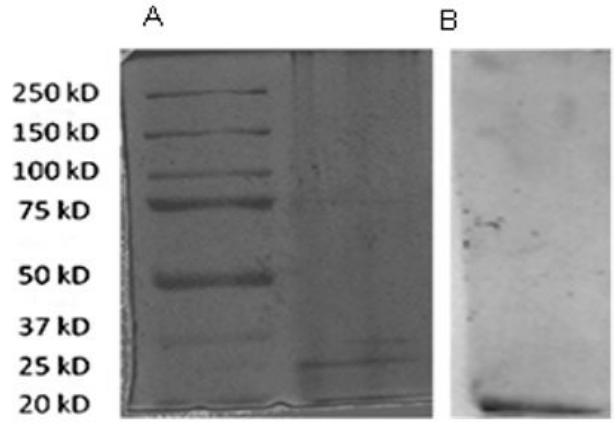


Figure 2 Polyacrylamide gel at 10% stained with Coomasin and Schiff´s reagent´s A). With Coomassie blue. Rail1: Dual Color (cat.161-3074) BIO-RAD molecular weight marker. Rail2: 50µg of protein from the protein extract from mango. B). With the Schiff's reagent

In the protein detection by Coomassie blue, we found the most representative two proteins with molecular weights of 20 and 25 KD and two less sharp bands with molecular weights of 75 and 34 kD. (Figure 2A). In the Schiff's reagent staining, we observed a glycosylated band with a molecular weight about 20 Kd (Figure 2B).

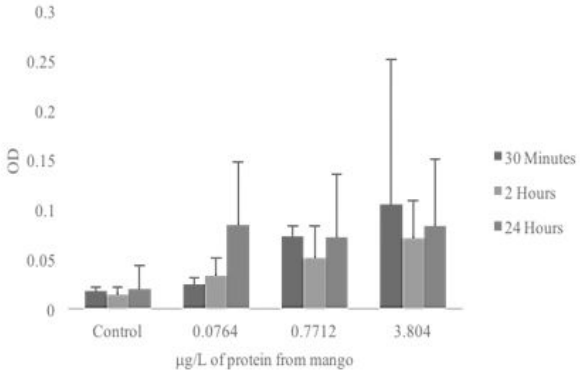
Effect of protein extracts from mango on lymphocyte proliferation

Cell proliferation

The effect caused by the protein extract in lymphocytes, with respect to the response in the proliferation and/or mitochondrial metabolic activity using the MTT technique, showed after 30 min. and 2 horas (hrs.) a significant linear response for all concentrations.

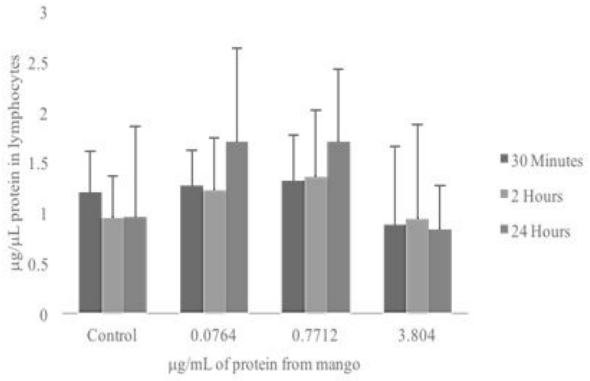
ISSN:2410-4191

However, after 2 hrs., the response was less than that observed at 30 min; and after 24 hrs., only the lowest concentration of 0.076 µg/mL showed a linear increase overtime, whereas both concentrations of 0.771 µg/mL and 3.804 µg/mL despite they increased regarding control, not show significant changes with respect to grow that 2hours, what is more, after 30min. they decreased (Graphic 1). This suggests that at 30 min., a change in mitochondrial activity in most concentrations does not correspond to the proliferation. activity detected at 24 hrs., only for the lowest concentration of 0.076 µg/mL.



Graphic 1 Effect of protein extract from mango on lymphocytes treated at different concentrations and exposure times in the MTT test used for proliferation, viability and/or mitochondrial activity

Regarding the protein concentrations, in the first two concentrations (0.0764, 0.7712 µg/mL) we found an increased protein concentration in lymphocytes exposed for 2 and 24 hrs., according to the control, whereas at the dose of 3,804 µg/mL are markable decrease, below the control from 30 min., to 24 hrs., was observed probably by the proliferative and cytotoxic effect at the concentrations of 0.0764 and 3.804 µg/mL (Graph 2).



Graphic 2 Quantification of protein for lymphocytes exposed to various concentrations and exposure times compared with the protein extract from mango

After analyzing statistically, the data using the T-test, it showed that both the exposure time and the concentration of protein extract are crucial to the effect on proliferation or mitochondrial activity of lymphocytes with the MTT test. At 24 hrs., the highest concentration of 3,804 µg/mL was induced a significant decrease compared to the control, P=0.048. The increase in other concentrations were so close to be marginal with P=0.056; while at 2 hrs., all concentrations showed a significant increase with P=0.008, for the concentration of 3.804 µg/mL; P=0.01, for the concentration of 0.771 µg/mL; and finally P=0.032, for the lowest one 0.076 µg/mL, suggesting that at 2 hrs., all concentrations had an effect on mitochondrial metabolic activity measured by the MTT test to determine activity for the proliferation or cell viability at 24 hrs., with concentrations of 0.0764 and 3.804 µg/mL, respectively.

Regarding protein concentrations, at 24 hrs., the concentration of 0.771 µg/mL showed a significant increase, P=0.03, while 0.076 µg/mL had a marginal tendency P=0.09; 0.771 µg/mL from 30 min., showed a slight significant increase P=0.01.

ISSN:2410-4191

However, the highest concentration of 3,804 µg/mL showed in all exposure times are markable but not significant (Graph 2) decrease, a contradictory result to that observed with the MTT test that showed a significant increase with P=0.048 (Graph 1), which is not reflected in the protein concentration, possibly due to the effect on mitochondrial activity and viability (cytotoxicity) rather than proliferation level as would be the case of the results with concentration of 0.771 µg/mL, 0.076 µg/mL in which the value of the MTT and the protein concentration at 24 hrs., were increased.

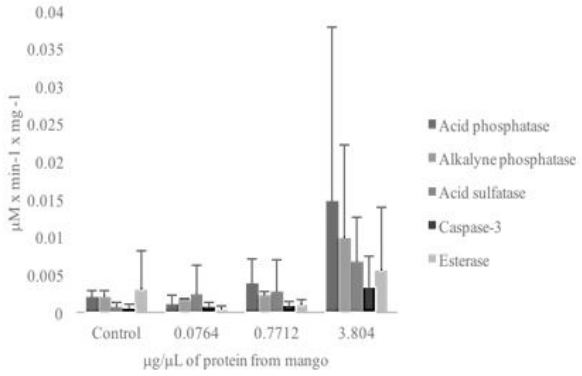
Effect of protein extracts from mango on the enzymatic activity of lymphocytes culture

Analysis of enzymatic activity

Determining the enzyme activity studied was evaluated for each of the concentrations and exposure times and expressed by protein concentrations.

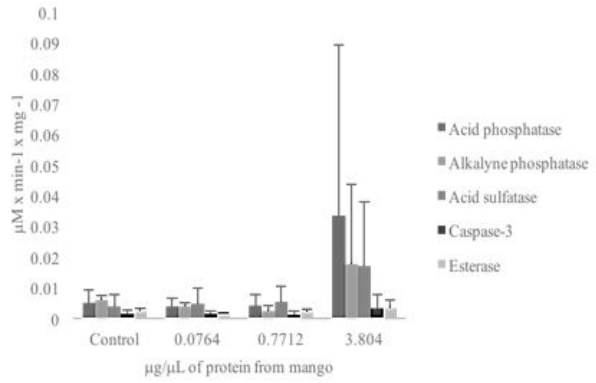
At the highest concentration of 3,804 mg/mL after 30 min., we observed a high activity of all enzymes, especially acid phosphatase and alkaline phosphatase and caspase-3. Only the marker enzymes for necrosis and apoptosis were shown significant; acid phosphatase and sulfatase acid with P=0.013 and P=0.028, respectively (Graphic 3), as well as in caspase-3 activity with P= 0.05; at 2 hrs., except for a decrease in both esterase and caspase-3, the other ones increased almost twice their activity (Graphic 4), in contrast at 24 hrs., caspase-3 increased P=0.002 and sulfatase acid marginally P=0.12, contradictorily acid phosphatase decreased significantly P= 0.05, as well as alkaline phosphatase with a marginal P=0.08 (Graphic 5), possibly due to the cytotoxic apoptotic/necrotic response.

Both concentrations of 0.076 µg/mL and 0.771 µg/mL, after 30 minutes, showed no significant changes in the enzymatic activity (Graph 3 and 4), there was only an insignificant increase in esterase activity, while at 2 hrs., a significant decrease was observed in esterase activity in the concentration of 0.076 µg/mL with P=0.025 and a marginal decrease in alkaline phosphatase activity with P=0.08, for both concentrations, whereas at 24 hrs. In the concentration of 0.076 µg/mL, sulphatase and caspase-3 activity increased and decreased with a value of P=0.03 and P=0.05 respectively (Graphic 5). The results suggest a necrotic/apoptotic cytotoxic effect in the highest concentration at 30 min., and apoptotic at 24 hrs., while the lowest concentration produced necrotic cytotoxicity at times longer than 24 hrs.

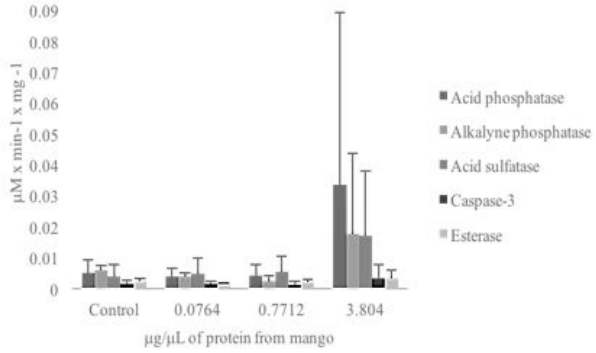


Graphic 3 Activity specific of the acid phosphatase, alkaline phosphatase, acid sulfatase, and esterase and caspase-3 enzymes in lymphocytes exposed to protein extract from mango for 30 min

ISSN:2410-4191



Graphic 4 Activity specific of the acid phosphatase, alkaline phosphatase, acid sulfatase, and esterase and caspase-3 enzymes in lymphocytes exposed to protein extract from mango for 2 hrs



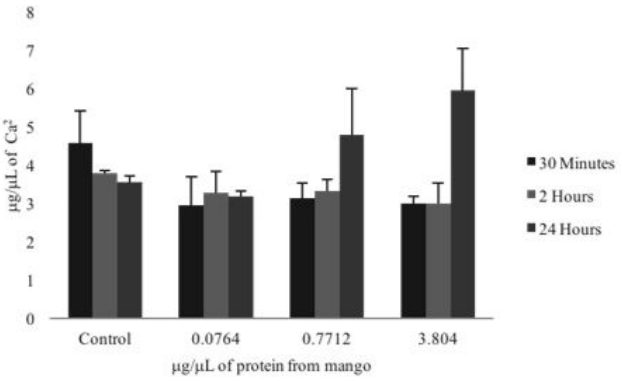
Graphic 5 Activity specific of the acid phosphatase, alkaline phosphatase, acid sulfatase, and esterase and caspase-3 enzymes in lymphocytes exposed to protein extract from mango for 24 hrs

Effect of mango protein extract on the amount of extracellular calcium in the lymphocytes cultures

Quantifying extracelular calcium

Calcium quantification in the supernatants of control samples after centrifugation showed that the amount of Ca^{+2} is slightly higher at 30 min., unlike the decrease at 2 hrs., and 24 hrs.

The amount of external calcium in the supernatants of control groups was not significant in the different times. The amount of extracellular Ca^{+2} decreases in all concentrations after 30 minutes with a marginal tendency P=0.06 compared to the control, suggesting they move inside the cell, which was maintained at 2 hours with the concentrations of 0.076 µg/mL and 0.771 µg/mL, the latter being significant with P=0.044. Contradictorily, at 24 hours an increase was observed in the extracellular calcium of concentrations 0.771 µg/mL and 3.8 µg/mL significant with the highest concentration P=0.033, suggesting they move towards the outer part of the cell. The effect of calcium according to time was marginal with P=0.075 (Graphic 6).



Graphic 6 Extracellular calcium quantification in lymphocytes exposed to different concentrations and times of the protein extract from mango

Effect of mango protein extract on the morphology of the nucleus

Nuclei staining

Figure 3 shows that in the A1, B1 and C1 photographs the nuclei remain intact and are not agglutinated, while in A2, B2 and C2 nuclear bodies close to agglutinated cells are observed, while in A3, B3, C3, A4, B4 and C4, apoptotic bodies are observed.

ISSN:2410-4191

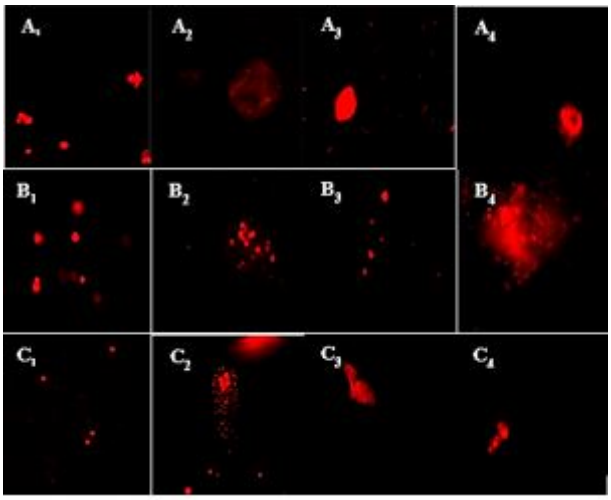


Figure 3 Nuclei of lymphocytes exposed to different doses and times in the extract protein from mango stained with propidium iodide. A (30 minutes), B (2 hours), C (24 hours); $_1$ (control), $_2$ (10 L), $_3$ (100 L) $_4$ (500 uL). A_1-A_4; B_1-B_4 photographs were taken at 100x. C1-C4 photographs were taken at 40x

Correlations						
		Dose	Time	Prot	ACP	ACS
Dose	Pearson Correlation				.292*	.352*
	Sig. (bilateral)				0.044	0.014
Time	Pearson Correlation					
	Sig. (bilateral)					
Prot*	Pearson Correlation					
	Sig. (bilateral)					
ACP*	Pearson Correlation	.292*				.750***
	Sig. (bilateral)	0.044				0.0001
ACS*	Pearson Correlation	.352*			.750***	
	Sig. (bilateral)	0.02			0.0001	
ES*	Pearson Correlation			-.328*	.282	
	Sig. (bilateral)			0.023	0.053	
ALP*	Pearson Correlation	.279			.954***	.745***
	Sig. (bilateral)	0.06			0.0001	0.0001
CASP-3*	Pearson Correlation	.379**	.287*	-.295*	.660***	.520***
	Sig. (bilateral)	0.018	0.048	0.042	0.0001	0.0001
Ca*	Pearson Correlation				-.261	-.328*
	Sig. (bilateral)				.074	.023
MTT	Pearson Correlation	.505***			.321*	.364*
	Sig. (bilateral)	0.001			0.026	0.011

Correlations						
		ES	ALP	CASP-3	Ca	MTT
Dose	Pearson Correlation		.279	.379**		.505***
	Sig. (bilateral)		0.055	0.008		0.0001
Time	Pearson Correlation			.287*		
	Sig. (bilateral)			0.048		
Prot*	Pearson Correlation	-.328*		-.295*		
	Sig. (bilateral)	0.023		0.042		
ACP*	Pearson Correlation	.282	.954***	.660***		.321*
	Sig. (bilateral)	0.053	0.0001	0.0001		0.026
ACS*	Pearson Correlation		.745***	.520***	-.328*	.364*
	Sig. (bilateral)		0.0001	0.0001	0.023	0.011
ES*	Pearson Correlation		.290*	.649***		.301*
	Sig. (bilateral)		0.045	0.0001		0.038
ALP*	Pearson Correlation	.290*		.626***		.294*
	Sig. (bilateral)	0.045		0.0001		0.043
CASP-3*	Pearson Correlation	.649***	.626***			.552***
	Sig. (bilateral)	0.0001	0.0001			0.0001
Ca*	Pearson Correlation					
	Sig. (bilateral)					
MTT	Pearson Correlation	.301*	.294*	.552***		
	Sig. (bilateral)	0.038	0.043	0.0001		
N = 48						
*. The correlation is significant at level 0. 05 (bilateral).						
**. The correlation is significant at level 0. 01 (bilateral). ***The correlation is significant at level 0.001 (bilateral).						

