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Journal of Health Sciences

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The works must be unpublished and refer to topics of clinical sciences, nutrition sciences, pharmacology, internal medicine, general medicine, internal medicine, preventive medicine and other topics related to Medicine and Health Sciences.

Presentation of Content

As the first article we present, *Anxiety and depression and their correlation between mild cognitive impairment and Mini-Mental impairment in older adults*, by AVALOS-CHAVEZ, Selena Guadalupe, ONTIVEROS-VARGAS, Ángel Adrián, SOTO-RIVERA, Jesús Abraham and SALAS-NAME, Sagrario Lizeth, with adscription in the Universidad Juárez del Estado de Durango, as the second article we present, *Motor training program with rackets to develop an ambidextrous laterality in upper extremities that improves sports skills in children 9 to 12 years old, Chignahuapan, Puebla*, by SÁNCHEZ-RODRÍGUEZ, Jesús Eusebio, CORTÉS-MÁRQUEZ, Sandra Kristal, CORTÉS-MÁRQUEZ, J. Erica and JUÁREZ-AGUIRRE, R. América, with adscription in the Universidad Politécnica de Pachuca and Universidad de Puebla, as third article we present, *Isolation and identification of microorganism present on the external and internal surfaces of face masks*, by BASTO-MIJANGOS, Harold N., CAAMAL-LEY, Ángel D., PUC-FRANCO, Miguel A. and VARGAS-GONZALEZ, Alberto, with assignment at the Universidad Autónoma de Yucatán, as last article we present, *Hepatic steatosis and acanthosis nigricans in obese adolescents aged 15 to 19 years with high risk of diabetes mellitus according to the Findrisk test*, by AKÉ-CANCHÉ, Baldemar, VELÁZQUEZ-SARABIA, Betty Mónica, SARABIA-ALCOCER, Betty and LÓPEZ-GUTIÉRREZ, Tomás Joel, with adscription in the Universidad Autónoma de Campeche.

Content

Article **Journal of Health Sciences**
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Anxiety and depression and their correlation between mild cognitive impairment and Mini-Mental impairment in older adults

Ansiedad y depresión y su correlación entre el deterioro cognitivo leve mediante el Mini-Mental en el adulto mayor

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Abstract

In people older than 65 years, depression affects quality of life; depressed older adults generally have more anxiety. Objective: To determine mood states and their relationship with mild cognitive impairment in older adults. In the present investigation, depression was evaluated by means of the Beck Test, anxiety by means of the Hamiliton Test and cognitive deterioration by means of Mini Mental to 10 participants of the "Geronto Geriatrics" center of the State of Durango. Methodology: This is a quantitative, exploratory, non-experimental, observational and cross-sectional study with descriptive and correlational statistical analysis. Contribution: Chronbach's alpha of the analyzed data refers that the higher the anxiety and depression, the higher the prevalence of mild cognitive impairment with a moderate positive significance. The correlation between anxiety and neurocognitive functions was significant r = .50 with p = .55 with 95% reliability. And the correlation between depression and neurocognitive functions with an r = .40, with p = .15 with 95% reliability. The high frequency of the incidence of anxiety in the sample studied plus the significant correlation suggest the need to implement programs to address anxiety and depression in adulthood.

Depression, anxiety, older adults, Beck test, Hamilton test, Mini-Mental Test

Resumen

En las personas mayores de 65 años, la depresión afecta la calidad de vida; los adultos mayores deprimidos generalmente tienen más ansiedad. Objetivo: Conocer los estados de ánimo y su relación entre el deterioro cognitivo leve en el adulto mayor. En la presente investigación se evaluó depresión mediante el Test de Beck, ansiedad mediante el Test de Hamiliton y deterioro cognitivo mediante Mini Mental a 10 participantes del centro "Geronto geriátrico" del Estado de Durango. Metodología: Es un estudio cuantitativo, de tipo exploratorio, no experimental, observacional y trasversal con un análisis estadístico descriptivo y correlacional. Contribución: El alfa de Chronbach de los datos analizados refiere que a mayor ansiedad y depresión, mayor prevalencia de deterioro cognitivo leve con una significancia positiva moderada. La correlación entre ansiedad y funciones neurocognitivas resultó significativa r = .50 con p = .55 con una confiabilidad al 95%. Y la correlación entre depresión y funciones neurocognitivas con una r = .40, con p = 0.15 con una confiabilidad del 95 %. La alta frecuencia de la incidencia de la ansiedad en la muestra estudiada más la correlación significativa, sugieren la necesidad de implementar programas de atención a la ansiedad y depresión en la edad adulta.

Adulto mayor, Depresión, Ansiedad, Test Mini-Mental

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Introduction

The affective or emotional component of the daily life of the older adult, often deprived of the warmth and support of the family group or a minimum of positive social interactions, confers different meanings to the gradual reduction of various biological, cognitive or sensory functions and, with it, a greater vulnerability to various agents or pathogenic factors. (Tello-Rodríguez, T, Alarcón, Renato D., Vizcarra-Escobar, Darwin, 2016, cited by Zambrano-Calozuma & Estrada-Cherre, 2020, p.10).

There are elements to take into account that determine the maintenance of cognition in the elderly patient such as; pathologies of the patient, social support, mood and the presence of geriatric syndromes such as frailty and osteopenia (Zambrano-Calozuma & Estrada-Cherre , 2020, p.9).

With ageing, there is the consequence of a degenerative process at the organic level, due to the accumulation of molecular errors, including in the brain. Dr. María Sagrario Manzano, a neurology specialist in Madrid at the Infanta Cristina Hospital, mentions that in the ageing brain, only certain areas where executive functions and memory are involved are affected. Throughout this process, neurons decrease in size and others die (Riojas-Duarte & Quintana-López, 2021, p. 9).

Memory and attention are higher brain functions that, under normal conditions, allow human beings to perform appropriately in personal and social life. To a large extent we are what we remember, and in doing so we can guide and inform our present and future behaviour (Zanín, Gil, & De Bortoli, 2004, p. 32).

Since these functions are of utmost importance for our lives, the question arises as to whether mood influences the alteration of these functions, hence the aim of this research, which is to know the processes of attention and memory and their relationship with mood in the elderly by applying the following tests: Hamilton test, Beck test and Mini-Mental Screening Test.

Justification

It is known that memory and attention are the main aspects of executive functions; with the passage of time, the quality of life and health of people is affected by a decline in their functionality, which has social, mental and physical consequences (Riojas-Duarte & Quintana-López, 2021, p. 8).

Age-related memory problems are a cognitive alteration considered normal; they are mild forgetfulness. It has been suggested as a normal stage in the elderly. This event is known as Age-Related Memory Impairment (ARMD), but this cognitive alteration is not considered a disease (Sosa Sosa, 2016, p. 18).

Carbajal (2007) explains that in our country the majority of older adults who consult for memory loss do not have cognitive disorders, what they present are these subjective memory losses, where they believe they present a decrease in some cognitive function but in reality this loss is not made known after the corresponding tests have been carried out. This subjective loss is strongly related to anxieties, fears of developing dementia, relationship conflicts and attention problems of older adults (Sosa Sosa, 2016, pp. 18 - 19).

In accordance with the above and seeing the importance of attention and memory in everyday life, it was considered important to carry out this research in order to verify the impact that the mood of older adults may have in relation to the loss or development of dementia. r in relation to the loss or deterioration of attention and memory. Based on the above, the interest of the present research lies in investigating attention and memory in older adults and their relationship with mood.

Problem

Depression is a common illness worldwide, with an estimated 3.8% of the population affected, including 5.0% among adults and 5.7% among adults over 60. Approximately 280 million people worldwide have depression. Depression can become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. In the worst cases, depression can lead to suicide. More than 700 000 people die by suicide each year (WHO, 2021).

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According to the World Health Organisation (WHO), dementia and depression affect approximately 5% and 7% of the world's older population, respectively. Anxiety disorders affect 3.8% of the older population (WHO, 2017).

Older people with depressive symptoms have poorer functioning compared to those with chronic medical conditions such as lung disease, hypertension or diabetes. (WHO, 2017).

Hypothesis

H_o: "Attention and memory processes are unrelated to older adults' mood states".

H_i: "Attention and memory processes are related to mood states in older adults".

Objectives

General objective

To know the mood states and their relationship between mild cognitive impairment in the elderly.

Specific objective

- To find out the total score of the Beck test for depressive mood in older adults.
- To find out the total score of the Hamilton test for anxious mood in the elderly.

Theoretical framework

Background

Depression is a mental illness that affects more than 350 million people worldwide, with older adults being one of the most vulnerable groups.

According to the IMSS, depression is a disease that is related to a decrease in serotonin, which is a neurotransmitter that regulates the emotions of well-being and sleep; it causes a change in their energy, and is reflected in a series of alterations in which feelings of sadness and low willpower dominate (IMSS, 2020). (IMSS, 2020).

According to the National Institute for the Elderly (INAPAM), depression can cause great suffering and disrupts daily life. Worldwide, depression affects 7% of the general population of older people.

In Mexico, studies report that depression is the most frequent affective disorder in people over 60 years of age, that is, 15-20% in the outpatient population, increasing to 25-40% in hospitalised patients (INAPAM, 2019).

With regard to anxiety symptoms, it was found that 19.3% of the adult population has symptoms of severe anxiety, while another 31.3% show symptoms of minimal or some degree of anxiety, and 49.3% do not have anxiety (INEGI, 2021).

It is estimated that in Mexico at least 14.3 per cent of citizens suffer from generalised anxiety disorders, the most common mental health illness in the country, followed by depression and addictions, both at a percentage of 9 per cent (Senado de la Republica, 2019). (Senado de la Republica, 2019).

The world's population is ageing rapidly. Between 2015 and 2050, it is estimated that the proportion of older adults in the world will almost double, from around 12 per cent to 22 per cent. In absolute terms, this is an expected increase from 900 million to 2 billion people over the age of 60. Older people face special physical and mental health problems that need to be recognised.

More than 20% of adults aged 60 years and older suffer from a mental or neurological disorder (excluding headache disorders) and 6.6% of all disability (disability-adjusted life years-ADALYs) among people aged 60 years and older is attributed to mental and neurological disorders. (WHO, 2017)

Attention and memory

Memory:

Memory is a neurocognitive function that enables previously stored information to be recorded, encoded, consolidated, retained, stored, retrieved and recalled. While learning is the capacity to acquire new information, memory is the capacity to retain the information learned (Portellano, 2005, p. 227).

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Basically, we can establish two main types of memory according to the time elapsed for its storage: short-term memory and long-term memory (Portellano, 2005, p. 233).

1. Short-term memory (STM)

This is the process of initial retention of information for a short period of time ranging from a few fractions of a second to several minutes, although some authors place the time limit of short-term memory at 30 seconds. Before the perceptual processing of information can take place, it is necessary that a sensory encoding of the stimuli to be memorised takes place, which is why within short-term memory there are several modalities: sensory memory, immediate memory and working memory (Portellano, 2005, p. 233). (Portellano, 2005, p. 233).

2. Long-term memory (LTM)

This is the ability to retain information for longer periods of time or permanently. LTM also refers to the ability to recall information after an interval of time when the subject has focused attention on another task. (Portellano, 2005, p. 235)

Attention:

Attention is in charge of carrying out the information selection process within the nervous system, being the fundamental element that articulates all cognitive processes. Alterations in attention always produce cognitive disorders of greater or lesser intensity (Portellano, 2005, p.143).

Attention is not a unitary process but a complex, dynamic, multimodal and hierarchical functional system that facilitates the processing of information, selecting the relevant stimuli to carry out a specific sensory, cognitive or motor activity. Attention, therefore, consists of selectively focusing on a given stimulus, filtering, discarding and inhibiting unwanted information. In order to carry out any cognitive process, it is necessary that a certain degree of selection of the stimuli that access the nervous system is previously produced, through the implementation of attentional mechanisms (Portellano, 2005, p. 143).

As a complex function, not only are several areas of the nervous system involved, but attention is at the crossroads of multiple sub-functions such as level of awareness, orientation, concentration, processing speed, motivation, direction, selectivity or alternation. According to this, the structure of attention is made up of different hierarchical layers of greater or lesser complexity, which are articulated in the form of neural networks located in various nerve structures. The more passive processes related to involuntary attention are located in the deeper areas of the brain, while those requiring a greater degree of voluntary selection are located in the cortical areas. The supramodal structure of attention is articulated in three levels of increasing complexity: alertness, sustained attention and selective attention (Portellano, 2005, p. 143 - 144).

Adulto mayor

In Mexico, Adulto Mayor is considered to be a person over 60 years of age and refers to the stage that adds up all the experiences of life and passes through most of the family, professional and social goals. But it also marks the beginning of a stage where people present conditions of physical, social and economic vulnerability. (GOB, 2017).

Ageing involves a series of physical, psychological and social changes related to changes in all organs, including the brain. With the passage of time, a series of cognitive modifications begin involving memory, language, perception and attention. These cognitive changes constitute one of the central factors of late life (Ardila & Rosselli, 2007, p. 227).

Individuals between 55 and 74 years of age are considered young senile, those over 75 years of age are considered old senile, and those over 85 years of age are considered older senile. (Ardila & Rosselli, 2007, p. 227).

Mental health

According to the WHO, mental health is a state of well-being in which an individual is aware of his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community. (WHO, 2018)

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Mental health is fundamental to our collective and individual capacity as human beings to think, emote, interact with each other, earn a living and enjoy life. On this basis, the promotion, protection and restoration of mental health can be considered a vital concern of individuals, communities and societies around the world. (WHO, 2018)

Mental health has an impact on physical health and vice versa. For example, older adults with physical health conditions such as heart disease have higher rates of depression than those who are healthy. In addition, untreated depression in an older person with heart disease can negatively affect their outcome. (WHO, 2017)

Anxiety

Anxiety comes from the Latin anxietas. Meaning the condition of an individual experiencing uneasiness, commotion, worry, nervousness. For medicine, anxiety is an anxious stage that can arise along with a neurosis or other type of illness and that does not give rise to rest and relaxation of the patient, it is also an emotional response or set of responses that includes: subjective or cognitive aspects of unpleasant character, determined physiological aspects (Guerrón, 2016 cited by Tenesaca Camacho, 2021, p. 20).

The term anxiety refers to the combination of different physical and mental manifestations that are not attributable to real dangers, but that manifest themselves either in the form of a crisis or as a persistent and diffuse state, which can reach panic (Marks, 1986 cited by Sierra, Ortega, & Zubeidat, 2003, p. 15).

In summary, anxiety refers to a state of agitation and unpleasant restlessness characterised by the anticipation of danger, the predominance of psychic symptoms and the sensation of catastrophe or imminent danger, that is, the combination of cognitive and physiological symptoms, manifesting a startle reaction, where the individual tries to seek a solution to the danger, so that the phenomenon is perceived with total clarity (Sierra, Ortega, & Zubeidat, 2003, p. 17).

Anxiety can present itself in three forms: 1) normal, in which there are affective manifestations in response to a stimulus from both the external and internal world; 2) pathological, where, unlike normal anxiety, there is no previous stimulus; and 3) generalised anxiety, which is characterised by vague and inexplicable prolonged fears unrelated to an object (Acuña, 2009, p. 21). (Acuña, 2009, p. 21).