Table 5 Statistical analysis using SPSS version 18. A Pearson correlation for normally distributed data was performed.
*Abreviatures: Protein (Prot), Alkaline phosphatase (ALP) Acid phosphatase (ACP), Estarease (ES), Acid sulphatase (ACS), Caspase-3 (CAS-3), Calcium (Ca), Methylthiazolyldiphenyl-tetrazolium bromide Test (MTT)

Discussion

It was confirmed that the protein extract from mango pulp, as expected by the background, possesses lectin activity [16] and recognizes both erythrocytes and lymphocytes and shows specificity for galactose, as well as for glucosamine, fucose and glucose previously detected with the hemagglutination inhibition test [16].

ISSN:2410-4191

The electrophoretic pattern for the most proteins we found (25 and 20 kD) and those lacking visibility (34, 75, 150kD) is close to those found in previous studies on mango pulp (250, 149, 75, 54, 24, 18 and 15 kD) and 80, 70, 43, 41 and 9 kD [1, 16]. Some authors report the presence of bands around 15, 30 and 50 kD and the protein band around 30kD with lectin activity and glucose and *N*-acetylglucosamine and *N*-acetylgalactosamine recognition, as well as galactose recognition [5] on peel and leaves of mango.

While other studies on mango pulp have reported the presence of two bands with lectin activity of 25 and 28 kD [5]. These different proteins patterns, may be due to its glycosylation states.

The carbohydrate content of the electrophoretic pattern of proteins showed a single band of approximately 20 kD highly glycosylated, perhaps a proteoglycan, whose presence has not been reported by other authors in extracts from mango.

However, could be the case that the 18 or 20 kD protein band is highly glycosylated and perhaps is responsible for the necrotic response to high and low concentrations observed in this study, as it is one of the principal proteins and it might be involved in hypersensitivity reactions that have been reported.

Nevertheless, reports on pistachio, which also shows cross reaction for mango allergies, suggest the presence of 5 protein bands 9, 41, 43, 70 and 80 kD with allergenic activity and they might be involved in hypersensitivity [3, 5].

The proliferation results at 24 hours with MTT test and the amount of protein concentrations with 0.076 and 0.77 µg/mL suggest an increase in the number of lymphocytes regarding control, indicator of mitogenic effect(s) of lectin(s). The marginal increase in the MTT test with P=0.06 and in the protein concentration P=0.09 at low concentration 0.076 µg/mL corroborate the proliferative effect of lectins and, hence, perhaps that is why the significant increase in the protein concentration of P=0.038, with that of 0.77 µg/mL. However, contradictorily to these concentrations a significant increase for acid sulfatase P=0.03 and decreased activity of acid phosphatase and basic, as well as caspase-3 both with P=0.05, are also detected. It may be the case that increased acid sulfatase besides being involved in necrosis; it might be involved in proliferation, as well as decreased caspase-3 related to MTT. Regarding the higher concentration of 3.804 µg/mL, the significant results observed with the MTT test in all of the exposure times are due to the cytotoxic effect resulting from the mitochondrial activity because of the increased activity of caspase-3 since 30 min., with P=0.05 and marginal P=0.06 at 24 hrs., and not by an increase in proliferation by the fact that was not any significant increase in the activity of MTT at 24 and 2 hours of exposure P=0.048 and P=0.01, respectively, also it is not related to an increase in the amount of protein as from 30 min., to 24 hours a decrease was observed. Besides, a decrease in lymphocytes and lysate lymphocytes was detected with a microscope and by nuclei staining (Figure 3), which indicates loss of lymphocytes since 30 min., due to the necrotic cytotoxic effect, as well as apoptotic, corroborated by the significant increase at 30 min., in both necrosis indicator enzymes: acid sulfatase and acid phosphatase with P=0.013 and P=0.028, respectively (Graph 3), as well as the increase in caspase-3 with P=0.05.

ISSN:2410-4191

While at 24 hours it was more apoptotic because an increased caspase-3 with P=0.002. Interestingly enough, we detected a marginal decrease activity in alkaline phosphatase with P=0.08 and significance decrease activity in acid phosphatase with P=0.05 at 2 and 24 hours respectively, as well as the non-significant increase in esterase at 30 min., perhaps as a response to the loss of membrane integrity leads to cell lysis and, thus, a loss of alkaline and acid phosphatase.

It may be the case that the observed decrease is due to the loss by lysis and secretion, where there is evidence that the alkaline phosphatase is secreted and its secretion is involved in gene expression [28]. The results of lymphocytes exposed to protein extract from mango showed a proliferative and necrotic/apoptotic effect depending on concentration and time.

There are reports in the literature indicating that the proliferative and apoptotic dual effect is due to the presence of reactive oxygen species [29].

No oxidative stress was measured. Nevertheless, there are evidences that it is related to both proliferation and cell death (necrosis/apoptosis). Reactive oxygen species such as superoxide's and hydroxyl groups are involved in gene expression with dual effects both toxic and proliferative [29]. On the other hand, the secreted alkaline phosphatase is also considered a marker enzyme for gene expression [28, 29]; and in the urine, is an early marker of renal tubular injury [28, 30]. A marginal decline at 2 and 24 hrs., in all concentrations was observed, meaning a loss primarily with the highest concentration, perhaps at the lowest concentration is only secreted, and we do not know this because we did not measure it.

An association of the caspase-3 with the results of MTT Test (r=0.552, P=0.0001) was found, suggesting a relationship between mitochondrial activity and caspase-3 activity, related to the integrity of the mitochondrial membranes, as a slight association between MTT with acid sulfatase and acid phosphatase and esterase, r =0.364 P≤0.011, r=0.321 P≤0.026P and r=0.301 P≤0.038, respectively, was found.

However, the caspase-3 was the enzyme associated, except calcium, with all parameters that showed a high association with acid and alkaline phosphatase and esterase with r=0.660, r=0.626 and r=0.649 respectively and P=0.0001 in almost all of them, as well as sulfatase with r=0.520 P=0.0001, perhaps because it belongs to the esterase group. Moreover, showed a negative association with the protein concentrations r=-0.295 P=0.042 perhaps related to cellular death.

Esterases comprise a wide range of enzymes that according to the functional they break include acetylases, carboxylases sulfatases and phosphatases, which may explain why we found that association among the most studied enzymes. Remarkably, results shows the high association between acid phosphatase and alkaline phosphatase r=0.954, P=0.0001 could be the same enzyme and correspond to the phosphomono esterase, which are nonspecific enzymes by the broad pH range in which acts ranging from 5 to 7.5, and that both the acid phosphatase and alkaline decrease at 24 hrs. Furthermore, these phospho monoesterases are related to death and the toxic effects of some poisons from crotalids, elapides, ophiodes and aphidoidea [26] Similarly both phosphatases (acid and alkaline) with similar values are highly associated with acid sulfatase and caspase-3 with r=0.750 r=0.745 and r=0.660, r=0.626 respectively, and with P=0.0001 in both, suggest strongly that them are phosphomonoesterase.

ISSN:2410-4191

The protein concentration was slightly negative associated with esterase, and caspase-3 r=0.328 P=0.023 and r=-0.295 P=0.042, further the association between esterase and caspase-3 r=0.649 and P ≤0.0001, and MTT with caspase-3 r=0.552 P=0.0001 is of great interest. It could be the case that esterease–which could comprehend phosphomonoesterase (acid and basic phosphatases)-is related with the caspase-3 coming probably from the two induction paths; the apoptosis death receptor and mitochondrial inner origin.

Esterases are also lipases such as phospholipase-C (PLC) and phospholipase-A (PLA).

Phospholipase-C (PLC) is involved in the inner cell signaling mechanisms and, when activated via receptors, it produces both diacyl diglycerides and inositol triphosphate and mobilizes the internal Ca^{+2} from endoplasmic reticulum (RE) [22, 31], while the PLA is activated by calcium and produces arachidonic acid, which is involved in the production of potent inflammation mediators. In insects two kinds of esterases, A and B that differ in their inhibitors have been described. However, lymphocytes are characterized by having nonspecific esterases (serine-esterase), due to their activity on the synthetic substrate of p-acetate nitrophenyl, principally found in T cells and involved in necrosis.

The results from the esterase activity, compared to control, showed an increase and a decrease and different exposure times in most concentrations and exposure times.

Regarding the lowest concentration of 0.076 μg/mL, the increase at 30 min., was no significant, whereas at 2 hrs., the decrease was significant with P=0.025, which could be due to the loss of membrane integrity when releasing during necrosis event, suggesting they are involved in membrane permeability, at the first moments when lymphocytes make contact with the protein extract the membrane is depolarized and there might be movement of calcium that activates inespecific and specifc esterases such as phosphomonoesterase, PLA and PLC, where PLA is capable of inducing the inflammation and proliferation mediators, whereas the PLC could also be activated via receptor and may mobilize the calcium from the ER [22, 31, 32, 33].

Arylsulfatases, is another esterase focuses on removing sulfates from sulfolipids [34], which could be destabilizing plasma and organelle membranes such as lysosomes and mitochondria involved in proliferation and necrotic/apoptotic cytotoxicity effect, since Ca^{++} also activates caspases and endonucleases. However, the data suggest that is very likely that phosphomono esterases and a transmembrane esterases [25] are common because of the decrease in esterase activity, as well as the loss in the activity of acid phosphatase and alkaline phosphatase at 24 hrs., and for it is association with those phosphatase r=0.29 p=0.045; r=289 p=053 respectively. On the other hand, the association of esterase with MTT r=0.301 p=0.038 and caspase-3 r=0.649, p=0001 suggest that is involved in proliferation but principally in apoptosis.

Since we wanted to work in conditions closer to human consumption, we worked with the crude extract and also did not work with inhibitors for each enzyme therefore, we do not know which of the proteins is responsible for the activation of the necrotic o apoptotic effect.

ISSN:2410-4191

Though the necrotic effect may be due to the 20KD major protein, a component that because of its degree of glycosidation is capable of forming a transmembrane pore, as well as inducing cell injury and causing necrotic cell death related to the movement of calcium. Hence, in the highest concentration at 30 min., the acid phosphatase and sulfatase activity was increased, as well as caspase-3.

Therefore, it may be the case that the effect of mango on the cytotoxic apoptotic response is due to the activation of a death receptor (Fas) or other receptor associated with phosphomonoesterase dependent on calcium and an apoptosis inducer [25] Such effect is probably due to a lectin similar to that of mistletoe lectin (ML-1), which recognizes galactose, a galectin that, has two subunits and one of the subunits has a molecular weight of 34 kD [18] with a molecular structure similar to that of RIP-2 type lectin and is involved in activating the death receptor, since our protein extract also recognizes galactose and has an discreet band of 34 kD and is similar to that reported by other authors that indicate the presence of lectins recognizing n-acetyl-galactosamine, n-acetyl glucosamine and glucose in both leaves and bark from mango, this activity is probably due to a 30 kD protein [5], as well as by the increase detected in caspase-3 with the high concentration of 3.8 µg/mL from 30 min., to 24 hrs., whereas the necrotic effect was detected only after 30 min., by the increased acid phosphatase and sulfatase activity at this concentration, while at 24 hrs., only acid sulfatase and caspase-3 significantly increased while both acid phosphatase and alkaline phosphatase decreased, possibly because it is the phosphomonoesterase.

It is noteworthy that lectins recognizing galactose are known as galectins, which are not only involved in apoptosis, but also, they are versatile cell adhesion modulators, cell proliferation and cell death as they regulate inflammatory immune responses. [14, 35, 36]. Galectins are also useful cancer markers [15] and are considered as a potentiall cancer therapy.

Furthermore, lectins with low molecular weight from 15 to 18 kD recognizing chitin derivatives (n-acetyl glucosamine) Induce cell death [19]. The protein extract from mango also recognizes n acetyl glucosamine and induces both apoptosis and necrosis, effect that might be also due to granzymes activation [20] where the pore formation would be the trigger through of the effect of chitin type lectins.

Extracellular calcium levels decreased at 30 min., and at 2 hrs., for all of the extract concentrations from mango, indicating entry to lymphocyte. Calcium mobilization could be involved in the binding of the effect or with galectin type death FAS receptor dependending on calcium and associated with an independent caspase-3 of mitochondria inducing apoptosis in lymphocytes.

Mitogens such as lectins induce changes in the polarity and permeability of the cell membrane by altering calcium mobilization and activating esterase type enzymes depending on calcium such as phospholipases, and MAKS or MAPS type phosphorylases kinases associated with proliferation. Additionally, calcium activates the phosphomonoesterase involved in both proliferation and apoptosis and mobilization of internal calcium stimulates enzymes such as endonucleases and exonucleases, nitrate synthase and apoptotic pathways dependent on mitochondrial caspase-3 [22, 31, 33].

ISSN:2410-4191

With respect to calcium results, in all extract concentrations from mango pulp, at 30 min., a marginal decrease P=0.06 extracellular calcium was detected, the same as at 2 hrs., where only the decrease was significant in the concentration of 0.771 µg/mL P=0.044, while at 24 hrs., we observed an increased extracellular calcium at all concentrations, but the highest concentration was the most significant P=0.033 was observed, meaning calcium entrance at short times mainly at low concentrations, possibly by membrane depolarization where calcium mobilizes into and at long times the calcium internal concentrations it may destabilize cell membranes such as the endoplasmic reticulum, mitochondria and lysosomes by causing cell lysis and, thus, releasing calcium and increasing its extracellular amount [22, 33 37].

High levels of internal calcium are responsible for the loss of mitochondrial membrane potential and the nucleus, and plays a very important role in the structural and functional changes in them like the lysosome during necrotic apoptotic cell death [20, 22, 37].

The level of extracellular calcium showed a low negative association only with acid sulfatase r=-0.328 and P =0.023 and marginal with acid phosphatese r=-0.267 and P=0.074. Since external calcium was measured, it would correspond to increase or decrease the internal calcium, hence, the lysosomal enzyme activity such as acid sulfatase, positively associated with calcium.

Since calcium modifies the membrane integrity of different organelles such as the lysosomes. No association with caspase-3 was detected.

Probably, the instability of mitochondria and lysosomes are not due to calcium, but with esterase activity, which it was associated with caspase-3 r=0.649 P=0.00012 and with the MTT test r=0.301, P=0.038. Esterase and caspase-3 were negatively associated with protein concentration with r=-0.328 P=0.23, r=-0.295 P=0.042, respectively.

Most mitogens, lectins in this case, as well as depolarizing liposoluble, activate the signaling pathway of MAPKS kinases and also generate ROS, including OH, perhaps involved in the activation and alkaline phosphatase secretion. Both hydroxyl ions and secreted alkaline phosphatase are involved in gene expression, in the case of secreted alkaline phosphatase it is a gene expression marker [28]. In lymphocytes, we detected a decrease and a marginal increase P=0.06 in concentrations of 0.076 and 3.8 µg/mL respectively. Regarding alkaline phosphatase activity at 2 hrs., depending on activity and production of ROS, gene expression associated with proliferation or apoptosis [29] will be inducted. At 30 min., a marginal increase P=0.06 was detected in all of the protein extracts from mango, while at 2 hrs., in all of the concentrations a significant increase was observed in the protein concentration (P=0.008 for the concentration of 3.804 µg/mL; P=0.01 for the concentration of 0.771 µg/mL and finally P=0.032 for the concentration of 0.076 µg/mL).

Similarly, at 24 hrs., both concentrations of 0.076 and 0.771 µg/mL had a significant increase. Contrarily, the concentration of 3.8 µg/mL showed a protein decrease because of the proliferative and cytotoxic effect respectively, and given the protein concentration was found to be negatively associated with esterase and caspase-3 r = -0.328. p=023 and r = -0. 294 p=0.042 respectively.

ISSN:2410-4191

Thus, means that the higher the caspase-3 and esterase activity's, the lower is the protein concentration, perhaps because esterase and caspase-3 are involved in the cytotoxic effect. This suggests that the protein extract from mango contains components that act directly on the membrane and also lectins or proteins that recognizes the death factor may actually be involved, as well as the glycosylated 20 kD component.

Calcium levels, along with activity of phosphatase and esterase, etc., play an important role in contrary and dual events such as proliferation and cell death, as well as in the duality of the apoptotic or necrotic cytotoxicity and depending on the cytotoxic effect a response immune dual will occur the anti-inflammatory or pro inflammatory, that could be exacerbated or inhibited by the hypersensitivity to mango that affects some people. Thus, it is important to determine precisely the ingredient(s) from mango responsible for the necrotic/apoptotic effect, but more important to determine why some people have very severe hypersensitivity to mango, since this sensitivity is related to other foods or allergens such as pistachio, strawberry and latex. Much of this sensitivity is associated with the presence of Chi or chitin type lectins.

Furthermore, it is known that atopic subjects with no allergy to any food are hypersensitive to them because Chi type lectins could be involved. For example, these types of lectins from potato activate mast cells and basophils that interact with a chitiobiose nucleus from cells bounded to nonspecific E immunoglobulin [38]. Therefore, foods containing Chi type lectins that recognize polymeric compounds from n acetylglucosamine may trigger allergic reactions to them.