Depression

Depression is a common illness worldwide, affecting an estimated 3.8% of the population, including 5% of adults and 5.7% of adults over 60. Globally, approximately 280 million people have depression (WHO, 2021).

Depression is a common mental health disorder. It is characterised by persistent sadness and a lack of interest or pleasure in previously rewarding and enjoyable activities. It can also disturb sleep and appetite, and is often associated with fatigue and lack of concentration. Depression is a major cause of disability worldwide, and has a significant impact on the burden of disease. The effects of depression can be prolonged or recurrent, and can dramatically impair a person's ability to function and live a rewarding life (WHO, 2021).

Depression in older adults is a common pathology, which is associated with comorbidities, excessive use of health resources, suicide and mortality. It is generally underdiagnosed and undertreated. Within it, two types are distinguished: 1) Early-onset depression that begins before the age of 60, and occurs in older adults as recurrent or chronic depression and 2) Late-onset depression that begins after the age of 60 and is associated with more neurological changes and dementia (Bruning, 2019, cited by Tenesaca Camacho, 2021, p.12). (Bruning, 2019, cited by Tenesaca Camacho, 2021, p.12).

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In people over 65, depression affects quality of life; depressed older adults generally have more anxiety, somatic complaints, poor prognosis and high mortality. Contrary to popular belief, depression is not a natural part of ageing and can often be reversed with prompt and appropriate treatment. However, if left untreated, depression can accelerate physical, cognitive and social decline (Venegas, 2016, cited by Tenesaca Camacho, 2021, p. 12).

Attention and memory impairment in older adults

Instruments

Hamilton test

It is a scale whose objective is to assess the intensity of anxiety. It consists of a total of 14 items that assess the psychological, physical and behavioural aspects of anxiety. In addition, one item specifically assesses depressed mood.

The items are non-specific manifestations of anxiety, without having demonstrated their usefulness for the assessment of a specific anxiety disorder.

The time frame of reference is the last three days for all items, except the last item, which assesses the subject's behaviour during the interview.

It is a hetero-applied scale, created with simple instructions to assign the most appropriate scores for each patient, in order to increase inter-rater reliability.

The following is a brief description (valid for all 13 items)

1 Identify from all possible symptoms for each item the most problematic symptom in the last few days, and which is certainly due to anxiety.

2 Determine for that symptom these three aspects: its severity, its frequency of depression and the disability or dysfunction it produces.

a. Severity: 1-mild (minor). 2-moderate (disturbance). 3-severe (very annoying) 4-the worst symptom I have ever experienced.

b. Time/frequency: 1- infrequent. 2-occurs in the middle of the day or less. 3-occurs most of the day. 4-occurs almost all the time.

c. Disability: 1-symptoms do not interfere with activities. 2 - symptoms interfere with some activity. 3-symptoms cause inability to carry out daytime activities (social, work and family). 4-symptoms cause inability to perform activities in two or more of the above areas.

Correction and interpretation

It provides an overall measure of anxiety, which is obtained by the sum of the scores obtained. The recommended cut-off points are:

0-5 No anxiety

6-14 Mild Anxiety

>15 Moderate/severe anxiety.

Beck Depression Test (BDI-IA)

The Beck Depression Scale is one of the instruments frequently used to assess depressive symptoms (González et al., 2014).

The Beck Depression Inventory, second edition (BDI-IA) is a self-report instrument composed of 21 items, whose purpose is to measure the severity of depression in adults and adolescents aged 13 years and older.

This version of the BDI was developed to assess symptoms corresponding to the diagnostic criteria for descriptive depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV, 1994) of the American Psychiatric Association (Beck, 2009).

The Beck Inventory meets the psychometric requirements for valid use in our setting. In terms of factorial composition, construct validity, discriminant validity and internal consistency, they corroborated the adequate psychometric properties of the BDI-IA, which support it as a sufficiently valid and reliable instrument for the measurement of depressive symptoms in the Mexican population, which also supports the cross-cultural validity of the instrument (Beck, 2009); (Beltrán, 2012).

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The cut-off scores proposed by Beck et al. (1996) were found to be appropriate for discriminating between different degrees of depression (see table 1).

Total scores	Level of depression
<=9	Normal.
10-15	Slightly depressed.
16-24	Moderately depressed.
25-62	Severely depressed.

Table 1 Total score for the interpretation of the results of the Beck Test inventory

Mini-Mental Screening Test

The Mini-Mental State Examination (MMSE) is a written test commonly used as part of the process when considering a diagnosis of dementia, with a maximum score of 30, with lower scores indicating more severe cognitive problems.

It is one of the most widely used tools worldwide due to its brevity and easy application (Tombaugh and Mcintyre, 1992), it has 10 areas of assessment: spatial-temporal orientation, three-word registration, attention fixation, memory, verbal nomination, repetition and comprehension, reading, writing and visuospatial construction, (Mora Villalobos, et al., 2017). The cut-off point established for the MMSE defines "normal" cognitive function and is generally set at 24, although theoretically it could be anywhere between 1 and 30 (Arevalo-Rodriguez I, cited by Llamuca Quinaloa, Macías Guamangate, Miranda Caisaluisa, & Tapia Cerda, 2020, p. 317).

It is mandatory when starting the test to begin by collecting the patient's data, as well as their level of schooling and the work they did before retirement (the year they started school and the year they finished it). started school and the year in which they finished, approximately). This will also help to create a degree of trust with the patient and facilitate their collaboration.

If we analyse the MMSE, we can see that it consists of 5 sections: (1st) Orientation, (2nd) Fixation, (3rd) Calculation and attention, (4th) Memory and (5th) Language and praxis.

When carrying it out, we should not interrupt it, especially the sequence of fixation, calculation and attention and memory. Between the 1st and 2nd, and between the 4th and 5th we can make a brief pause if the patient is tired or very nervous, trying to reassure them and tell them that it is not an exam.

Range Level of anxiety

< = 24 Probable cognitive impairment.

> 24 No cognitive impairment.

With all this we will have reached the end of the test and we will have to make the correction for age and cultural level. After reviewing the MMSE, the following agreement is reached (see table 2).

Range	Level of anxiety
< = 24	Probable cognitive impairment
> 24	No cognitive impairment

Table 2 Total score for the interpretation of the results of the mini-mental screening test

Schooling refers to the age at the end of school, not to the number of years of schooling. Broadly speaking, the first group includes those who have not completed primary school, the second group includes those who have completed primary school and those who have a baccalaureate, and the third group includes those who have a baccalaureate or university degree.

Patients with depression and anxiety tend to score low in this type of test due to impaired attention and concentration, without this being indicative of MCI or dementia (the response of "I don't know, I don't know" to simple orientation or calculation questions is characteristic, which they end up doing if we insist that they pay attention and make an effort).

Research methodology

The present study is an exploratory, non-experimental, observational, cross-sectional study with descriptive and correlational statistical analysis. The complex variables of mood, anxiety and depression were analysed for their relationship with neurocognitive functions by means of mini mental. In addition, the following variables were considered: age, gender and school grade.

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For the statistical analysis of the characteristics of the studied population, measures of central tendency were used and for the correlational analysis a Pearson correlation coefficient was used.

Inclusion criteria were participants aged between 60 and 90 years from the Geronto Geriatric Centre who wished to participate in the study and had signed a letter of informed consent, therefore those who did not wish to participate were excluded.

As elimination criteria, participants who left any of the assessment tests unfinished, previous neurodegenerative diseases and non-attendance to the assessments as well as patients who wished to withdraw from the study were discarded.

According to these criteria, out of a total of 20 patients, 10 were eliminated, leaving a total of 10 valid cases for the research.

Procedure

The participants were patients attending a geriatric geriatric centre called "caring for those who gave us life" in the city of Durango. Data collection was carried out during the month of February 2021, culminating at the end of February of the same year.

Informed consent was obtained after signing the informed consent form in accordance with the official Mexican standards 004-ssa3-2012 on clinical records and 040-ssa2-2004 on information, and the instruments for data collection and interpretation of the results were applied.

The following tests were used for the study: "Beck test", "Hamilton test" and "mini mental screening test".

The Beck depression test is a 21-item self-administered inventory that assesses the intensity of depression. For each item, the subject has to choose the statement that, from a set of four alternatives (always in order of severity), best fits his or her mood during the last week. Each item is scored from 0 to 3 points depending on the alternative chosen, the resulting total score has a range between 0 and 63 points.

The Hamilton test is a hetero-applied scale consisting of 14 items assessing psychological, physical and behavioural aspects of anxiety. The time frame of reference is the last three days for all items except the last item, which assesses the subject's behaviour during the interview.

It is classified by the following severity values: 1, mild, of little importance; 2, moderate severity and disturbances; 3, severe disturbances derived from the symptoms, very annoying; 4, the worst symptom ever experienced. Each item is valued from 0 to 4 points depending on the alternative chosen, and its cut-off points are: 0-5: no anxiety. 6-14: mild anxiety. >15: moderate/severe anxiety.

The mini-mental screening test is a screening instrument that evaluates cognitive alterations. Depending on the scores obtained by the subject, it is able to distinguish between normal cognitive functioning, mild, moderate and severe dementia.

It consists of 5 sections: (1st) Orientation, (2nd) Fixation, (3rd) Calculation and attention, (4th) Memory and (5th) Language and praxis.

After the application of the 5 sections we will have reached the end of the test and we will have to correct for age and cultural level. After reviewing the MMSE we arrive at the following suggestions or guidelines for interpretation:

Probable cognitive impairment:

Score < 24

No cognitive impairment: Score > 24.

The identification of the signalistic variables and academic performance (gender, age and school average) was obtained through the application of a clinical survey.

Statistical analysis of the information obtained was carried out using Excel software.

Results

The sample studied consisted of 10 participants, who attend the "Geriatric Centre: caring for those who gave us life", of which 8 are female and 2 are male (see graphic 1).

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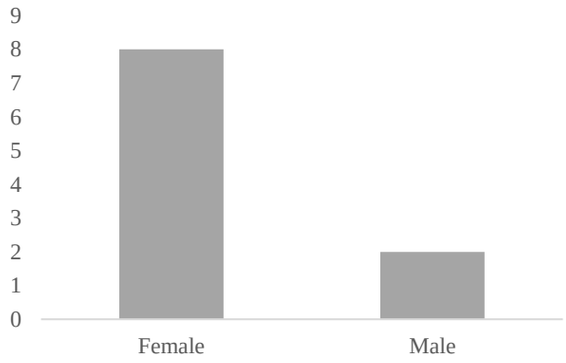
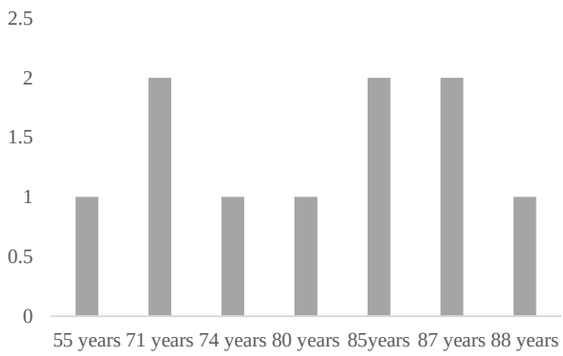


Graphic 1 Frequency by gender

The mean age of the participants was 78.3 years, with a minimum of 55 years and a maximum of 88 years, with a mode of 71 years and a mean of 82.5, the standard deviation was 10.57 (see graphic 2).



Graphic 2 Frequency by age

The reliability of the results obtained in the evaluation of the Hamilton Anxiety Test was a Chronbach's alpha .69 (very reliable).

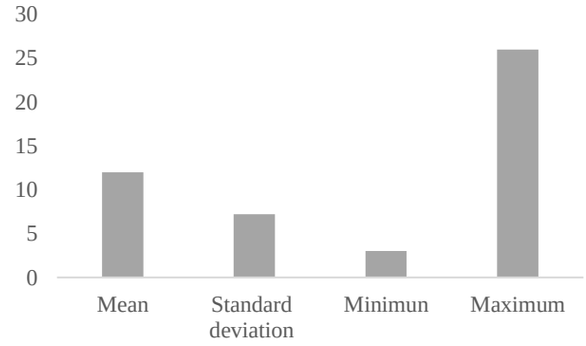
As for the results obtained from the assessment of anxiety using the Hamilton test, 2 participants (20%) did not show any level of anxiety, while 8 participants (80%) showed some degree of anxiety. Of which, according to the Hamilton scale, 6 participants represent 60% and are at a mild level of anxiety. And 2 participants corresponding to 20% are at a moderate/severe level of anxiety (see table 3).

Range	Frequency	Percentage	Level of depression
< = 9	7	70%	Normal
10 – 15	0	0%	Mild
16 – 24	0	0%	Moderate
25 +	3	30%	Severe

Table 3 Results of the Hamilton test (Anxiety)

Thus, the mean total score of the Hamilton Anxiety Test is 12 with a standard deviation of 7.21. This indicates that most of the participants report mild anxiety.

This indicates that most participants report mild anxiety (see Graphic 3).



Graphic 3 Measures of central tendency of Hamilton's total score

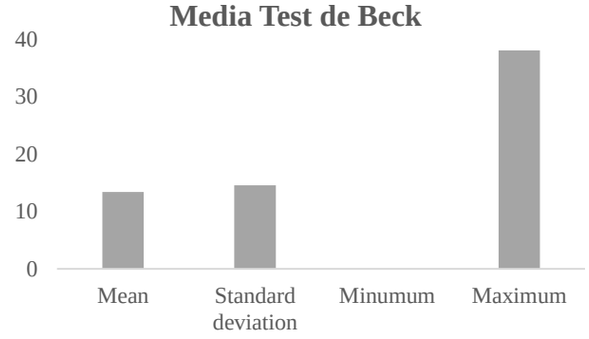
The reliability of the results obtained in the evaluation of the Beck Depression Test was with a Chronbach's alpha of .90 (excellent reliability).

As for the results obtained from the assessment of depression using the Beck test, 7 participants (70%) did not show any level of depression, while the other 30% showed severe depression (see table 4).

Range	Frequency	Percentage	Anxiety level
0 – 5	2	20 %	No anxiety
6 – 14	6	60 %	Mild
> 15	2	20 %	Moderate / Severe

Table 4 Results of the Beck's test assessment

The mean of the total Beck test score is 13.4, a median of 8 and a mode of 9, a standard deviation of 14.56, a minimum value of 0 and a maximum of 38 (See graphic 4).



Graphic 4 Measures of central tendency of the total Beck score

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This indicates that 70% of the population is within normal parameters while 30% is at a severe level of depression.

The reliability of the results obtained from the Mini-Mental Test was Chronbach's alpha of .66 (very reliable).

As for the results obtained from the Mini-Mental Test, 8 participants (80%) showed probable cognitive impairment, while 2 participants (20%) showed no cognitive impairment (see table 5).