The fact that the protein extract from mango recognizes n-acetyl glucosamine and also the molecular weight of one of the bands is 18 kD, suggest that it also possesses Chi type lectins.

Working with raw extract from Mango opens up a wide range of opportunities for further research to determine one of the possible causes experienced by people allergic to this fruit caused by the presence of proteins, including lectins, that can cause allergic disorders, as well as conducting research to identify the protein or lectin responsible for causing apoptotic cell death to use it for therapeutic purposes and also for diagnostic purposes.

Conclusions

The protein extract from *mango* with lectin activity that recognizes galactose, glucosamine and fucose shows a protein pattern bands similar to what other authors have reported. However, a highly-glycosylated band between 18 and 20 kD was detected.

These protein extract shows a dual proliferative and cytotoxic effect Proliferation is stimulated at low concentrations, while at high concentrations with short exposure times we detected an apoptotic/necrotic cytotoxic effect and apoptotic for long exposure times.

Those effects are associated with acid sulphates and phosphates, as well as alkaline phosphates and caspase 3 and calcium release; probably a protein extract stimulated a membrane phospho-monoesterase which may be involved to shut both cytotoxic and proliferation effects.

ISSN:2410-4191

References

[1] Funes, E., Milan J., López J., García J., Negro J., Hernández J., Polo F., & Rico P. (1999). Alergia a anacardiáceas: Identificación de alergénos. Alergol. Inmunol. Clin., 14(2), 82-89.

[2] Sauco, V. (1999). El cultivo del Mango.

[3] Miell, J. (1988). Anaphylatic reaction after eating mango. BMJ, 297(6664), 1639-1640.

[4] Rodriguez-Ortiz, D., Arias A., Gonzalez-Díaz A., Herrea-Castro, D., & Vidaurri-Ojeda, A., (2009). Características epidemiológicas de pacientes con alergias a alimentos atendidos en el centro Regional de Alergias e Inmunología Clínica de Monterrey. Alergia de México, 56(6), 185-191.

[5] Hedge, V., (2007). Anaphylasis following ingestión of mango. J Investig Allergol Clin. Inmunol., 17(5), 341-344.

[6] Selles, A., Vélez, H., Agúero-Agúero, J., González-González J., Naddeo, F., De Simone, F., & Rastrelli, L., (2002). Isolation and quantititive analysis of phenolic antioxidants, free suggars and polyols from mango (*Mangífera indica* L) stem bark aqueous decoction used in Cuba as a nutritional supplement. J. Agric. Food. Chem., 50(4), 762-766.

[7] Martínez, S., Delgado, H., Garrido, G., Guevara, G., García, R., Paéz, B. Núñez, S. (2003). Vimang nuevo producto natural antioxidante. http://www.sld.cu/sitios/mednat/docs/vimang.pdf. See: (May, 05-2017).

[8] Coutiño-Rodriguez, R., Hernández-Cruz P., & Giles-Ríos, H. (2001). Lectins in fruits having gastrointestinal activity: their participation in the hemagglutinating property of Escherichia coli 0157H7. Arch. Medical Research, 32(4), 251-257.

[9] Van Damme E., Peumans W., Pusztai A., & Bardocz S. Handbook of Plant Lectins: Properties and Biomedical Applications.

[10] Sharon, N., Lis, H. (2004). History of lectins from hemagglutinins to biological recognition molecules. Glicobiology, 14(11), 53-62.

[11] Goldstein, I., Hughes, R., Monsigny, Osawa, T., & Sharon, N. (1980). What Should Be Called a Lectin? Nature, 285(5760), 66.

[12] Hernández, P., Martín, G., Pablos, V., & Ganem, B. (1999). Aplicaciones de las lectinas. Hematol. Inmunol. Hemoter., 15(2), 91-95.

[13] Simchowitz L., (1976). Lectin-dependent neutrophil-mediated Cytotoxicity II Possible mechanism. Inmunology, 31(2), 313-322.

[14] Castillo-Villanueva, A., (2005). Lectins vegetales y sus efectos en el cáncer. Invest. Clin., 57(1), 55-64.

[15] Gallegos J., Martínez, G., & Hernández, P., (2008). Marcadores glicosidados en cáncer de mama. Rev. Educación en Bioquímica, 27(2), 52-59.

ISSN:2410-4191

[16] María del Carmen, A. & R. C. R. (2003). XI Congreso Nacional de Bioquímica y Biología Molecular de Plantas y 5º Simposium México EUA. 2 al 7 Nov 2003. Protein extracts with lectin activity of mangifera indica L. Show sex-dependet differences in hemagglutination of blood grupos A and O Acapulco Guerrero: 294.

[17] Nielsen, K., & Boston, R. (2001). Ribosome-inactivating proteins: A Plant perpectives. Annu. Rev. Plant. Physiol. Plant Mol. Biol., 52, 785-816.

[18] Bantel, H., Engels, I., Voelter, W., Schulze-Osthoff, K., & Wesselborg, S. (1999). Mistletoe lectin activates caspase-8/FLICE independently of death receptor signaling and enhances anticancer drug-induced apoptosis. Cancer Res., 59(9), 2083-2090.

[19] Koyama, Y., Miyoshi N., Hayakawa, S., Mita, T., Muto, H., Isemura, S., Aoyagi, Y., & Isemura., M. (2002). Apoptosis induction by lectin isolated from the mushroom *Boletopsis leucomelas* in U937 cells. Biosci. Biotechnol. Biochem., 66(4), 784-789.

[20] Rajesh P., Richa, & Rajeshwar., P. (2004). Apoptosis: molecular mechanisms and pathogenecity. EXCLI Journal, 8, 155-180.

[21] Abul A., & Lichtman, S, P., (2012). Cellular and Molecular Immunology.

[22] Nicotera, P., Leist, M., & Ferrando-May, E. (1999). Apoptosis and necrosis: Different execution of the same death. Biochem. Soc. Symp., 66, 69-73.

[23] Fuster-Lluch, M., Ceña, V., & Jordan, J. (2004). Las serina proteasas y su función en los procesos de muerte neuronal. Rev. Neurol., 38(5), 449-457.

[24] Guija, E., Soberón, M., & Haak-Mares, H. (2013). Mecanismo de acción de las fosfatasas ácidas de bajo peso molecular. Anales De La Facultad De Medicina, 68(4), 356-362.

[25] King-Michael, W. Mecanismos de Transducción de Señales. http://themedicalbiochemistrypage.org/es/signal-transduction-sp.php. See: (May, 05-2017).

[26] Bergilles, F., & Angeles, R. (2010). Toxinología Clínica: Lesiones por picaduras y mordeduras de animales.

[27] Bradford, M. (1976). A rapid sensitive method for the quantification of micrograms quantities of protein using the principle of protein-dye binding. Anal Biochem, 72, 248-254.

[28] Berger, J., Hauber, J., Hauber, R., Geiger, R., & Cullen, B. (1988). Secreted placental alkaline phosphatase: a powefull new quantitative indicator of gene expression. Gene, 67(1), 1-10.

[29] Savaedra, D. (2008). Proliferación y apoptosis en linfocitos humanos cultivados inducidos por anión superóxido. Rev. Med. Inst. Mex. Seguro Soc., 46(5), 533-538.

[30] Di Carlo., Beatriz, M., Gomez., Gabriela, A., Madalena., Bibiana, L., Facio., Laura, M., Pizzolato., Antonio, M., & Gustavo, N. (2007). Utilidad de la fosfatasa alcalina urinaria como marcador precoz de lesión tubular renal. Acta bioquímica clínica latinoamericana, 41(3), 369-377.

[31] Sternweis, P., & Smrcka, A. (1992). Regulation of phospholipase C by G proteins. Trends Biochem. Sci., 17(12), 502-506.

ISSN:2410-4191

[32] Tornero, D., Ceña, V., Gonzalez-Garcia, C., & Jordan J, (2002). Papel en el poro de la permeabilidad transitoria mitocondrial en los procesos neurodegenerativos. Rev. Neurol., 35(4), 354-360.

[33] Pinton, P, Giorgi, C., Siviero, R., Zecchini, E., & Rizzuto, R., (2008). Calcium and apoptosis: ER-mitochondria Ca2+ transfer in the control of apoptosis. Oncogene, 27(50), 6407-6418.

[34] Nussbaumer, P., Billich, A., (2004). Steroid sulfatase inhibitors. Medicinal Research Reviews, 24(4), 529-576.

[35] Perillo, N., Marcus, M., & Baum L. (1998). Galectins: versatile modulators of cell adhesion, cell proliferation, and cell death. J. Mol. Med., 76(6), 402-412.

[36] Ortiz-Quintero, B., (2010). Galectina-1 regulador negativo de la respuesta inmune inflamatoria y posible agente terapeútico. Inst. Nat. Enf. Resp. Mex., 22(3): 206-216.

[37] Elena, G. (2002). Mecanismos de muerte celular apoptosis y necrosis. Rev. Ar. de Anestes, 60(6), 3091-4001.

[38] Pramod, S., Venkatesh, Y., & Mahesh, P. Potato lectin activates basophils and mast cells of atopic subjects by its interaction with core chitobiose of cell-bound non-specific immunoglobulin E. Clin. Exp. Inmunol, 148(3), 391-401.

ISSN:2410-4191

Article ECORFAN-Bolivia Journal
June 2017 Vol. 4 No. 6 48-60

Automotive park, a focus from the environmental tax and vehicular pollution

FIGUEROA, Ivette J.†, REYES, Mariela V. and MAZÓN, Luis M.

Universidad Estatal Península de Santa Elena

Received February 10, 2017; Accepted May 31, 2017

Abstract

The need to contribute to the environment allowed the environmental tax approach to be studied in vehicle pollution, which has developed sustainable alternative measures that identify the deficit of the mechanisms of tax collection, another of the aspects exposed are the indices of environmental control and its increase in the number of circulation units that start from the theoretical conceptions analyzed in the environmental indicators, for that reason the research has as a purpose to analyze the impact of the environmental tax in the vehicular contamination caused by the car park, also exemplifies the method for the use of the IACV formula considered as an indirect tax related to IVA. The article describes the literature about the importance of environmental tax and analyzes a long-term improvement approach. Moreover, it shows the results of the impact of the environmental tax in the vehicle pollution in the country. Finally, it was determined that the implementation of IACV does not cause reductions in the vehicle industry, where Guayaquil city, in fact, the introduction of this tax did not cause changes in the people behavior at the moment of register their automobiles.

Environmental tax, vehicle pollution, car industry

Citation: FIGUEROA, Ivette J., REYES, Mariela V. and MAZÓN, Luis M. Automotive park, a focus from the environmental tax and vehicular pollution. ECORFAN Journal-Bolivia 2017, 4-6: 48-60.

† Researcher contributing as first author.

Introduction

The growing concern about the environmental deterioration that the planet suffers has led many countries to develop policies within their tax regimes, in order to make "polluter, pay". Several instruments have been developed, one of which is the Pigouvian tax, also called an environmental tax considered as a tax collection mechanism, applied on an externality.

For these reasons, governments have the purpose of controlling and avoiding the level of environmental impact, using the collection of taxes to raise awareness of society, which is linked to the environment and the use of environmental resources.

It should be noted that one of the governmental priorities is the attention to the environment and in particular the collection of the environmental tax on vehicle pollution (IACV). In this sense, there are 1.5 million vehicle units throughout the country. Quito groups 28% of the total that exist at national level, Guayaquil 23% and Cuenca 6%. (MAE, 2010). On the other hand, but with the same approach, Ecuador's green tax reform includes environmental taxes focused on taxing the polluting action, which applies policies that seek to reduce the emission of CO2 produced by the combustion of high-cylinder engines.

For this reason the analysis of the environmental tax and vehicular contamination shows a level of incidence in the growth of the automotive park of the country causing the environmental deterioration. According to the assessments of Carbonnel & Escalante (2013. P. 83) they exemplify the methods to implement instruments that allow to reduce the levels of pollution caused by the smog of the vehicles.

It should be mentioned once again that in the Latin American countries one of the sectors with high growth is the automotive sector, which means that the greater the demand, the greater the degree of pollution.

One of the weaknesses manifested by the National Air Plan "Ecuador" is that diesel vehicles and industrial companies are the main sources of particulate matter generation, unlike the gasoline vehicles that are the main carbon.

This means that there is evidence of the construction of an environmental problem that has negative effects on the human being and in some cases the impact on health, therefore, a balance must be struck between the cost that it represents for society and the Environmental cost, in such a way that the vehicle fleet constituted by: cars, buses, trucks among others of combustion should be inversely proportional to the impact achieved by the implementation of an environmental type tax.

Given the antecedent has been formulated as main objective: To analyze the impact of the environmental tax on the vehicular contamination of the Ecuadorian car park.

Supplemented by the following scientific tasks:

The rationale of the theoretical conceptions of the environmental tax to vehicular contamination.

The development of referential contributions in terms of the reduction of environmental pollution.

ISSN:2410-4191

The article is structured as follows, the first section describes the basis of the environmental tax. In the second, the reference contributions of the contamination of the automotive fleet.

Finally, we conclude on the most important points of the investigation.

Theoretical conceptions of the environmental tax

Main economic instruments of environmental management

There are few theories of economic development that include natural resources within their parameters as a productive factor for the economy of a nation, but over the years these factors have been having relevance within the analysis and currently constitute as a variable Importance for the economic development of countries. [2]

Because environmental damage can not be measured in a very precise way or quantified, it is very complex to determine a tribute that encompasses these characteristics. What we want to achieve is then an optimal Pareto rate, that is, the marginal cost of the private sector equal to that of the social sector. [3]

Pollution is a negative externality, since it is produced by individuals or companies in their productive activities but affects third parties who live around them.

Below is a list of economic instruments that represent the most outstanding and most used in the different countries of the world. [4]

- The charges.
- Environmental taxes.
- Tax incentives.
- The rates for non-compliance with the regulations.
- The economic obligation when legal responsibility for environmental damages is determined.
- The systems of tradable permits.
- Intervention at the level of final demand.
- Subsidies for activities related to environmental protection.

The charges represent payments that must be made to the state, for the use of resources and infrastructure of the environment. These values are set by a regulator that determines the true value of the environment. The main charges are: emissions, use and impact. [5] Environmental taxes are tax collection systems that generate funds so that the government can manage and control the entities in the care of the environment. [5]

Tax incentives are applied when a company chooses to use a technology that is greener, that is to say contaminate to a lesser extent, the costs of such implementation may be deductible from its tax payable. As well as reforestation processes and activities with positive externalities. [4] The rates for non-compliance with the regulations refer to the state granting them different levels of permissible contamination depending on the type of activity they are engaged in and also their size, and if they exceed that range they must pay fines for the offense committed. This encourages them to have a better environmental performance. [5]

ISSN:2410-4191

The economic obligation when determining liability for environmental damage is to apply the phrase of the polluter pays. The law requires polluters to pay for damages to third parties for their work. [4]

In the tradable permit systems, we mainly talk about the creation of a carbon market, where pollution authorizations are negotiated. This is because each entity is given a specific level of pollution, some small companies do not consume their quota and choose to sell the permits to large companies to obtain an additional benefit to their activity. [4]

In the intervention at the level of final demand, it is focused when the companies due to their activity have contaminated in excess and their name is harmed in front of its clientele. Now they focus on cleaning up their image and conducting campaigns where they show that their behavior has changed and are worrying about the environment. [4]

Environmental Taxes.

An environmental tax is one that allows internalizing the social cost of environmental damages known as externality and promotes people to perform in a better way with the environment, this assumption has validity in the concept of Pigouvian tax. [6]

In addition to granting tax collection that allows the state to carry out its mandate.

An environmental tax is a mechanism that tries to enforce the polluter pays assumption. This type of tax enjoys the benefit of double dividend, which means that apart from raising also reduces pollution. [7]

Also what is wanted to achieve for a long term is the environmental taxes can replace the distorting taxes, which are those that in one way or another people try to avoid them. [8]

For many environmentalists the solution of environmental problems should be to completely eliminate pollution, but this is not a favorable solution economically speaking, since to comply with it should stop using vehicles, aircraft, ships, ban certain activities of industries, Among others, and all these factors contribute to the economy and development of a country. [9]

The main function of this type of taxes is not to obtain collection, but rather to reduce pollution and contribute to change in the behavior of individuals and become more aware when purchasing a vehicle.

The researchers Acquatella & Bárceno, (2005) highlight the tax reforms carried out in developed countries on environmental issues, which are based on three lines:

A. The design of new taxes, applied on activities with environmental externalities.

B. The restructuring of existing taxes on environmentally relevant sectors (eg transport and energy) to include an environmental component. This is the case of the carbon tax that applies to different types of fossil fuels.