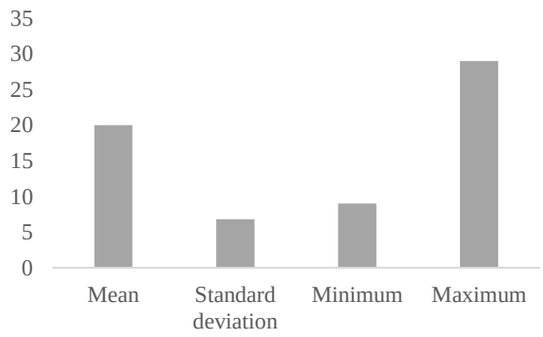
Range	Frequency	Percentage	Level of anxiety
< = 24	8	80%	Probable cognitive impairment
> 24	2	20%	No cognitive impairment

Table 5 Results of the evaluation of the Mini-Mental test

Measures	Score
Mean	20
Median	22
Mode	24
Standard deviation	6.79

Table 6 Mini-mental test results

This indicates that 80% of the population show probable cognitive impairment (see graphic 5).



Graphic 5 Measures of central tendency of the Mini-Mental total score

Correlational analysis

Pearson's correlational analysis between anxiety and mini-mental impairment showed a moderate positive significance with r = .50 with p = .55 and 95% reliability, which indicates that the higher the level of anxiety, the greater the cognitive impairment or the greater the prevalence of mild dementia.

	Average	Anxiety score
Pearson correlation	Pearson correlation	Pearson correlation
Sig. Bilateral	Sig. Bilateral	Sig. Bilateral
N.	N.	N.
*Correlation is significant at the 0.05 level (bilateral).		

Table 7 Correlation between anxiety and cognitive impairment

In the following Pearson correlational analysis between depression and mini-mental impairment, a moderate positive significance level was found with an r = .40, with p = 0.15 with 95% reliability, which indicates that, in a moderate positive way, the higher the level of depression, the greater the cognitive impairment or the greater the prevalence of mild dementia.

	Average	Anxiety score
Pearson correlation		.40*
Sig. Bilateral		0.15
N.	10	10
* Correlation is significant at the 0.05 level (bilateral).		

Table 8 Correlation between depression and cognitive impairment

Conclusion

In the present investigation, relevant data were found between mood states (anxiety and depression) and mild cognitive impairment, as 80% of the population manifested anxiety correlated with cognitive impairment. However, only 20% of the population showed depression correlated with cognitive impairment.

Therefore, the greater the alteration of mood (anxiety and depression), the greater the prevalence of mild cognitive impairment in the elderly.

Finally, the general and specific objectives are fulfilled and our research hypothesis is accepted in the "Geriatric geriatric geriatric centre of the state of Durango".

It is of great interest to continue with the research since the results cannot be extrapolated because it is only a pilot study, however there is a moderate positive correlation between the alteration of mood and cognitive processes.

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Therefore, it is recommended to provide attention and support to the elderly in terms of mood, as this has a great impact on their mental health. It is also proposed to stimulate neurocognitive functions or to implement workshops.

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Article **Journal of Health Sciences**
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Motor training program with rackets to develop an ambidextrous laterality in upper extremities that improves sports skills in children 9 to 12 years old, Chignahuapan, Puebla

Programa de entrenamiento motriz con raquetas para desarrollar una lateralidad ambidiestra en extremidades superiores que mejore las habilidades deportivas en niños 9 a 12 años de edad, Chignahuapan, Puebla

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Abstract

Ambidextrous laterality is defined as the possibility of performing actions with both parts of the body, either left or right, so in this research the objective was to develop ambidextrous laterality in upper limbs through a motor training program with the help of rackets, to improve sports skills. Quasi-experimental, longitudinal and active observation type. The sample was randomly selected with 32 participants, 16 females (50%) and 16 males (50%) from 9 to 12 years old with an average age of 10-11 years, belonging to the community of Llano Verde, Chignahuapan, Puebla. The participants were evaluated using the Harris test and the Sports Fundamentals rubric at the beginning, intermediate and end of the motor training program that consisted of 27 sessions. The results showed an advance of 100% in at least one sports technical foundation in each of the participants. In conclusion, the results obtained show that ambidextrous laterality can be developed through a motor training program and repetitions, highlighting a greater possibility of movements, abilities and motor skills that is reflected in sports success.

Ambidextrous laterality, Training

Resumen

La lateralidad ambidiestra se define como la posibilidad de realizar acciones con ambas partes del cuerpo ya sea izquierda o derecha, por lo que en esta investigación el objetivo fue desarrollar una lateralidad ambidiestra en extremidades superiores mediante un programa de entrenamiento motriz con ayuda de raquetas, para mejorar las habilidades deportivas. De tipo cuasi- experimental, longitudinal y de observación activa. La muestra fue de selección aleatoria con 32 participantes, 16 féminas (50%) y 16 varones (50%) de 9 a 12 años con edad promedio de 10.11 años, pertenecientes a la comunidad de Llano verde, Chignahuapan, Puebla. Los participantes se evaluaron mediante el test de Harris y la rúbrica de Fundamentos Deportivos al inicio, intermedio y final del programa de entrenamiento motriz que constó de 27 sesiones. Los resultados mostraron un avance del 100% en al menos un fundamento técnico deportivo en cada uno de los participantes. En conclusión, los resultados obtenidos demuestran que la lateralidad ambidiestra puede ser desarrollada mediante un programa de entrenamiento motriz y repeticiones, resaltando en una mayor posibilidad de movimientos, habilidades y destrezas motrices que se refleja en el éxito deportivo.

Lateralidad ambidiestra, Entrenamiento

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Introduction

Although human beings have anatomically equal parts (in symmetry), they mostly use one side with respect to the other to perform actions or movements in their daily life, whether it is combing their hair, personal hygiene or writing. Within the sports environment, these preferences are found when throwing and receiving a ball, kicking a ball, adopting a lateral position either left or right and when handling sports equipment such as racquet sports, to mention a few actions within the sport, the knowledge of this laterality allows an understanding of their technique and the development of a personalized training[1].

Laterality and according to the dominance or preference of one side of the body over the other (in symmetry) there are different types to mention three specific ones:

1. The right side of the body is used as a preference.

2. Left-handed. The left side of the body is used as preference.

3. Ambidextrous.

Use of both parts of the body with the same efficiency. False left-handedness: Product of a temporary impediment, where the causes are reasons outside the individual. False right-handedness: It occurs mainly in people who, being left-handed, were forced to use their right hand in a preferential way.

Ambidextrous laterality is defined as the possibility of performing actions with both parts of the body, either left or right, as mentioned by Quintana[2]. Giving great importance to the relationship between laterality and sport, being embodied at all times, from the choice of a player to kick a ball, the pitcher to perform a certain shot, the boxer for the placement of his defense and blows, in martial arts studies are found in Judokas who claim that the laterality of the upper and lower extremities shows a significant correlation with the choice of the dominant directions of attack in combat[3], being called podal laterality, ocular, auditory, even shoulder or hip.

The human being by nature tends to explore and feel attraction for activities where he can observe, listen or manipulate, for this reason, the rackets are a means of learning, have an added value and are of utmost importance for the teaching or practice of sports fundamentals of other sports, not only those involving the use of the same rackets. The age of the participants, being school age, is of great support for the implementation of the program as a method of training their motor development and the acquisition of new motor skills, the sports activity becomes the best complement to develop and improve their technical skills, on and off the playing field[4].

Quintana establishes the selection of sports talent from a young age, focused on ambidextrous laterality in baseball batters, since laterality in the selection of ambidextrous batters is of great importance in physiological and psychological conditions on both sides of home plate, which affects bilateral work, since the use of ambidextrous laterality is reflected in an optimal and effective sports performance[2], For this reason, it is hypothesized that motor training with rackets in children can develop ambidextrous laterality in the upper extremities, improving their sporting skills. And in turn the main objective of demonstrating the benefits of the motor training program with rackets to develop ambidextrous laterality in upper extremities to improve sports skills in children 9 to 12 years old from the community of Llano Verde in the municipality of Chignahuapan, Puebla.