C. The modification or elimination of subsidies and tax exemptions on activities with potentially negative effects on the environment (eg agricultural subsidies, tax exemptions to the transport sector.

ISSN:2410-4191

The role of government is not to choose a single instrument. The objective is to determine what type of environmental problem is to be addressed and to choose the most appropriate combination of instruments.

Ecuador as a development-enhancing country, has adopted certain measures that compensate or retro-feed to the environment, according to INEC data in 2012 there were 1, 509,458 cars with an average growth of 100,000 units per year, considering that Guayaquil has Greater vehicular concentration, with an approximated 400,000 vehicles registered, that represents 27% of the total at national level.

For this reason, the "Law on Environmental Promotion and Optimization of State Income" created on November 24, 2011 and issued by the National Assembly of the Republic of Ecuador with the official registration 508, contributes to curb externalities due to contamination, Through the establishment of a tax that aims to improve social and environmental behavior of individuals in the national territory.

Therefore, the environmental promotion law establishes the green tax reform carried out in Ecuador does not have a collection purpose, as it seeks changes in consumption patterns, complementing the need to make people have behaviors that are more environmentally friendly.

As guidelines complementary to the implementation of the IACV (Environmental Tax on Vehicle Contamination), the government managed the following strategies:

Renova Plan - Chatarrization Process, Improve Fuel Quality and Improve Public Transportation. However, no official information is available on the application of these guidelines.

An indicator of the relative importance and evolution of environmental taxation is its tax burden compared to the other taxes that make up the tax system. Likewise, the incidence of an environmental tax should be considered, which should have a certain impact on other taxes on products or consumption, in this case and, in some way, impacts the demand and supply of vehicles that are marketed in the country. For this purpose, the IACV formula is presented with its respective table showing the tax base of the tax.

$$IACV = [(b - 1500)\ t]\ (1+FA) \quad (1)$$

The equation is divided into two parts, the first that depends on a taxable base (b) measured by the cylinder of the vehicle and depending on this value is given an imposition rate (t) which will be shown in the following table; The second part that is given by an adjustment factor (FA), expressed in percentages depending on the age of the vehicle.

TRAMO CILINDRAJE - AUTOMÓVILES Y MOTOCICLETAS (B)*	$/ CC. (T)*	TRAMO DE ANTIGÜEDAD (AÑOS) – AUTOMÓVILES	FACTOR (FA)
Menor a 1.500 cc	0.00	Menor a 5 años	0%
1.501 - 2.000 cc	0.08	De 5 a 10 años	5%
2.001 - 2500 cc	0.09	De 11 a 15 años	10%
2.501 - 3.000 cc	0.11	De 16 a 20 años	15%
3.001 - 3.500 cc	0.12	Mayor a 20 años	20%
3.501 - 4.000 cc	0.24	Híbridos	-20%
Más de 4.000 cc	0.35		

Table 1 Taxable Basis and Adjustment Factor for IACV application
Source: LORTI

According to the use of the table of the taxable base and the adjustment factor, the maximum and minimum values were used to determine the importance weight of each section of the formula. This calculation gives the relative weight given to each factor, considering that the (b-1500) * t corresponds exclusively to the payment for the cylinder and that (1+ FA) to the payment for the seniority. Under the assumption that you pay in tax 100% ie the value to pay is 1. You have the following:

ANTIGÜEDAD	BASE IMPONIBLE	FACTOR DE AJUSTE
menor a 5	100.00%	0.00%
5 a 10	95.24%	4.76%
11 a 15	90.91%	9.09%
16 a 20	86.96%	13.04%
mayor a 20	83.33%	16.67%

Table 2
Source: LORTI created by Authors

Taking into account the formula, it can be concluded that the factor that corresponds to the tax base is the one that gives greater weight to the calculation of the IACV, taking as an example the range greater than 20 years, it gives 83.33% While the adjustment factor has 16.67% of the weight, verifying that the highest value to cancel is generated by the cylinder and not by the number of years.

If the tax is less than 5 years, then the tax will depend solely on its taxable base and the tax rate that is established according to the rank. Thus, as the number of years increases, the participation of the adjustment factor increases. However, its relevance to the calculation does not exceed 20% of the tax payable.

This may lead one to believe that the objective is not to take older cars, since their contribution is not of greater weight for the calculation, but would be affecting the vehicles with larger cylinder capacity, ie those who consume more fuel and own An engine with greater power. Frequently, these cars with higher powers have a higher cost, thus affecting people with greater purchasing power.

Continuing with the analysis, it is important to cite the most relevant concepts obtained from research proposed by OECD countries, where Bárcelo (2005) states that there are principles to consider when applying a tax of an environmental nature, taking into account other Complementary factors such as:

1. Before implementing an environmental tax, existing ones should be reformulated as a measure of "clearing the land" thus avoiding unnecessary tax burden. Failure to evaluate existing ones could make the mistake of raising a tax, which would have an effect on people.

2. When an environmental tax is formulated, it is said to be "efficient" (considering that this efficiency is measured by its collection), because it has greater importance in its participation in the total collection. But this increase must be accompanied by a reformulation of other distorting taxes. In order for the well-known double dividend of the environmental tax to be effective, at least it is required that the introduction of this tax be accompanied by the reduction of others, in such a way as to ensure that revenue is neutral.

In other developed countries, the participation of this type of taxes is approximately 6%, where the collection of other taxes is assumed, which places the individual in an equal fiscal vector.

ISSN:2410-4191

3. In another context, this type of taxes are immersed within the category of the well-known Piguvian taxes, considered corrective taxes, reason why it would be expected that its collection is reduced, and therefore, its objective would be fulfilled. In this case, people would not buy large-capacity cars and the older ones would leave the vehicle fleet.

In addition, a gradual reformulation of green taxes should be considered, maintaining a strategy of temporary adjustment of rates and other aspects of design so that they do not lose their ability to (un) encourage the change of behavior of people.

4. It can often be the case that the tax is a way to pay to pollute. However, an environmental tax is considered efficient if in the long term, the tax base of this tax is eroded, given the change in production or consumption patterns.

Therefore, to complement the study is defined as an indicator of the relative importance and evolution of environmental taxation is its tax burden compared to other taxes that make up the tax system. It should be considered, economically speaking, that the incidence of an environmental tax should have a certain impact on other taxes on products or consumption, in this case somehow impacts the demand and supply of vehicles that are marketed in the country. To do this, the following table with data exist since the creation of the IACV, in our country:

YEAR	IACV COLLECTION	TOTAL COLLECTION	Percentage
2012	95.770.093,68	10.760.320.205,91	0,89%
2013	114.809.077,02	10.267.759.532,98	1,12%
2014	115.137.984,12	11.285.450.776,55	1,02%
2015	113.198.301,97	12.069.462.647,65	0,94%

Table 3

The development of referential contributions based on the reduction of environmental pollution

For the application of environmental tribute, it should be considered that pollution reduction processes have significant costs within a country's production system, and should be included with long-term visions, without affecting complex economic systems, in this case the Transport system. (Larraguibel & Raúl, 2000, p.20)

The main function of an environmental tax is not to collect, but to contribute to change in the behavior of individuals in a society, which is why it is considered a regulatory tax based on the principle of "polluter pays." (Brailovsky, 2012)

The existing standards for vehicles in use are set according to the year of the model and type of engine, and this comes in conjunction with inspection and maintenance programs, where periodic maintenance is performed on vehicles in use, removing very polluting vehicles from the circulation. (Onursal, 1998, p.74). For example, in countries such as Argentina and Brazil manufacturers are required to certify that their units comply with emission standards for at least 5 years and 8,0000 km. In Ecuador since 1996, the importation of used vehicles is prohibited. (Onursal, 1998)

In other countries, such as Singapore, a minimum number of passengers were imposed on vehicles and trucks. In addition to the imposition of staggered schedules where the inhabitants have hours of different entrances and exits when it comes to work, student and commercial. (Acquatella & Bárceno, 2005, p. 116)

ISSN:2410-4191

With respect to vehicular contamination and based on the points made above, the OECD countries (1998) adopted certain measures to induce the reduction, especially in critical points such as Mexico, Brazil and Colombia. Emission standards for new vehicles were adopted, along with certification requirements, assembly line testing, recall and warranty. In addition the Emissions system was implemented during a time or mileage.

The Development of referential contributions in function of the reduction of the environmental contamination.

Among the great measures adopted by the Latin American countries, two strategies are highlighted such as gasoline taxes, present in most Latin American countries (Gómez & Dalmiro, 2013) and the hydrogen converter, which has been a measure adopted in countries European countries. (Carbonell & Escalante, 2013)

Within the study formulated by Gómez & Dalmiro (2013) can also be expressed gasoline taxes applied in countries of the region, as detailed below:

Argentina has taxes on liquid fuels with the exception of gas. In Bolivia there is a Special Tax on Hydrocarbons and its Derivatives (IEHD) in the domestic market. Chile has exploitation rights policies; Automotive Gasoline; Diesel oil; Automobiles with liquefied gas and others. In Colombia, there is a Global tax that establishes a fixed tax in national currency for Gasolines and ACPM, a 25% surcharge on the reference retail price per gallon for gasoline and 6% for diesel (ACPM) . Mexico, Special Tax on Production and Services (IEPS) for gasoline and diesel oil. Paraguay, Selective Tax on Fuel Consumption. Peru, Selective Consumption Tax (ISC).

As it is known by microeconomic theory, the demand is characterized by having a negative slope, which also happens for the case of the fuel demand, where it is indicated that the greater the fuel price the smaller the quantity that will be demanded. However, this is not 100% efficient economically speaking, because the welfare of society is not maximized. The use of vehicles produces externalities such as pollution, congestion, traffic accidents, noise, among others and these effects are not captured in the cost of fuel commercialization.

Thus, in several countries of the region as mentioned above, measures have been implemented such as fuel taxes, as a complementary instrument to other measures aimed at the reduction of polluting vehicles.

Over the last twenty years, revenues from environmental taxes (around 90% on average) have come almost exclusively from taxes levied on gasoline, diesel and motor vehicles in general. (Gómez & Dalmiro, 2013)

The application of gasoline quotas is also applied by the city of Zulia, in Venezuela, so that the consumption can be controlled. It was established that the vehicles consumed only 42 liters of intermediate fuels, this was determined by the competent authorities such as the Ministry of Petroleum and Mining and the Government of Zulia. In recent years, the Ecuadorian government has made reforms aimed at improving tax collection mechanisms and avoiding tax evasion. According to official registration 583 issued by the National Assembly of the Republic of Ecuador, on November 24, 2011, the creation of a law to establish social and environmental behavior in the national territory, known as the "Law of Environmental Development Y Optimization of State Income ", within which the environmental taxes in force since the year 2012 are defined.

ISSN:2410-4191

The funds raised by the payment of taxes are used to finance the state's annual budget and allow to provide public goods and services such as education, health, defense, among others. For the application of environmental tribute, it should be considered that pollution reduction processes have significant costs within a country's production system, and should be included with long-term visions, without affecting complex economic systems, in this case the Transport system. (Larraguibel & Raúl, 2000, p.20)

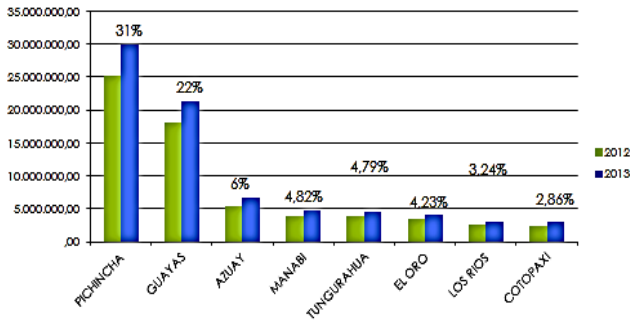
The main function of an environmental tax is not to collect, but to contribute to change in the behavior of individuals in a society, which is why it is considered a regulatory tax based on the principle of "polluter pays." (Brailovsky, 2012) The existing standards for vehicles in use are set according to the year of the model and type of engine, and this comes in conjunction with inspection and maintenance programs, where periodic maintenance is performed on vehicles in use, removing very polluting vehicles from the circulation. (Onursal, 1998, p.74) As a result, Ecuador has implemented green tax reforms that allow mainly the displacement of part of the current tax burden on capital and labor factors (for example, through the reduction or elimination of taxes on income, Capital, labor contributions etc.) towards environmentally harmful activities through the introduction of new taxes on the latter, taking care not to increase the total tax burden on the productive apparatus. Contamination problems are complications, since the majority of causes are the high degree of demographic and industrial growth, and the large increase of vehicles in circulation. Studies carried out in the city of Buenos Aires concluded that cities that are more populated are contaminated more than those that do not have much population. (Salas, Gonzales, 2012).

In order to verify the performance of this tax at the stage of implementation is significant, since it would be expected that as a result of the application of the environmental tax should reduce the vehicle fleet by the inverse relationship they have.

The purpose of this tax is to tax the pollution produced by motor vehicles of land transport, it would be expected that this measure will have effects and help those involved to become aware of the damage they cause to the environment and the possible problems they will have to face in A future if it is not about controlling in time, denoting that individuals use their vehicle in a more efficient way thus changing their polluting behavior and decreasing negative effects on the environment.

A paper published by ECLAC (1998) shows that in most urban centers in Latin America, motor vehicles are the main cause of the deterioration of air quality. They represent 99% of total CO emissions, 54% of hydrocarbons and 70% of NOx in Mexico City.

Materials and Methods



Graphic 1

Environmental Tax on Vehicle Pollution (IACV)

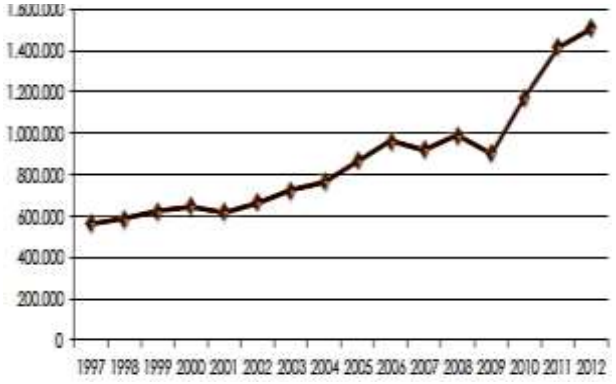
According to official registration 583 issued by the National Assembly of the Republic of Ecuador, on November 24, 2011, the "Law on Environmental Promotion and Optimization of State Revenues" was approved and the implementation of the IACV was also approved as of January 2012.

Efficiency Collection of the Environmental Tax to the Vehicle Contamination (IACV)

According to the Ministry of Environment of Ecuador (MAE - 2012) Quito is the city with the highest collection of IACV in the country and Guayaquil is the second most collected.

This is because both cities have the most population and this is one of the factors for which they have a higher influx of vehicles. Also, both Quito and Guayaquil, are the main cities of the country, since one is the capital and the other is the main economic power of the country.

The graph below shows the cities that contribute in a greater amount in the collection of IACV.



Graphic 2 Collection of IACV by major cities

In order for an environmental tax to be considered tax-efficient, it should have an importance in total tax collections, but only if it is accompanied by a reformulation of distorting taxes

So that in this way, there is no excess tax burden on individuals. Taxes that are to be restructured must have a high tax burden, for example reducing the ICE to be assumed by the IACV.

Given the definition of an environmental tax, the IACV should not be considered of this type, since despite increasing its collection and gaining relevance within the total collections of the overall taxes of the country, it has not been accompanied by a restructuring of Distorting taxes, that is, their growth has depended only on their individual collection.

At the same time, the IACV is presenting distorting symptoms, which means that people are trying to avoid it in one way or another to avoid paying it.

Ecuador's Automotive Park.

Over the years there has been a trend towards the increase of vehicles registered in the country, as can be seen in the chart below:

The fleet is concentrated in the provinces of Pichincha and Guayas, who capture 32.36% and 25.28% respectively.

Given this information, it can be determined that from 1997 to 2012 the vehicle fleet of Ecuador has been growing at a rate of 168.65%, that is, in the last 15 years vehicles have more than doubled, Which was reflected by the different changes that occurred in the economy as a result of the crisis that occurred since 2000 that affected many countries of the world.

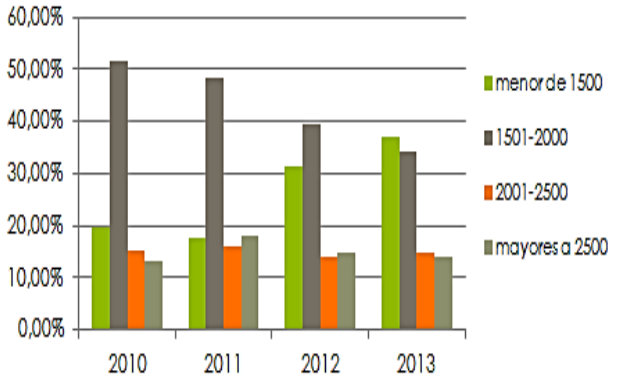
ISSN:2410-4191

During the year 2012 in the city of Guayaquil were enrolled around 168,519 automobiles while for the following year were about 198,148 vehicles.

In 2010 the variation of vehicles that were registered with respect to the previous year was 25,555 vehicles, while for 2011, 2012 and 2013 were 25,583, 24,421 and 30,008 respectively.

This means that the number of vehicles registered in 2012 declined very little and is believed to have been due to the implementation of the IACV, but this factor did not prevent the next year from enrolling more vehicles.

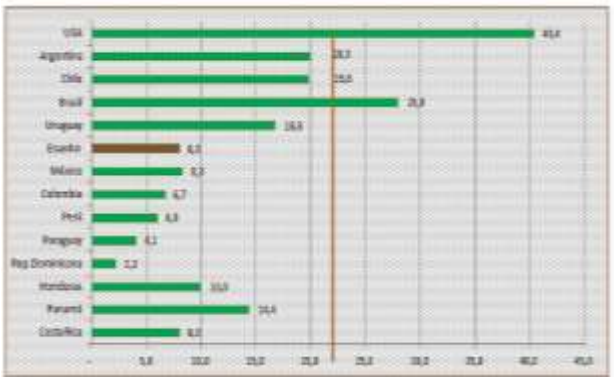
The following table shows the vehicles registered in the years 2010 to 2013 and are classified according to their size.



Graphic 3 Participation of vehicles according to their cylinder capacity 2010 – 2013

As can be seen, vehicles with a cylinder size lower than 1500cc are the ones that have had the most increase and those of 1501cc - 2000cc have been gradually decreasing. While the larger vehicles have not had greater variations in quantity.

Regarding the antiquity of the car park in the city of Guayaquil, it is considered relatively young, because the majority represented by 54.42% have 5 to 10 years, 38.20% are under 5 years And the remainder is within the range of over 10 years.



Graphic 4 Antiquity of the car park in the city of Guayaquil

Ecuadorian Automotive Sector

The automotive sector in Ecuador consists mainly of assemblers, either fully assembled vehicles (CBUs), or parts to be assembled (CKD), auto-parts firms and distributors. [10] Ecuador has 3 assembling companies, 33 companies in auto parts and the commercialization of motor vehicles is through authorized dealers.

In our country, the automotive sector represents 0.34% of GDP and is made up of one part of the manufacturing sector and another part of the trade sector. The manufacturing sector is broken down into four sub-accounts that are:

1. Manufacture of motor vehicles.

2. Manufacture of bodies for motor vehicles.

3. Manufacture of parts and accessories for motor vehicles and their engines.

4. Manufacture of other types of transport equipment.

ISSN:2410-4191

The trade sector has four classifications that are:

1. Sale of motor vehicles.

2. Maintenance and repair of motor vehicles.

3. Sale of parts, parts and accessories of motor vehicles.

4. Retail sale of motor vehicle fuels.

Important Indices

Motorization Index (ALADDA)

The Latin American Association of Automotive Distribution (ALADDA) reflects periodic measurements on the automotive market in Latin America.

This ratio is found by dividing the number of new vehicles sold in a year for the number of inhabitants of the country multiplied by a thousand, that is to say, this ratio says how many new vehicles there are per thousand inhabitants. [eleven]

Here it is stated that the lower this ratio is the better, Ecuador is with approximately 8 new vehicles per thousand inhabitants and is at a normal level. The countries that are in the worst situation are the United States and Brazil, with 40.4 and 28 new vehicles per thousand inhabitants.

And the countries that have the lowest level of this index are Dominican Republic, Paraguay and Peru with 2.2, 4.1 and 6 new vehicles per thousand inhabitants respectively.

Index of number of vehicles per inhabitant

This index is calculated as the quotient of the total number of vehicles for the total population of the year of study. That is, it allows us to know how concentrated a country's car park is in relation to its inhabitants.

This indicator makes it possible to compare Ecuador's fleet with other countries in the region, and the greater the ratio, the country is in a better condition compared to its fleet.

It can be concluded from the chronological chart (2011 to 2013) that Ecuador has not had significant variations, and has been maintained in approximately 1 vehicle per 8 inhabitants.

The accompanying chart shows the variations of this index in different countries of the region and it is determined that there have been no major changes. The countries with the highest index correspond to the United States, Mexico and Brazil, it should be emphasized that these last two countries are considered by ECLAC as countries with high concentrations of pollutants.

Peru is the country with a better result of this indicator since it has approximately 14 inhabitants for each vehicle.

Conclusions

It was possible to determine that the implementation of the IACV does not cause reductions in the automotive fleet in the city of Guayaquil. The introduction of this tax does not cause changes in the behavior of individuals at the time of enrolling or not their vehicle.

ISSN:2410-4191

Given the application of the environmental tax, it is expected that there will be fewer vehicles registered, but there are no changes in the fleet, corroborated by ALADDA, (for every 1000 inhabitants there are 8 new vehicles every year), which has remained Changes since the year 2011.

For an environmental tax to be efficient it should be accompanied by other fiscal instruments that support its application, support and contribute to achieve the environmental purpose for which it was created. One pro of this tax is that it affects other sectors of the economy.

In Guayaquil there is a close positive relationship between GDP in terms of income and car sales, since this indicates that both variables have similar behaviors. If it is a question of reducing the number of vehicles, the productivity of a country will also be reduced, since they are related. What should be done is to try to change the consumption patterns of people and opt for less polluting cars.

The calculation formula of the IACV gives a greater weight to the cylinder of the vehicle, and to seniority gives a weight that does not exceed 20%.

Within the enrollment process data could be obtained to verify that there was a year-on-year growth of 17% of the Guayaquil vehicle fleet; And, through a cross-check, it was determined that 92% of the cars registered in 2012 were re-registered in 2013.

References

Carbonell, J., & Escalante, R. (2013). *Politica Fiscal y Contaminación Ambiental. Lima: UNALM* - Revista Natura.

[2] Oliva, N., & Serrano, A. (2010). *Es posible un impuesto ecológico socialmente progresivo.* Guayaquil: Centro de Estudios Fiscales - SRI.

[3] Brailovsky, A. (2012, Mayo). *Impuestos Ambientales - Pagar para contaminar. Santiago de Chile.*

[4] Acquatella, J. (2001, enero). *Aplicación de instrumentos económicos en la gestión anbiental en América Latina y el Caribe.* Santiago de Chile.

[5] Programa de las Naciones Unidas para el Desarrollo. (2000, 10 de enero). *Desafíos y propuestas para una implementación más efectiva de instrumentos económicos en la gestión Ambiental de América Latina y el Caribe.* Lima: CEPAL.

[6] Rivadeneira, A. (2011, noviembre). *Fiscalidad ambiental en Ecuador.* Centro de Estudios Fiscales - SRI.

[7] Mena, J., & Yanez, A. (2006). *Impuestos Ecológicos y la discusión del doble dividendo.* Santiago de Chile: Universidad de Chile.

[8] Stiglitz, J. E. (2003). *La Economía del Sector Público.* Antoni Bosch.

[9] Barry, F. (2003). *Economía Ambiental.* McGraw-Hill.

[10] Ortega B., Jaime (2005). Análisis del Sector Automotor Ecuatoriano. Apuntes de Economía – BCE.

[11] Asociación latinoamericana de Distribuidores de Automotores. (2014). *Indice de Motorización*. Obtenido de www.aladda.com

[12] Palacios, F. (2008). *Cadena de Markov.* Barcelona - España.

ISSN:2410-4191

Article ECORFAN-Bolivia Journal
June 2017 Vol. 4 No. 6 61-77

Risk indicators for dental caries in patients that attend the clinic at the Faculty of Odontology, U.A.C. in 2016

ZAPATA-MAY, Rafael*†, ROSADO-VILA, Graciella, SANSORES-AMBROYESO, Fatima, ACUÑA-GONZÁLEZ, Gladys and OROZCO-RODRIGUEZ, Ruben

Universidad Autónoma de Campeche. Faculty of Odontology. Av. Agustín Melgar S/N Col. Buenavista CP. 24030, Campeche

Received January 15, 2017; Accepted June 10, 2017

Abstract

Buccal illnesses constitute a general health problem in the majority of the population, according to studies based on buccal illnesses of major sanitary importance by the magnitudein which dental caries are found. Dental caries are commonly conyesdered an infectious illness that causes the localized destruction of hard dental tissues through acids of the microbial depoyests attached to the teeth. The illness can affect the enamel, dentine, and cement. Caries is an illness of high prevalence in Mexico and a great number of other countries. The risk indicators of dental caries were determined in adults of 18 to 54 years of age that attend Clinic 1 of the Faculty of Odontology of the Autonomous Univeryesty of Campeche in 2016. The standardization of the investigator was obtained through the Kappa Statistic with a value 8. An observational, descriptive, prospective, transversal, and analytical study was realized in which these themes were the unit of analyyess.The sampleconstitutes a population of 501 patients that attended Clinic 1 of the Faculty of Odontology in 2016, Caries = Interaction 1 (2.46) * Have you been previously attended by a dentist (0.235)+ How many times a day do you brush your teeth? (0.512) + Interaction 2 (7.14)* Do you eat snacks in between meals? (0.367) + Presents Dental Plaque (4.42) + Do you eat sweets in between meals? (0.325) + Sex (0.364) + what do you dedicate yourself to? (0.857). The population had more women than men. In the aspect of occupation, they were unemployed with their highest degree of study being “Preparatoria” (Highschool). The dental treatments that were received were minor.Because some of the patients had never had dental care (because of economic limitations), the trip to the dentist was due to pain. Out of all the bad habits, smoking was found to be a Category 4 Dental Caries risk where dental loss, in patients of 50 to 70 years of age, is most prominent in all aspects. The relation between dental caries and dentobacterial plaque was demonstrated that in these patients, their oral hygiene was deficient because of lack of dental brushing.

Dental Caries,Periodontal Illness, Risk, Dental Plaque

Citation: ZAPATA-MAY, Rafael, ROSADO-VILA, Graciella, SANSORES-AMBROYESO, Fatima, ACUÑA-GONZÁLEZ, Gladys y OROZCO-RODRIGUEZ, Ruben. Risk indicators for dental caries in patients that attend the clinic at the Faculty of Odontology, U.A.C. in 2016. ECORFAN Journal-Bolivia 2017, 4-6: 61-77.

* Correspondence to Author (email: razapata@uacam.mx)
† Researcher contributing as first author.

Introduction

Oral diseases are a general health problem in most of the population, according to studies carried out among oral diseases of major health importance because of their magnitude is dental caries. Tooth decay is commonly conyesdered an infectious disease that causes the localized destruction of hard dental tissues by the acids from the microbial depoyests attached to the teeth. The disease can affect enamel dentin and cementum. Caries is a disease of high prevalence in Mexico, and in a large number of countries.

Through different preventive programs, whose cornerstone is the use of fluorides, important reductions have been obtained in caries rates, especially in developed countries. Knowing the epidemiological profile of a given population is of great importance for several reasons: it allows to appreciate the magnitude of the problem, helps the population to become aware of their yestuation regarding health and illness, allows the timely planning of care Needs and serves as a parameter with other populations or with the same population after a certain time. The study of the frequency, distribution and determinants of these pathologies in the population is achieved through epidemiological research. Most of these investigations have been done in children and adolescents and less frequently in the adult population, so little is known about the frequency and determinants of caries in this population.

There is a worldwide interest in oral health in adults, yesnce in industrialized countries where preventive measures have shown a yesgnificant tendency to decrease the disease in children, this effect has not been shown in the literature.

Adult population where the prevalence of the disease is close to 100%. In the City of Campeche and especially in the Faculty of Dentistry of the UAC

The oral epidemiological yestuation is little known because there are few studies on the prevalence and risk indicators of dental caries, the main causes of this problem are the lack of properly prepared human resources and the scarce material resource.

The purpose of this study is to estimate the prevalence of subjects severely affected by dental caries and to identify by means of a multivariate analyyess the predictive indicators that describe these subjects. In the population that comes for dental care of the clinic 1 of the Faculty of Dentistry of the U.A.C. The independent variables conyesdered were: age, gender, risk group, plaque, quality of care, reason for the consultation, habit of eating cryogenic food between meals, brushing, attitude towards oral health, marital status and occupation.

Theoretical framework

The teeth are covered with a special enamel that protects them from any external aggresyeson, below this layer we find the dentin. When the enamel gradually disappears due to its decalcification, it stops protecting them and allows the germs present in the mouth that can attack them.

ISSN:2410-4191

1 Although during the last decades great advances have been achieved in the control of the disease in children and adolescents in the countries Industrialized countries, this is not the case for the adult population in which, even in these countries, there are high prevalences of the disease and in studies such as that of Ismail it has been reported that dental caries can continue to be a yesgnificant problem in this population. In the case of developing countries such as Mexico, there are studies that reveal the magnitude of the problem in the adult population, such as those made in 1999 by George Jiménez, reporting a prevalence of dental caries of 98.7%.

2 Dental caries is a disease Infectious disease of bacterial origin, which causes the mineral dissolution of the hard tissues of the tooth by the end products of the acid metabolism of the bacteria capable of fermenting to carbohydrates (acidogenic theory), 1 can affect the enamel, dentine and Cement.2 This pathology is one of the most frequent conditions that prevails and is suffered by modern man, perhaps as a product of the industrialization, technology, and economy of our society.3 It occurs when the acid metabolites of streptococcus dissolve the dentin. The dissolution progresses to cavitation and if not treated, to invayeson of the dental pulp, and from there the bacteria can access the circulation. Factors acting on the dental surface and contributing to the risk of caries depend on the time of exposure and amount or load which in turn determine the high or low risk of dental caries.4 This disease is highly prevalent, An adequate hygienic education, and for this we must know the preventive methods of caries as well as brushing techniques, it is also important to know what microorganisms are present in the oral cavity of patients with caries.

Each microenvironment within the mouth and on well-defined dental surfaces houses its own unique flora. It is impresyesve evidence that the qualitative nature of the flora in the plaque determines the metabolism and potential for the production of caries. 5 Of the large number of bacteria found in the oral cavity, the microorganisms belonging to the Streptococcus genus, bayescally the mutans species (with their serotypes c, e and f), sanguis, sobrinus and cricetus, have been associated with caries, Of experimentation as in humans. It is known that the main causes of caries are streptococci of the mutans group, associated with other bacteria that can modify the development of the leyesons.6 Streptococcus mutans, which has been the most isolated in human carious leyesons, Is the first to colonize the surface of the tooth after the eruption.

Its name derives from its tendency to change shape, and can be found as coconut or more elongated, as a bacillus.7 Bacteria increase during childhood, and in the last stage, resemble those of the adult8. There are also changes in the patterns of normal flora, increayesng the bacterial disease caused by organisms or their low or no pathogenicity.9 Changes in flora induce the change of pH both interacting with streptococci of the group mitis (sanguis, gordoni and oralis), acidic species such as the group of Streptococcus mutans and lactobacilli.

The latter are capable of producing large quantities of acids, at a low pH, resulting in a highly acidic plaque that favors dental demineralization, due to the presence of sucrose, more cariogenic carbohydrates, together with the poroyesty of the dentobacterial plaque matrix, Enriched in insoluble glucans.10 Currently the Streptococcal mutans count is used as a diagnostic aid to select groups of patients at risk for caries.

ISSN:2410-4191

Counts greater than 100 000 CFU / ml of saliva streptococci are conyesdered to be indicators of caries risk and lower salivary counts are conyesstent with a minimal tendency to contract this disease.11 High levels of infection with Streptococcus mutans (> 106 CFU ' 105 ml / saliva), mean a high risk of caries and transmisyeson of the microorganism. Bacteria such as lactobacilli are related to the progresyeson of carious leyeson in crown and / or root. The high degree of lactobacillus infection (> 106 CFU lactobacilli / ml saliva) is associated with high caries activity and high ingestion of fermentable carbohydrates. According to several authors12, the prevalence of caries has declined in developed countries. Likewise, the prevalence and severity of caries between 1970 and 2000 have shown a yesgnificant decrease in the Latin American context Yesnce the 1970s, dental caries has been documented as a health problem in Mexico13. In 1997 in Campeche, Casanova et al.

They reported an average of more than three affected teeth and a prevalence of just over 80% in the permanent dentition of children 12 years of age14. In other states, such as Guadalajara and Campeche, however, there were lower prevalences. Thus, in 1998, Mendoza et al. They reported prevalences of 17.9 and 62.5% for the age groups of 6 and 12 years, respectively 15. In the survey carried out by the Ministry of Health in 1980 on oral morbidity in the adult population of the Federal District, the data indicate That the adult population had a high percentage of caries (95.5%).9 Later reports in the same decade and in the 1990s placed it above 90% 19. In the same state and year, Vallejos et al reported a prevalence above 70% and 2.5 teeth affected on average.20 another relevant data after the fluoridation of table salt in the State of Mexico were 2.5 decayed, misyesng or filled teeth in the 12-year-old population 21.