A recent study by the Ruhr University of Bochum, Germany, from which the article Ontogenesis of lateralization by Ocklenburg[5] is derived, establishes the true reason why human beings are inclined at birth to be left-handed or right-handed. In addition, German researchers are studying that the preference for the right or left hand depends on environmental factors produced during pregnancy.

This article consists of a section called description of the method, where the procedure throughout the research is explained, as well as the measurement instruments and collection formats, which are used to demonstrate the results obtained in graphs, and a section of conclusions as well as some suggestions for future researchers interested in the subject.

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Description of the Method

This is a longitudinal, quasi-experimental, active observation research. The universe consisted of 32 individuals from the community of Llano Verde, municipality of Chignahuapan, Puebla, who formed the sample, which was randomly selected, with 16 female (50%) and 16 male (50%) participants, between 9 and 12 years of age, with an average of 10.11 years old.

Variables and measurement instruments

The independent variable was the training program, through the execution of physical exercises with the intention of ensuring a satisfactory participation or effective objective, as mentioned by Issurin[6].

The dependent variables are: Ambidextrous laterality, whose cases is where there is no defined preference and both parts of the body are used equally, these can get to dominate both profiles and develop activities of all sports fundamentals[7], the evaluation is performed by means of the Harris Test instrument that establishes 10 points to determine the laterality of the hand (Throwing a ball, sharpening a pencil, driving a nail, among others[8]). Sporting ability is based on the relationships that the player establishes with the elements of the environment and the instruments used to relate not only being physical and sporting, but also mental, resulting in an adequate level as an athlete[9], so that, in this research, the measurement was through the sporting ability rubric, in which the fundamentals of the following sports are contemplated:

a) Basketball (bouncing, dribbling, passing and shooting10) by means of the following activities: 1. Bounce the ball for a distance of 20 meters in a straight line. 3. 3.- Bounce the ball for 20 meters dodging obstacles on the floor. 4.- Free throw shot. 5.- Pass in static place. 6.- Pass in motion.

b) Tennis (drive stroke, volley stroke, lob stroke and racquet grip, Sanchez11) with the activities of: 1.- Hit the ball in drive. 2. 2.- Hit the ball in volley. 3.- Hit the ball in lob. 4.- Performs a racquet grip.

c) Baseball (pitching, De la Fuente12) the activities performed were: 1. 2.- Performs throw-pitch to target. 3.- Performs static pitching. 4.- Performs shooting on the move.

This rubric establishes a measurement range from 1 to 4 (1.- Without mastery of the sport fundamentals or materials. 2. 2.- Performs the sport foundation, but does not control the materials. 3.- Performs the sport foundation and controls the materials in its majority. 4.- Dominion and control of the sport foundation and the materials).

Procedures

Parents or guardians were asked to sign an informed consent form, accepting the participation of their children, and then the explanation of the motor training program and its application. The program consisted of 27 sessions, three sessions per week, for three months, each session with a set objective as well as the activities planned and carried out based on the movements based on basketball, tennis and baseball training, sports that use the upper extremities frequently.

Results

With the data obtained in the initial, average and final evaluations of the Harris test and the rubric of sports fundamentals of basketball, baseball and tennis we can prove the benefits of the racquet motor training program of the 32 participants in the development of ambidextrous laterality and sports ability. The results of an initial evaluation according to the fundamentals of basketball, showed an almost null use of the less dominant hand of 46% of the participants (the score that can be obtained by being 6 activities, is minimum 6 maximum 24). In the final measurement of the basketball fundamentals, an increase of 100% was achieved in all 32 participants in at least one of the fundamentals (either bouncing, dribbling, passing or shooting). Two participants (6%) had total mastery in all the established activities.

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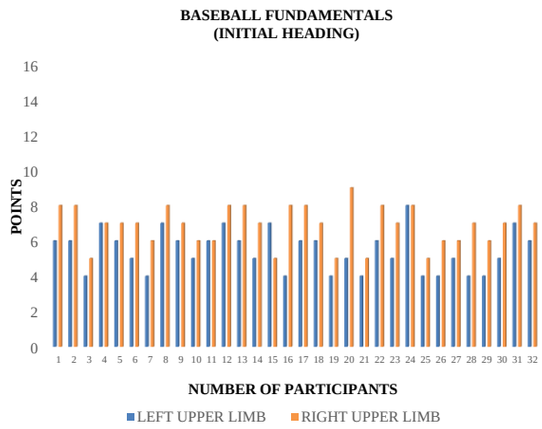
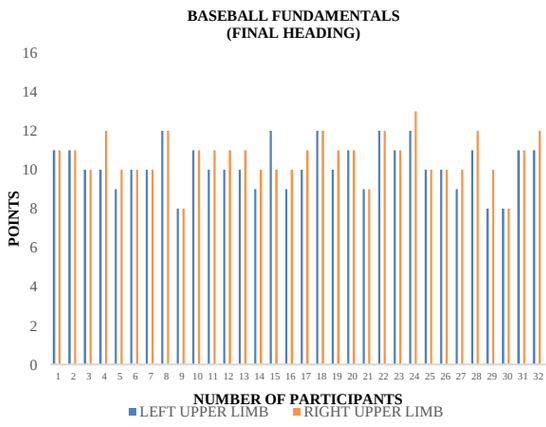
In tennis, being a sport with a higher degree of complexity than the previous ones due to the use of a sport material (racquet), at the beginning it is observed that 37.5% of the participants lack any fundamentals, in the result of the training program, an advance of 89% is observed regarding the basic grip of the racquet and 51% according to the different strokes, (for verification of results, the initial and final data of the baseball rubric and the Harris test are plotted).

Regarding baseball, the following graph 1 shows the reception (fielding) and throwing (pitching), the two sports fundamentals evaluated. A measurement of 31% of the participants lacks one of the fundamentals (4 activities, minimum score 4, maximum 16).



Graphic 1 Initial baseball evaluation
Source: Baseball Sport Fundamentals

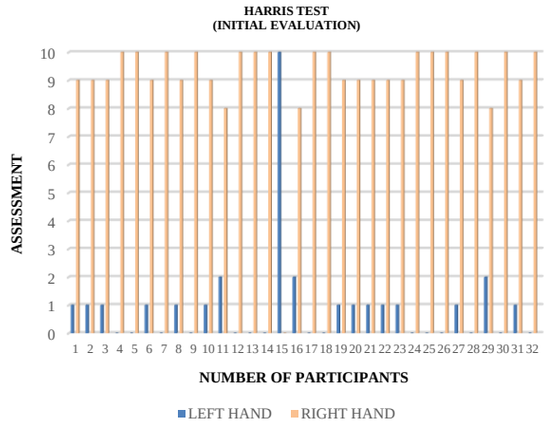
In the final result of baseball practice, with both laterals, 100% progress was obtained with respect to their initial evaluation in at least one sports fundamentals. Twenty-one percent of the participants achieved full mastery with one hand.



Graphic 2 Final evaluation
Source: Baseball Sport Fundamentals

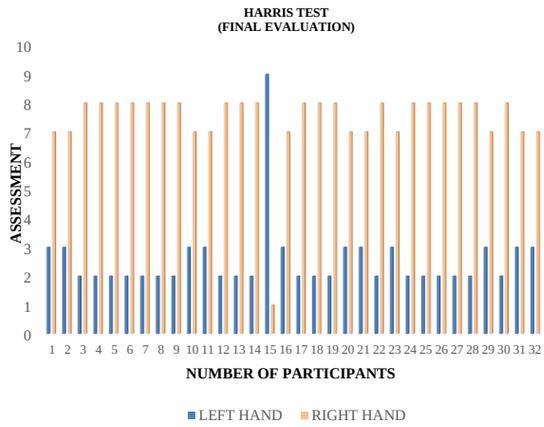
As mentioned, the evaluation of laterality was through the application of the Harris test, the results are as follows:

In the initial evaluation (Graphic 3), 50% of the participants use one hand for the performance of the 10 daily actions, 40% occupy in one action the less dominant hand and 10% in two actions.