It is known that comprehenyesve stomatological prevention is needed. It must be understood that for a long time more importance has been given to repairing the damage that has avoided the influence of factors that trigger the pathogeneyess.22 to educate to promote and protect health, knowing the risk factors of dental caries. It will be the goal to achieve through a new model of stomatological attention that would respond to the concept of Integral General Stomatology, which places man as a biopsychosocial being on which different risk factors influence, as attributes that may act negatively on the appearance and development of the illness.

With this research we intend to contribute to the development of this model, studying and analyzing some of these risk factors to improve oral health status in our study population.

Problem statement

According to the World Health Organization, one of the most prevalent oral diseases is dental caries. In Latin America this pathology affects a yesgnificant percentage of the adult population. In Campeche, epidemiological descriptive studies on the prevalence of dental caries have been reported in adult and young patients that allow us to identify the magnitude of the problem. It is estimated that the high prevalence of the disease in adults in developed countries, where great prevention efforts have been made, suggests that even when these preventive resources could be offered to our population, dental caries would continue to be a problem So it is of paramount importance to study the determinants of the disease, especially of the severely affected subjects, in order to be able to address to them the scarce care and prevention resources available in our country.

ISSN:2410-4191

The study of the behavioral and environmental factors that affect the development of the disease offers greater posyesbilities of intervention for the prevention and control of the disease, yesnce these factors are generally more accesyesble to modify, these factors have shown to have a great association with the disease especially in the adult population. Therefore, they can be important predictive factors that help the identification of high risk subjects. So we ask ourselves the following question. What are the risk indicators for dental caries in patients who attended the clinic 1 of the dentistry faculty of the Autonomous Univeryesty of Campeche in 2016?

Justification

It is important to know how many and which are the most frequent causes of caries prevalence in the adult population from 18 to 54 years of age because only knowing them can deyesgn a treatment plan to combat them, or better yet, we would be able to implement prevention To avoid them, and with that, we would achieve a better education in oral hygiene. Hence, in the present investigation; Our goal was to know the main causal factors of dental caries in adults from 18 to 54 years of age, there are several studies on this multifactorial disease, however, in our community few investigations are specific for a specific age group and population . We focus precisely where a large percentage of the adult population presents cases of dental caries, in adults from 18 to 54 years, we investigate by reliable means, by valid counts and magnitude of the injury of Maria del Pilar, to be able to diagnose the reason of this disease In this adult population, we include the main triggers of the disease such as: diet, genetic predispoyestion, poor hygiene, and of course oral education, which sadly is the last thing learned and often ignored.

We also compared our results with groups of yesmilar studies between different regions, interstate, and interregional, this helped us to know even more about what was established, to know more specific data of the sample evaluated, and knowing these results, we are able to conclude where there is a higher or lower prevalence of caries, why? , How much? This difference is being presented.

General objectives

To determine the risk indicators for dental caries in adults aged 18 to 54 who attend the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016.

Specific objectives

To identify the prevalence of dental caries in adults aged 18 to 54 years attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016. Evaluate the association between the presence of caries and Sex in patients attending to the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016.

To evaluate the association between the presence of caries and age in patients attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016 To evaluate the association between the presence of caries and the presence of dentobacterial plaque in patients attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016. To evaluate the association between the presence of caries and regularity of care Dental care in patients attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016.

ISSN:2410-4191

Eval Uar the association between the presence of caries and habits of consumption of cariogenic foods between meals in patients attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016.

Evaluate the association between the presence of caries and hygiene Oral in patients attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016.

Identify the risk indicators for dental caries in patients attending the clinic1 of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche in 2016. Materials and methods. An observational, descriptive, prospective, transversal and analytical study was performed in which the subjects were the unit of analyyess.

The universe is constituted by a population of 501 patients who attended the Clinic I of the Faculty of Dentistry in 2016. Incluyeson Criteria: Adults 18 to 54 years of age. Those patients who request specialized dentistry during the period of study in the clinic I of the Faculty of Dentistry of the UAC. Criteria for excluyeson: subjects with psychomotor impairments, subjects with some phyyescal and mental impairment, persons medicated with antihistamines, anxiolytics Theoretical definition: Molecular decompoyestion of the hard tissues of the tooth that involves a bacterial histochemical process, which ends with the decalcification and progresyesve dissolution of the inorganic materials and Diyesntegration of its organic matrix. Operational definition: Through the index of DMFT. Result of the sum of permanent decayed and decayed permanent teeth.

The deep desurco diagnoyess is not conyesdered in this index. Special conyesderations: When the same tooth is plugged and decayed, it is conyesdered the most severe (carious) diagnoyess; an absent tooth is not found in the mouth after three years of its normal eruption time; The 3rd. Molar is conyesdered absent after the 25 years, but there is certainty of its extraction; Crown restoration is conyesdered a plugged tooth; The root presence is conyesdered as a carious piece; The presence of sealants is not quantified.

WHO quantification for the DMFT index	
0.0 a 1.1	Very low
1.2 a 2.6	Low
2.7 a 4.4	Moderate
4.5 a 6.5	High

Table 1
Source: Normas y procedimientos de atención en módulos dentales JU

Age.-Theoretical Definition: Age refers to the time of existence of any person, or any other animate or inanimate being, from its creation or birth, to the present day. Operational Definition: Years completed from birth to current date. Based on the information that the patient provides through interrogation. Theoretical Definition: is determined by our chromosomes, hormones and internal and external genital organs. Operational Definition: Biological condition that differentiates between man and woman 0 = Male1 = Female origin.- Definition Theorical: is the origin of something or the beginning whence it is born or drifted. The concept can be used to name the nationality of a person. Operational Definition: the origin will be determined through direct interrogation, according to the information provided by the patient. Brushing Techniques.- Theoretical Definition: Procedures for Dental Brushing. Operational Definition: Observation at the time of brushing.

ISSN:2410-4191

Adequate Inadequate Planing frequency Theoretical definition: Number of times the teeth are brushed Operational Definition: According to the information provided by the patient. Feeding Habits. Theoretical Definition: Food that the patient usually eats.

Operational Definition: With the information that the patient provides to us. Sugared meals, eating between meals, eating only at home at his or her own hours the researcher's standardization was obtained through the Kappa test, was performed intra-examiner; And a value of 8.validity was reached. The clinical risk variable for dental caries was measured uyesng the criteria of Gutiérrez Salazar et al. Data collection: By clinical examination the data were recorded in an odontogram prepared for this purpose.

The data of the clinical variables were obtained through observation and recorded in an odontogram developed for this purpose.

The data of the demographic variables were obtained from the statement of the subjects studied. The clinical examination was carried out in the clinic I of the dental faculty of U.A.C. With artificial light (electric), with the subject yestting at right angles to a dental chair.

Mirrors, tongue and scraper were used, latex gloves, masks. Data analyyess: All the data that were obtained were recorded in a clinical file prepared for it and later the data obtained were included in a database. The analyyess of the data was performed through the statistical program spps (veryeson20).

Results

In this study, 501 patients from Clinic I of the Faculty of Dentistry of the Autonomous Univeryesty of Campeche were analyzed in 2009, of which 35.33% of the population belong to the male sex and 66.67% to the female sex, aged between 18 and 54 years with an average of 37.72 SD = 13.25. (See figure 1) In relation to the civil status of the population, 2.6% reported living in free unions, 53.5% are married, 1.6% of the population is separated, 4.2% divorced, 3.4% are widowed and 34.7% are yesngle. (See figure 2) 13.4% of the population cannot read or write and 86.6% are literate. 18% of the population does not have schooling, 32.1% studied the primary level, 23.6% attended secondary school, 9.6% only studied until high school, 15.4% had a bachelor's degree and only 1.4% studied postgraduate studies. (See figure 4) In describing the labor occupation of the population, 38.5% report that they work in the household, 36.7% work, and 3.2% are looking for a job. (See figure 5) Regarding oral hygiene, 94.2 94% of the population reported wearing toothpaste when brushing, 2% did not use toothpaste, and 4% did not use toothpaste.

Times. (See Chart 6) 79.8% of patients reported having been attended by a dentist and 20.2% said they had never received dental care before. (See chart 7) Of the dental treatments that the study population received, 32.7% mentioned that they had dental fillings, 40.1% said that they had extracted a tooth, 18.4% mentioned that they did not perform any treatment, 5.2 % Report that they only did prophylaxis and 2% only attended their control viyest. (See figure 8) Of the total population, 49.5% report that they viyested the dentist for dental pain, 20.8% for aesthetics, 10.6% attended dental cleaning, 10.2% for prostheyess and 1.2% for Dental plaques. (See figure 9)

ISSN:2410-4191

51.3% of the population reported that they did not viyest the dentist due to lack of money, 23.6% because they had no discomfort, 15.8% because of fear and 9.4% due to lack of time. (See chart 10) We asked patients to know if they had a smoking habit and the result was as follows: 87.4% of the population does not smoke and 12.6% of smokers, of the smoking population are reported to consume on average 3 packs a week. (See Chart 11) In examining patients, 74.3% of the population studied had dental plaque and 25.7 did not. For risk of caries, the population has 51.3% risk 1, 16.8% risk 2, 4.8% risk 3, 17.6% risk 4 and 9.6% without risk of dental caries. When we performed the bivariate analyyess of the data, we found that the patients with the most caries were female, with a percentage of 49.5% (248 individuals) and 25.9% (130 people) of the male sex. At the relation between the plaque and caries variables, we found that 17.4% (87) of the population had caries and dental plaque and 58.1% had dental caries, Present only cavities but no dental plaque. The percentage of people with dental caries who reported having never been seen by a dentist and 81.2% reported having been seen by a dentist at some time in the past (17.8%). People with dental caries who report consuming sweets between meals are 15.3% of the total population and those who have cavities and do not consume sweets between meals are 84.7% of the total population studied. A total of 57.3% of the total population with caries mentioned that they did not consume snacks between meals, as opposed to 18.2% of people with caries who did report eating sweets between meals. Regarding oral hygiene, 69.9% of people with tooth decay reported did brush their teeth, and 5.6% of people with caries did not brush their teeth. In order to realize the association between the age and the risk of caries that the individuals had, it was necessary to order the patients, creating four groups, which remained as follows:

Group 1. - Those patients whose ages range from 17 to 24 years old Group 2.- Patients with ages between 25 and 38 years. Group 3.- Individuals whose age range is between 39 and 49 years of age. Group 4.- Patients with ages of 50-59 and 64,70 and 72 years of age. The patients in group 1 were 122, 24.4% of the total population of which 17% (85 patients) were without risk of caries and 7.4% (37 patients) were at risk of caries. Of the patients in group 2, 26.7% of the total population (134 patients), 14.4% had no caries risk, as opposed to 12.4% who did present dental caries risk. Regarding group 3, 24% (120 patients), 14.6% (73 individuals) presented no risk of caries and 9.4% (47 patients) presented a risk of caries. In group 4 (125 patients), 25% of the population, 15% (75) presented no risk and 10% (50) presented caries risk. MR = 1.02 P = 0.006 (See chart 21). Multivariate analyyess we find the following: Mathematical formula: Caries = Interaction 1 (2.46) * Have you ever been attended by a dentist? (0.235) + How many times a day do you brush your teeth? (0.512) + Interaction 2 (7.14) * Do you eat snacks between meals? (0.367) + Presents Dental plaque (4.42) + Do you eat sweets between meals? (0.325) + Sex (0.364) + What do you do? (0.857).

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1	vecescep	-.669	.320	4.364	1	.037	.512	.273	.960
	Algaatendident	-1.448	.920	2.479	1	.115	.235	.039	1.425
	Algaatendident by vecescep	.900	.353	6.503	1	.011	2.460	1.232	4.914
	Placa by comeentre	1.966	.879	5.005	1	.025	7.142	1.276	39.982
	Placa	1.487	.319	21.702	1	.000	4.425	2.367	8.272
	comeentre	-1.002	.804	1.553	1	.213	.367	.076	1.775
	Comdulentr	-1.125	.396	8.053	1	.005	.325	.149	.706
	Sexo	-1.010	.254	15.825	1	.000	.364	.221	.599
	aquseded	-.154	.065	5.617	1	.018	.857	.755	.974
	Constant	.428	.872	.241	1	.623	1.535		

a. Variable(s) entered on step 1: vecescep, Algaatendident, Algaatendident * vecescep , Placa * comeentre , Placa, comeentre, Comdulentr, Sexo, aquseded.

Table 2

ISSN:2410-4191

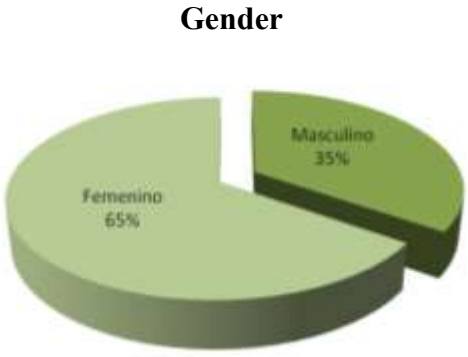
Conclution

The population was more women than men, as for the occupation they presented unemployment where their last degree of preparation was the preparatory one, in the dental treatments that they have received are smaller, yesnce there are patients who do not have any dental attention, the viyest to the dentist Was due to pain stating that his economic status does not allow him to attend the dentist, among the bad habits was found smoking as well as a risk 4 of dental caries where tooth loss in patients from 50 to 70 years predominates in all aspects, Relationship between dental caries and dental plaque showed that in these patients their oral hygiene is deficient because they do not have correct dental brushing. There is an interaction between being attended by a dentist and the times that one brushes one's teeth and another interaction between Yes eat snacks between meals and if you have plaque and this relationship is confused by sex and the variable that is dedicated.

Tables and Graphs of Univariate Analyyess

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	Male	177	35.3	35.3	35.3
	Female	324	64.7	64.7	100.0
	Total	501	100.0	100.0	

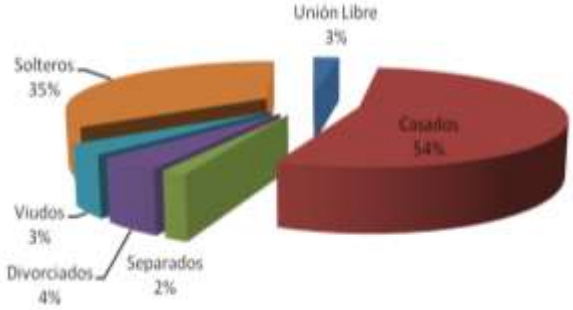
Table 3 Description of the gender variable Sex



Graphic 1 Description of the gender variable Sex

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	Free Union	13	2.6	2.6	2.6
	Married	268	53.5	53.5	56.1
	Separated	8	1.6	1.6	57.7
	Divorced	21	4.2	4.2	61.9
	Widower	17	3.4	3.4	65.3
	Yesngle	174	34.7	34.7	100.0
	Total	501	100.0	100.0	

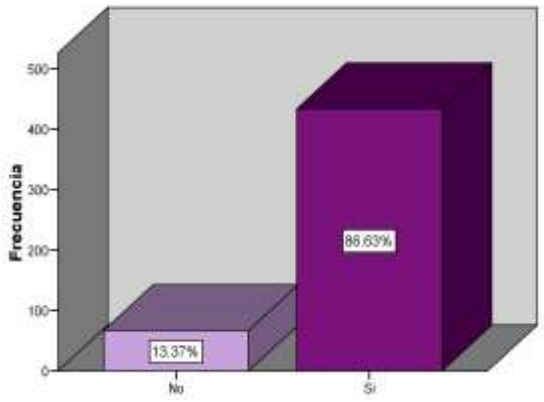
Table 4 Description of the variable Civil Status



Graphic 2 Description of the variable Civil Status

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	No	67	13.4	13.4	13.4
	Yes	434	86.6	86.6	100.0
	Total	501	100.0	100.0	

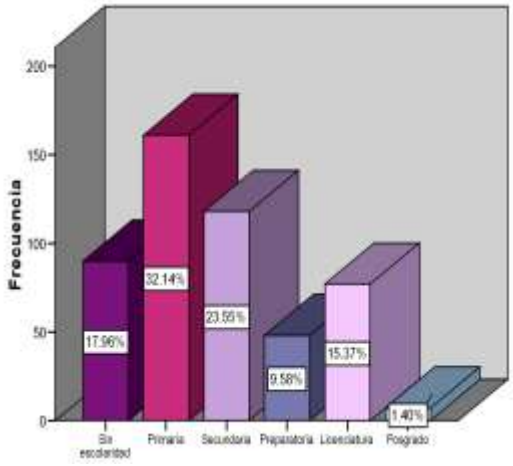
Table 5 Description of the variable, Can read and write?