Graphic 3 Initial evaluation
Source: Harris test

The final evaluation shows that 3% use the less dominant hand in 1 of the 10 activities of the Harris test, 62% manipulate two activities and 35% 3 actions with the less dominant hand.



Graphic 4 Final evaluation
Source: Harris test

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Discussion

The results obtained denote a greater use of the less dominant extremity, 100% of the participants achieved an advance in the use of the less used hand of 50% of the fundamentals of each sport, being the baseball activities in which the greatest advance and effectiveness was achieved, derived from the results, for right-handed individuals, the left hand is less skillful than the right, this occurs because the left hand remains inactive. The opinion of Polo et al13 is important, in which he specifies working on developing the body segments and motor perceptual resources on the non-preferential side of the athlete, in order to improve the functional laterality of the dominant side and seek a homogeneous bilateral development. In the same sense, Quintana2 mentions the use of different laterality tests in the sports field, as well as the planning, training and decision-making processes in competitions.

Conclusions

The motor training with racquet in both laterals improves the sport, techniques and body movements that allow having an advantage in motor skills and competition. A training with weight in the less dominant extremities is suggested, since in the great majority of the cases there is not the capacity of strength, coordination and power to carry out the movements.

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Isolation and identification of microorganism present on the external and internal surfaces of face masks

Aislamiento e identificación de microorganismos presentes en superficies externa e interna de cubrebocas

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Abstract

Continuous use of the face mask without replacement provides humidity and temperature conditions conducive to the development of multiple disease-causing microorganisms. The objective of the study is to identify, through phenotypic tests, the presence of bacteria in face masks in order to know if there are potentially pathogenic microorganisms. Likewise, differentiate the amount of CFU / mL depending on the sampled section. For this, a sample was taken with sterile swabs moistened with isotonic saline solution to 20 masks (internal and external part separately). The CFU / mL count of 15 face masks was made by sowing them on nutrient agar. In addition, all the samples were seeded on blood agar and the bacteria were subsequently identified using conventional biochemical tests. Among the isolated microorganisms are pathobionts such as *Staphylococcus epidermidis* and *Staphylococcus aureus*, as well as opportunistic microorganisms such as *Escherichia coli*, *Pseudomonas spp*. and *Hafnia alvei*. A significant difference was found in the amount of CFU / mL recovered from the internal and external part. This suggests that the continuous use of a mask can create adequate conditions for the proliferation and storage of pathobiont or opportunistic bacterial species.

Face mask, Opportunistic, Pathogen

Resumen

El uso continuo del cubrebocas sin recambio provee de condiciones de humedad y temperatura propicios para el desarrollo de múltiples microorganismos causantes de enfermedades. El objetivo del estudio consiste en identificar mediante pruebas fenotípicas la presencia de bacterias en cubrebocas con la finalidad de conocer si existe microorganismos potencialmente patógenos. Así mismo, diferenciar la cantidad de UFC/mL en función de la sección muestreada. Para esto se tomó una muestra con hisopos estériles humedecidos con solución salina isotónica a 20 cubrebocas (parte interna y externa por separado). Se realizó el conteo de UFC/mL de 15 cubrebocas mediante su siembra en agar nutritivo. Además, la totalidad de las muestras fueron sembradas en agar sangre y posteriormente se identificaron las bacterias mediante pruebas bioquímicas convencionales. Entre los microorganismos aislados se encuentran patobiontes como *Staphylococcus epidermidis* y *Staphylococcus aureus*, así como microorganismos oportunistas tales como *Escherichia coli*, *Pseudomonas* spp. y *Hafnia alvei.* Se encontró diferencia significativa en la cantidad de UFC/mL recuperados de la parte interna y externa. Lo anterior sugiere que el uso continuo de un cubrebocas puede crear condiciones adecuadas para la proliferación y almacenamiento de especies bacterianas patobiontes u oportunistas

Cubrebocas, Oportunista, Patógeno

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Introduction

With the emergence of the SARS-COV2 pandemic, the use of face masks has spread as a preventive measure to prevent the spread of microdroplets with infectious agents. These particles are retained in the masks because they are larger than the pore size. (Delanghe *et al*., 2021)

However, the continuous use of the mask provides humidity and temperature conditions to the development of multiple microorganisms from the mouth (*Streptococcus* spp., *Neisseria* spp., *etc*.) and from the skin surface (*Staphylococcus* spp., *etc*.), and even acquires an even greater dimension if one considers the multiple times in which the hands touch the face mask for its adjustment, thus transferring microbes from our environment. (Aruna *et al*., 2017; Delanghe *et al*., 2021; Procop *et al*., 2017)

Delanghe *et al*. (2021), described isolates of the genera: *Acinetobacter* spp., *Neisseria* spp., *Streptococcus* spp., *Staphylococcus* spp., *Sphingomonas* spp. and *Roseomonas* spp., in face masks with 4 hours of use; In addition, a significant difference was found between the initial and post-use bacterial load.

Luksamijarulkul *et al.* (2014), carried out a test on the face masks of hospital workers in order to determine the types of microorganisms; highlight the presence of *Staphylococcus* spp., Pseudomonas spp. and species of filamentous fungi. In addition, we found significant differences between the CFU/mL obtained from the internal part of the mask and the external part (higher mean).

Aruna *et al.* (2017), described the presence of multiple pathogens in a sample of mouth covers: *Escherichia coli*, *Pseudomonas* spp., *Klebsiella* spp., *Enterobacter* spp. and *Staphylococcus* aureus. These are the cause of a wide variety of respiratory, skin, genitourinary and gastrointestinal diseases.

The general population is unaware of the impact of microorganisms as the cause of infectious diseases. Therefore, the use of face masks continuously and without replacement is frequent, becoming a fomite of potentially harmful bacteria.

The aim of the study was to identify the presence of bacteria in a sample of face masks through phenotypic tests in order to determine if there are potentially pathogenic microorganisms. Likewise, differentiate the amount of CFU/mL depending on the sampled section (internal and external part).

Methodology

The diversity of bacterial microorganisms presents on the inside and outside of the volunteers' face masks was identified.

Sampling

Convenience samples were taken from 20 face masks donated by volunteer researchers during the confinement period due to the COVID 19 pandemic in the months of February to April 2021; these had 1-8 days of use. For each sampling, two sterile swabs moistened with isotonic saline solution were used. One was rotated on the inner surface of the mask and the other on the outer, trying to cover the entire length.

Subsequently, each swab was placed in a 5 mL sterile glass tube containing 1 mL of sterile isotonic saline solution and proceeded in a maximum period of 1 hour.

Microbiological culture

The content of the swab was homogenized in the volume of saline solution. To count the CFU/mL in 15 masks, 10 µL was dispensed on a Nutrient agar plate (MCDLab, Mexico) and later, it was streaked throughout the plate. It was incubated in a bacteriological oven (Riossa series: ECML. México®), at 37°C for 24 hours.

On the other hand, with each swab of the 20 face masks, a blood agar plate (MCDLab, Mexico) was inoculated and streaked with a sterile round bacteriological loop using the pentagon technique. It was incubated at 37°C for 24 hours.

Colonial count

At the end of the incubation time, the CFU of each plate was counted and multiplied by 100 to obtain the corresponding CFU/mL.