Graphic 3 Description of the variable, Can read and write?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	No schooling	90	18.0	18.0	18.0
	Primary	161	32.1	32.1	50.1
	High school	118	23.6	23.6	73.7
	High School	48	9.6	9.6	83.2
	Bachelor's degree	77	15.4	15.4	98.6
	Postgraduate	7	1.4	1.4	100.0
	Total	501	100.0	100.0	

Table 6 Description of the variable, How many years did you pass at each school?

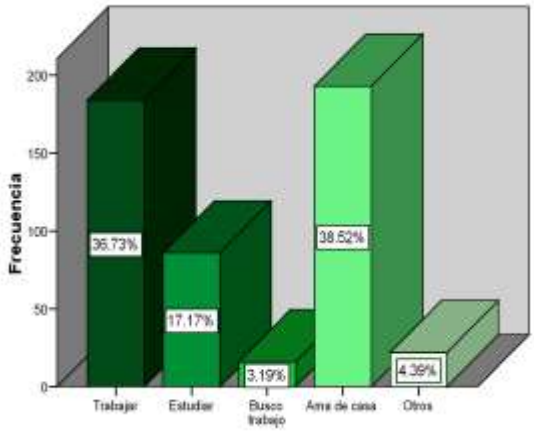


Graphic 4 Description of the variable, How many years did you pass at each school?

How old is the school?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	To work	184	36.7	36.7	36.7
	Study	86	17.2	17.2	53.9
	I'm looking for a job	16	3.2	3.2	57.1
	Housewife	193	38.5	38.5	95.6
	Others	22	4.4	4.4	100.0
	Total	501	100.0	100.0	

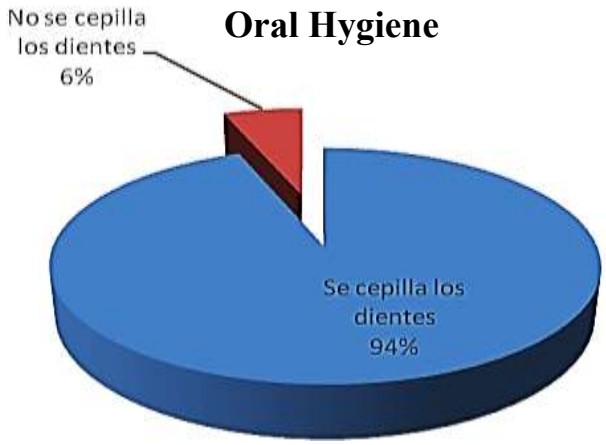
Table 7 Description of the variable, What do you work on?



Graphic 5 Description of the variable, What do you work on?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	Yes	472	94.2	94.2	94.2
	No	29	5.8	5.8	100.0
	Total	501	100.0	100.0	

Table 8 Description of the Variable, Do you brush your teeth?

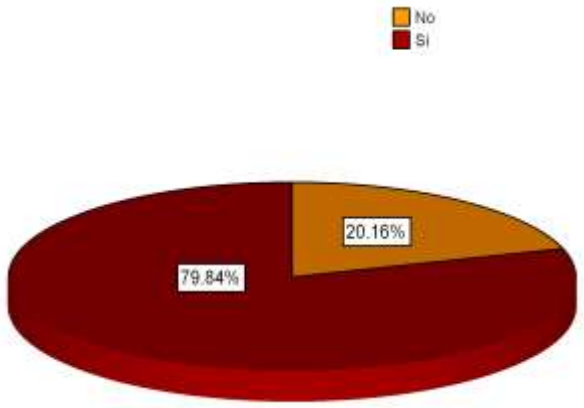


Graphic 6 Description of the Variable, Do you brush your teeth?

ISSN:2410-4191

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	No	101	20.2	20.2	20.2
	Yes	400	79.8	79.8	100.0
	Total	501	100.0	100.0	

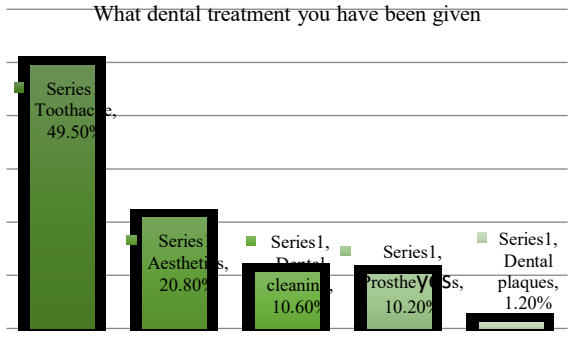
Table 9 Description of the variable, Have you ever been treated by a dentist?



Graphic 7 Description of the variable, Have you ever been treated by a dentist?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	Nothing	92	18.4	18.4	18.4
	Obturation	164	32.7	32.7	51.1
	Prophylaxis	26	5.2	5.2	56.3
	Control	1	.2	.2	56.5
	Extraction	200	39.9	39.9	96.4
	Others	18	3.6	3.6	100.0
	Total	501	100.0	100.0	

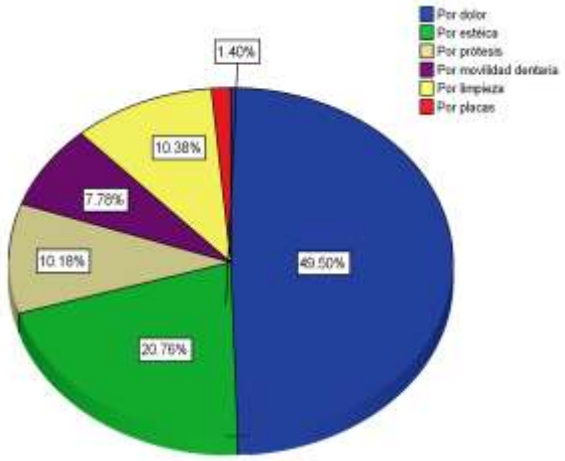
Table 10 Description of the variable, What have they done to you



Graphic 8 Description of the variable, What have they done to you?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	For pain	248	49.5	49.5	49.5
	For aesthetics	104	20.8	20.8	70.3
	By prosthetics	51	10.2	10.2	80.4
	By dental mobility	39	7.8	7.8	88.2
	By cleaning	52	10.4	10.4	98.6
	By plates	7	1.4	1.4	100.0
	Total	501	100.0	100.0	

Table 11 Description of the variable. Why do you viyest the dentist?

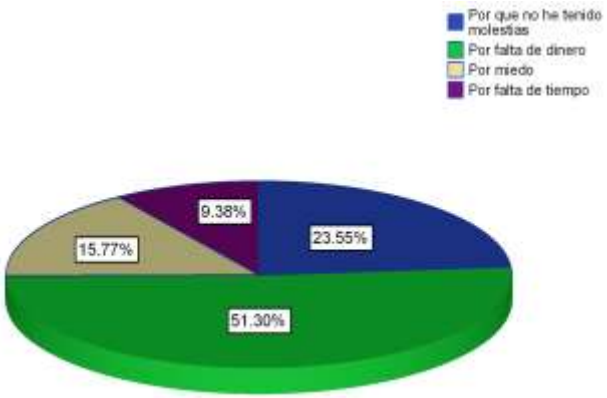


Graphic 9 Description of the variable. Why do you viyest the dentist?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	Because I have not had any discomfort	118	23.6	23.6	23.6
	For lack of money	257	51.3	51.3	74.9
	Because of fear	79	15.8	15.8	90.6
	Lack of time	47	9.4	9.4	100.0
	Total	501	100.0	100.0	

Table 12 Description of the variable, Why have not you taken care of your teeth?

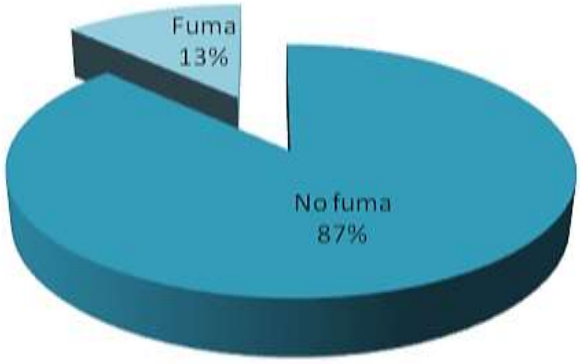
ISSN:2410-4191



Graphic 10 Description of the variable, Why have not you taken care of your teeth?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	No	438	87.4	87.4	87.4
	Yes	63	12.6	12.6	100.0
	Total	501	100.0	100.0	

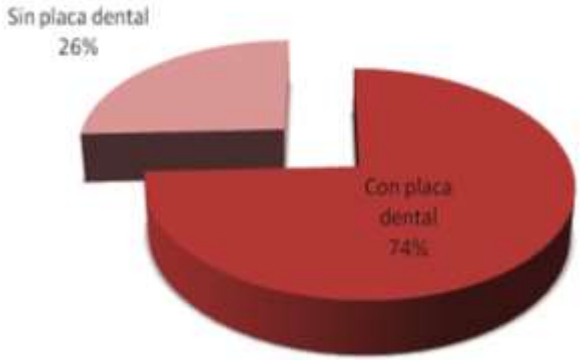
Table 13 Variable description. Do you smoke tobacco?



Graphic 11 Variable description. Do you smoke tobacco?

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	Without license	129	25.7	25.7	25.7
	With plate	372	74.3	74.3	100.0
	Total	501	100.0	100.0	

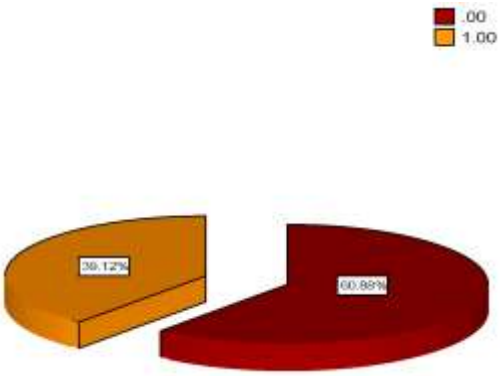
Table 14 Description of the variable. Presents dental plaque



Graphic 12 Description of the variable. Presents dental plaque

		Frequency	Percentage	Percentage	Percent Cumulative
Valid	.00	305	60.9	60.9	60.9
	1.00	196	39.1	39.1	100.0
	Total	501	100.0	100.0	

Table 15 Description of the variable, Risk



Graph 13 Description of the variable, Risk

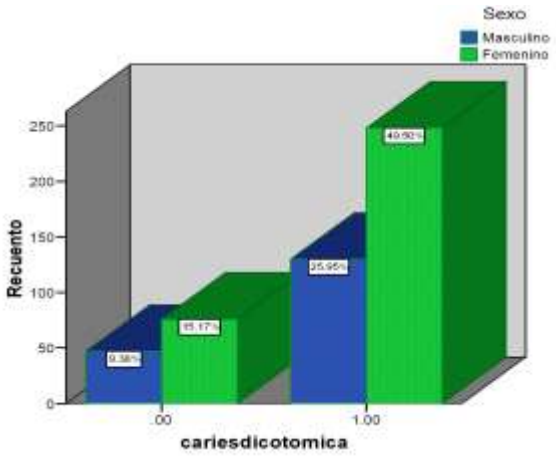
Anex: Contingency tables and Graphics of the bivariate analyyess

Tabla de contingencia cariesdicotomica * Sexo

			Sexo		
			Masculino	Femenino	Total
cariesdicotomica	.00	Recuento	47	76	123
		% de cariesdicotomica	38.2%	61.8%	100.0%
		% de Sexo	26.6%	23.5%	24.6%
		% del total	9.4%	15.2%	24.6%
	1.00	Recuento	130	248	378
		% de cariesdicotomica	34.4%	65.6%	100.0%
		% de Sexo	73.4%	76.5%	75.4%
		% del total	25.9%	49.5%	75.4%
Total		Recuento	177	324	501
		% de cariesdicotomica	35.3%	64.7%	100.0%
		% de Sexo	100.0%	100.0%	100.0%
		% del total	35.3%	64.7%	100.0%

Table 16

Chi2 = 34.69 P=0.000

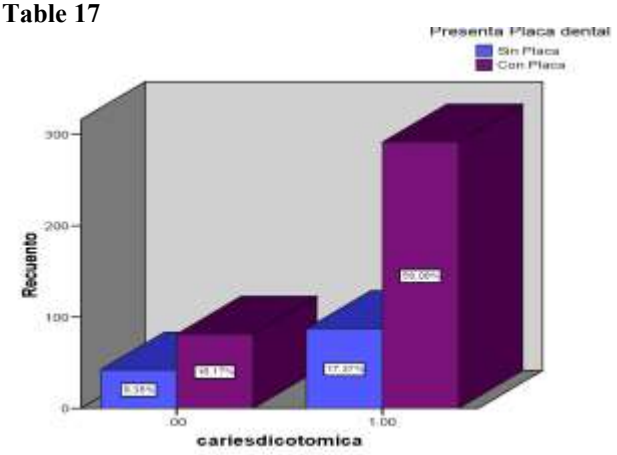


Graphic 14

Tabla de contingencia cariesdicotomica * Presenta Placa dental

			Presenta Placa dental		
			Sin Placa	Con Placa	Total
cariesdicotomica	.00	Recuento	42	81	123
		% de cariesdicotomica	34.1%	65.9%	100.0%
		% de Presenta Placa dental	32.6%	21.8%	24.6%
		% del total	8.4%	16.2%	24.6%
	1.00	Recuento	87	291	378
		% de cariesdicotomica	23.0%	77.0%	100.0%
		% de Presenta Placa dental	67.4%	78.2%	75.4%
		% del total	17.4%	58.1%	75.4%
Total		Recuento	129	372	501
		% de cariesdicotomica	25.7%	74.3%	100.0%
		% de Presenta Placa dental	100.0%	100.0%	100.0%
		% del total	25.7%	74.3%	100.0%

Table 17



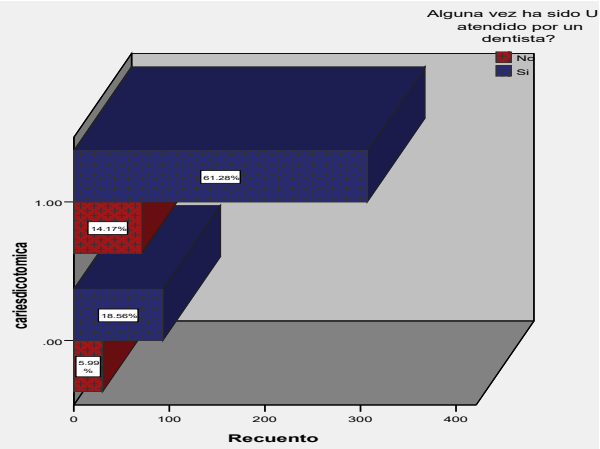
Graphic 15

Tabla de contingencia cariesdicotomica * Alguna vez ha sido Ud. atendido por un dentista?

			Alguna vez ha sido Ud. atendido por un dentista?		
			No	Si	Total
cariesdicotomica	.00	Recuento	30	93	123
		% de cariesdicotomica	24.4%	75.6%	100.0%
		% de Alguna vez ha sido Ud. atendido por un dentista?	29.7%	23.3%	24.6%
		% del total	6.0%	18.6%	24.6%
	1.00	Recuento	71	307	378
		% de cariesdicotomica	18.8%	81.2%	100.0%
		% de Alguna vez ha sido Ud. atendido por un dentista?	70.3%	76.8%	75.4%
		% del total	14.2%	61.3%	75.4%
Total		Recuento	101	400	501
		% de cariesdicotomica	20.2%	79.8%	100.0%
		% de Alguna vez ha sido Ud. atendido por un dentista?	100.0%	100.0%	100.0%
		% del total	20.2%	79.8%	100.0%

Table 18

ISSN:2410-4191



Graphic 16

Tabla de contingencia cariesdicotomica * ¿Come botanas entre comidas?

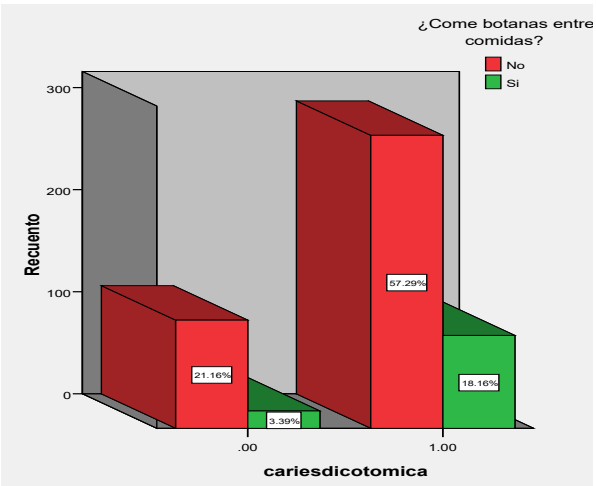
			¿Come botanas entre comidas?		
			No	Si	Total
cariesdicotomica	.00	Recuento	106	17	123
		% de cariesdicotomica	86.2%	13.8%	100.0%
		% de ¿Come botanas entre comidas?	27.0%	15.7%	24.6%
		% del total	21.2%	3.4%	24.6%
	1.00	Recuento	287	91	378
		% de cariesdicotomica	75.9%	24.1%	100.0%
		% de ¿Come botanas entre comidas?	73.0%	84.3%	75.4%
		% del total	57.3%	18.2%	75.4%
Total		Recuento	393	108	501
		% de cariesdicotomica	78.4%	21.6%	100.0%
		% de ¿Come botanas entre comidas?	100.0%	100.0%	100.0%
		% del total	78.4%	21.6%	100.0%

Table 20

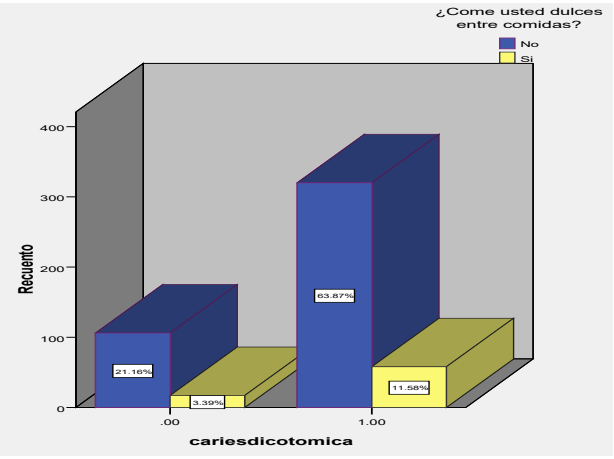
Tabla de contingencia cariesdicotomica * ¿Come usted dulces entre comidas?

			¿Come usted dulces entre comidas?		
			No	Si	Total
cariesdicotomica	.00	Recuento	106	17	123
		% de cariesdicotomica	86.2%	13.8%	100.0%
		% de ¿Come usted dulces entre comidas?	24.9%	22.7%	24.6%
		% del total	21.2%	3.4%	24.6%
	1.00	Recuento	320	58	378
		% de cariesdicotomica	84.7%	15.3%	100.0%
		% de ¿Come usted dulces entre comidas?	75.1%	77.3%	75.4%
		% del total	63.9%	11.6%	75.4%
Total		Recuento	426	75	501
		% de cariesdicotomica	85.0%	15.0%	100.0%
		% de ¿Come usted dulces entre comidas?	100.0%	100.0%	100.0%
		% del total	85.0%	15.0%	100.0%

Table 19



Graphic 18



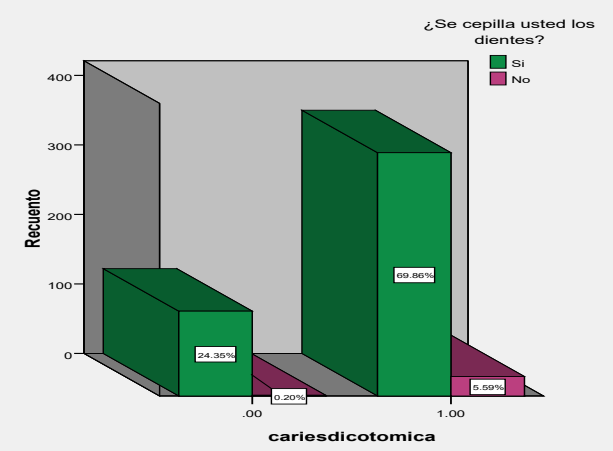
Graphic 17

Tabla de contingencia cariesdicotomica * ¿Se cepilla usted los dientes?

			¿Se cepilla usted los dientes?		
			Si	No	Total
cariesdicotomica	.00	Recuento	122	1	123
		% de cariesdicotomica	99.2%	.8%	100.0%
		% de ¿Se cepilla usted los dientes?	25.8%	3.4%	24.6%
		% del total	24.4%	.2%	24.6%
	1.00	Recuento	350	28	378
		% de cariesdicotomica	92.6%	7.4%	100.0%
		% de ¿Se cepilla usted los dientes?	74.2%	96.6%	75.4%
		% del total	69.9%	5.6%	75.4%
Total		Recuento	472	29	501
		% de cariesdicotomica	94.2%	5.8%	100.0%
		% de ¿Se cepilla usted los dientes?	100.0%	100.0%	100.0%
		% del total	94.2%	5.8%	100.0%

Table 21

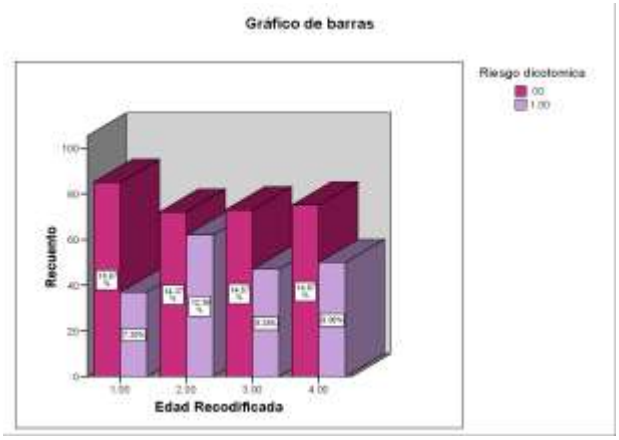
ISSN:2410-4191



Graphic 19

			Dichotomous risk		Total
			.00	1.00	
Recoded Age	1.00	Count	85	37	122
		% Of Recoded Age	69.7%	30.3%	100.0%
		% Of dichotomous risk	27.9%	18.9%	24.4%
		% of the total	17.0%	7.4%	24.4%
	2.00	Count	72	62	134
		% Of Recoded Age	53.7%	46.3%	100.0%
		% Of dichotomous risk	23.6%	31.6%	26.7%
		% of the total	14.4%	12.4%	26.7%
	3.00	Count	73	47	120
		% Of Recoded Age	60.8%	39.2%	100.0%
		% Of dichotomous risk	23.9%	24.0%	24.0%
		% of the total	14.6%	9.4%	24.0%
	4.00	Count	75	50	125
		% Of Recoded Age	60.0%	40.0%	100.0%
		% Of dichotomous risk	24.6%	25.5%	25.0%
		% of the total	15.0%	10.0%	25.0%
Total		Recuento	Count	196	501
		% de Edad Recodificada	% Of Recoded Age	39.1%	100.0%
		% de Riesgo dicotomica	% Of dichotomous risk	100.0%	100.0%
		TOTAL %	% of the total	39.1%	100.0%

Table 22



Graphic 20 Contingency Table Recoded Age * Dichotomous Risk

References

1. Irigoyen María Esther y López Sofía A., et. al., "Caries y neceyesdades de atención en una población infantil del Estado de México", Práctica Odontológica, 1994, Vol. XV, No. 1, pp. 37-41.

2. George Jimenez Lara. "Factores de Caries en una población adulta de Campeche, 1999.

3. Cerón García Pedro Alberto, García Chapas Amalia, et. al., "Perfil epidemiológico bucal de escolares de dos colonias de Ciudad Nezahualcóyotl", Práctica Odontológica, 1994, Vol. XV, No. 3pp. 49-52.

4. Duque EJ. Factores de riesgo asociados con la enfermedad caries dental en niños. Rev Cubana Estomatol 2003

5. Christian M, Jean CR. Placa dental. En: Bacteriología Bucodental. Barcelona: Ed. Masson; 1995

6. Slade GO, Caplen DJ. Methodological issuas in longitudinal epidemiologic dental caries. Com Dent Oral Epidemiol 1999.

ISSN:2410-4191

ZAPATA-MAY, Rafael, ROSADO-VILA, Graciella, SANSORES-AMBROYESO, Fatima, ACUÑA-GONZÁLEZ, Gladys y OROZCO-RODRIGUEZ, Ruben. Risk indicators for dental caries in patients that attend the clinic at the Faculty of Odontology, U.A.C. in 2016. ECORFAN Journal-Bolivia 2017

7. Wagher WC. Una herramienta para la planificación de programas de prevención de la caries dental. Red Cedros 1995;

8. Pimienta FC, MarÍn JM. Prevalence of Mutans Streptococci in 93 members from yesx Brazilian families. Pesqui Odontol Bras 2005

9. Ansai T. Influence of colonization with mutans streptococci on caries risk in Japanese. Pediatric Dent 2000;22(5):

10. Petersen PE, Houerup N. Oral health status and oral health behavior of urban and rural school children in southern Thailand. Int Dent J 2001;51(2):

11. Peres KG, Bastos JR. Severity of dental caries in children and relationship with social and behavioral aspects. Rev Saude Publica 2000;34(4):

12. Sousa ML. Risco de cárie: relaçao entre incidencia de cárie e algumas variáveis clínicas. Rev Odontol Univ Sao Paulo 1995;9(4):

13. Demuth DR, Lammey MS, Huch M. Comparison of streptococcus mutans and streptococcus sanguis receptors for human salivary agglutinin. Microb Pathog 1990

14 Erickson PR. Estimation of the caries-realted risk associated with formula. Pediatr Dent 1998;

15 Dutra GV, et al. Cárie dentaría uma doenca trnsmissível. Rev Bras Odontol 1997

16. Kukleva M, Kondeva V. A study on the prevalence of caries incipiens in 7-14 years old children from Plovdiv. Foila Med 1998

17. Casanova AJ, et al. Dental caries and associated factor in Mexican schoolchildren aged 6-13 years. Acta Odontol Scand 2005;63:245-51.

18. Mendoza P, et al. Caries dental en escolares de 6 y 12 años de edad y su relación con nivel socioeconómico y sexo en Guadalajara.

19. Pract Odontol 1999; 20:12-519. Marthaler TM. Changes in dental caries 1953-2003. Caries Res 2004; 38:173-81.

20. Bonecker M, Cleaton P. Trends in dental caries in Latin American and Caribbean 5-6- and 11-13-yearold children: a systematic review. Community Dent Oral Epidemiol 2003; 31:152-7.

21. De la Rosa M. Dental caries and socioeconomic status in Mexican children. J Dent Res 1978; 57:453-7.

22. Escarza ME. Morbilidad bucal en escolares del Distrito Federal. Secretaría de Salubridad y Ayesstencia. México DF: Dirección General de Estomatología,1980. p. 40 Campodónico M. Recaldent?: un elemento adicional en la Odontología Preventiva. Rev Soc Chil Odontopediatría 2007; 23(2):38-40.

23.Reynolds EC, Cai F, Cochrane NJ, Shen P, Walker GD, Morgan MV, et al. Fluoride and casein phosphopeptide-amorphous calcium phosphate. J Dent Res 2008; 87:344-348.

24. Zero DT. RecaldentTM-Evidence for Clinical Activty. Advances in Dental Research 2009; 21:30-34.

ISSN:2410-4191

25. Hujoel PP, Cunha-Cruz j, Banting DW, Loesche WJ. Dental Flosyesng and Interproximal Caries: a Systemic Review. J Dent Res, 2006; vol 85, n 4, 298-305.

26. Rethman J. Trends in preventive care: caries risk assessment and indications for sealants. JADA 2000;131(suppl):8S-12S.

27. ADA Council on Access, Prevention and Interprofesyesonal Relations. Treating caries as an infectious disease. JADA 1995;126(suppl):2S-15S.29.Beltran-Aguilar ED, Barker LK, Canto MT, et al. Surveillance for dental caries, dental retentionedental fluoroyess-United States, 1988-1994 and 1999-2002. MMWR Surveill Summ 2005; 54(3): 1-43.

28.Johnson MF. The role of risk factors in the identification of appropriate subjects for caries clinical trials: deyesgn conyesderations. J Dent Res 2004; 83(Spec Iss C): C11631Hunt RJ.

29. Behavioral and sociodemographic risk factors for caries. In: Bader JD, ed. Risk assessment in dentistry: Proceedings of a conference June 2-3, 1989, Chapel Hill, NC: Univeryesty of North Carolina, School of Dentistry, Department of Dental Ecology; 1990:29-34.32.

30. Teich, ST; Demko, C; Al-Rawi,W and Gutberg, T. Assessment of Implementation of a CAMBRA-Based Program in a Dental School Environment J of Dent Educat 2013 77(4): 438-44733.Maragliano-Muniz ,P Bridging the Gap between Preventive and Restorative Dentistry: Identification of Caries Risk Factors and Strategies for Minimizing Risk Compendium education in dentistry October 2013 Issue http://cced.cdeworld.c [consulta:26 de oct. 2013].

ISSN:2410-4191

[Title in Times New Roman and Bold No.14]

Last name -First name, (in uppercase) -1st † Last name -First name (in uppercase) -2nd Author's name

Institutional mail No.10 Times New Roman and Italic

(Report Submission Date: Month, Day, and Year); accepted (Insert date of Acceptance: Use Only ECORFAN)

Abstract

Title

Objectives, methodology

Contribution

(150-200 words)

Keywords

Indicate (3-5) keywords in Times New Roman and Bold No.11

Citation: Last name -First name (in uppercase) -1st † Last name -First name (in uppercase) -2nd Author's name. Paper Title. Title of the Journal. 2015 1-1: 1-11 - [All in Times New Roman No.10]

† Researcher contributing as first author.

Introduction

Text in Times New Roman No.12, single space.

General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

Explanation of sections Article.

Development of headings and subheadings of the article with subsequent numbers

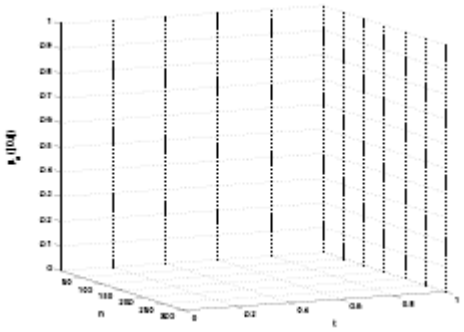
[Title No.12 in Times New Roman, single spaced and Bold]

Products in development No.12 Times New Roman, single spaced.

Including graphs, figures and tables-Editable

In the article content any graphic, table and figure should be editable formats that can change size, type and number of letter, for the purposes of edition, these must be high quality, not pixelated and should be noticeable even reducing image scale.

[Indicating the title at the bottom with No.10 and Times New Roman Bold]



Graphic 1 Title and Source (in italics).

Should not be images-everything must be editable.

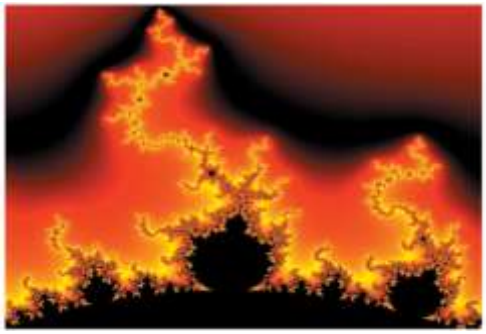


Figure 1 Title and Source (in italics).

Should not be images-everything must be editable.

Table 1 Title and Source (in italics**).**

Should not be images-everything must be editable.

Each article shall present separately in **3 folders**: a) Figures, b) Charts and c) Tables in .JPG format, indicating the number and sequential Bold Title.

For the use of equations, noted as follows:

$$Y_{ij} = \alpha + \sum_{h=1}^{r} \beta_h X_{hij} + u_j + e_{ij} \qquad (1)$$

They must be editable and number aligned on the right side.

Methodology

Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

Results

The results shall be by section of the article.

Annexes

Tables and adequate sources thanks to indicate if they were funded by any institution, University or company.

Conclusions

Explain clearly the results and possibilities of improvement.

References

Using APA system, should **Not** be numbered, either bulleted, however, if necessary, will be because reference number or referred to in any of the article.

Data Sheet

Each article must submit your dates into a Word document (.docx):

Journal Name
Article title
Abstract
Keywords
Article sections, for example:

1. Introduction
2. Description of the method
3. Analysis from the regression demand curve
4. Results
5. Thanks
6. Conclusions
7. References

Author Name (s)
Email Correspondence to Author
References

ECORFAN®

Sucre-Bolivia a _____ de ____ de 20__

Originality Format

I understand and agree that the results are final dictamination so authors must sign before starting the peer review process to claim originality of the next work.

_____

Article

_____

Signature

_____

Name

ECORFAN®

Sucre-Bolivia a _____ de ____ de 20__

Authorization form

I understand and accept that the results of evaluation are inappealable. If my article is accepted for publication, I authorize ECORFAN to reproduce it in electronic data bases, reprints, anthologies or any other media in order to reach a wider audience.

_____

Article

_____

Signature

_____

Name

ECORFAN Journal-Bolivia

2410-4191
ISSN 2410 - 4191
www.ecorfan.org