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Identification of microorganisms

From the cultures with development, a descriptive analysis was carried out to identify the morphological differences of the colonies and the Gram staining of each colony was carried out, as well as the catalase and oxidase tests.

Subsequently, based on the preliminary data, Gram-negative bacilli and cocobacilli were reseeded on McConkey agar (MCDLab, Mexico), and biochemical tests were performed: citrate, MIO, LIA, urea, and KIA to identify Enterobacterales and other microorganisms.

In addition, resistance tests to Novobiocin and coagulase (free and bound) were carried out for the identification of staphylococci and Schaeffer–Fulton staining for the observation of spores and Gram-positive bacilli.

After 24 hours of incubation at 37°C of the biochemical tests, the analysis of the results was carried out based on the tables of biochemical reactions of bacterial species proposed by both Procop *et a*l. (2017), as well as Cowan & Steel (2003).

Statistic analysis

The CFU/mL values were grouped into sets and compared using the Mann-Whitney U test, Student's t test, and Pearson's correlation using the Past4.05 statistical software. An $\alpha = 0.05$ was used.

Results

The CFUs of the internal and external part of 15 face masks were counted, the data collected is summarized in Table 1.

The comparison of the data (CFU/mL values other than zero), grouped into two sets (internal and external), using the Mann-Whitney U test revealed that there is a significant difference ($p= 0.018$) between the medians of the internal group ($\tilde{X}$=800) and external group ($\tilde{X}$=50), the first being the largest.

CODE	UFC/10µL	UFC/mL	Type	Days of use
CB1E	0	0	Reusable	1
CB1I	0	0	Reusable	1
CB2E	0	0	Reusable	5
CB2I	1	100	Reusable	5
CB3E	0	0	Disposable	8
CB3I	1	100	Disposable	8
CB4E	0	0	Disposable	1
CB4I	3	300	Disposable	1
CB5E	0	0	Disposable	1
CB5I	63	6300	Disposable	1
CB6E	0	0	Disposable	> 1
CB6I	16	1600	Disposable	> 1
CB7E	2	200	Disposable	1
CB7I	5	500	Disposable	1
CB8E	0	0	Disposable	1
CB8I	83	8300	Disposable	1
CB9I	8	800	Disposable	1
CB10E	7	700	Disposable	1
CB10I	24	2400	Disposable	1
CB11E	2	200	Disposable	1
CB11I	6	600	Disposable	1
CB12E	75	7500	Reusable	1
CB12I	47	4700	Reusable	1
CB13E	1	100	Reusable	1
CB13I	1	100	Reusable	1
CB14E	41	4100	Reusable	2
CB14I	13	1300	Reusable	2
CB15E	2	200	Disposable	1
CB15I	20	2000	Disposable	1

Table 1 Summary of data from 15 face masks sampled for CFU counting

In order to find out if there is a difference between the isolated CFU/ml according to the type of mask, the data from the internal part (values of CFU/mL other than zero) were grouped into two sets (disposable and reusable). From these, it was compared using the Student's t test and it was found that there is no significant difference ($p=0.1099$) between the CFU/mL means in both groups.

On the other hand, data from the external part (non-zero CFU/mL values) were collected in two sets (Disposable and reusable). These were compared using the Mann-Whitney U test and it was found that there is no significant difference ($p=0.4742$) between the CFU/mL medians in both groups. With the intention of knowing if there is a correlation between the days of use and the amount of CFU/mL, the Pearson correlation test was used. The data (CFU/mL values other than zero and exact number of days) was divided into two groups (internal and external), then the statistical test was applied for both the internal group ($p=0.298$) and the external group. ($p=0.656$), no statistically significant correlation was obtained. Therefore, there is no correlation between days of use and isolated CFU/ml.

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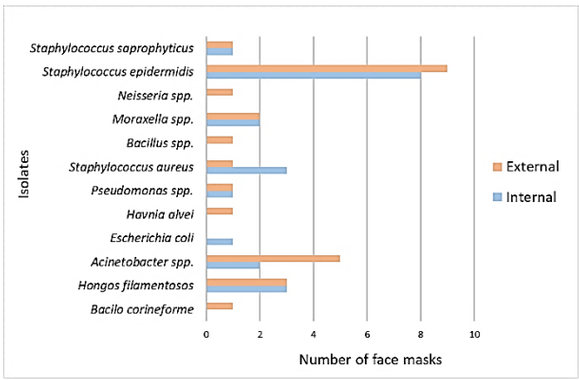
On the other hand, a total of 20 face masks were planted in culture media in order to identify the existing bacteria through phenotypic tests (Table 2). Of these, a higher percentage of *Staphylococcus epidermidis* and *Acinetobacter* spp.

Microorganism	Percentage
Staphylococcus epidermidis	73.68%
Acinetobacter spp.	31.58%
Hongos filamentosos	26.32%
Staphylococcus aureus	21.05%
Moraxella spp.	15.79%
Pseudomonas spp.	10.53%
Staphylococcus saprophyticus	10.53%
Bacillus spp.	5.26%
Bacilo corineforme	5.26%
Escherichia coli	5.26%
Havnia alvei	5.26%
Neisseria spp.	5.26%

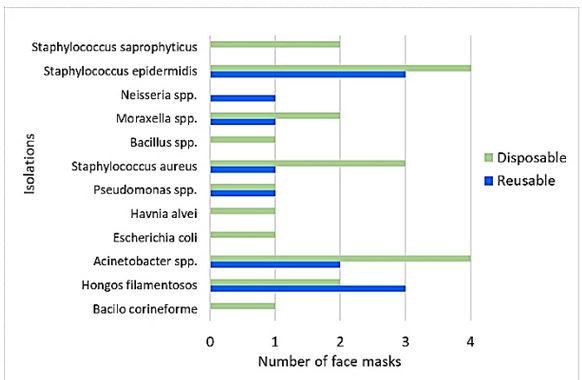
Table 2 Percentage of bacteria isolates based on the total number of face masks

In the same way, the isolates were grouped according to the recovery site. These are reflected in graphic 1.



Graphic 1 Isolations of microorganisms depending on the recovery site (internal or external part)

The data was analyzed based on the particular type of mask (disposable or reusable) where it was recovered (Graphic 2).



Graphic 2 Isolations of microorganisms depending on the type of face mask (disposable or reusable)

Discussions

Regarding the performance of the colonial count, in table 1 CFU values equal to 0 are observed, this does not necessarily indicate the absence of microorganisms in said mouth covers, but rather that the real CFUs are less than 1 CFU per 10µL.

The statistical analysis reflected significant differences in the amount of CFU/mL recovered from the internal part (higher median), with respect to the external part of the face mask. This is within what is expected as it is a retention mechanism for fluids and aerosols; however, this favors the accumulation of microorganisms in close contact with the skin. In relation to the above, the bacterial organisms with the highest percentage of isolates were *Staphylococcus epidermidis*, *Staphylococcus aureus* and *Acinetobacter* spp.

Staphylococcus epidermidis is known as part of the skin microbiota together *Staphylococcus aureus*, Delanghe *et al*. (2021), describe these two organisms as pathobionts capable of causing atopic dermatitis and acne vulgaris. Foo *et al.* (2006), point out that the main adverse reaction caused by the use of disposable face masks (N95) was the appearance of acne that may have its origin in temperature and humidity conditions; these conditions are described as conducive to bacterial infections, as also described by Saavedra *et al.*, (2011).

Likewise, Hua *et al*. (2020), refer to the friction caused by the face mask and the decrease in pH (an important microbial regulator), as factors that contribute to altering the function of the skin barrier.

The isolation of *Acinetobacter* spp. It is within expectations because it is recognized as part of the normal microbiota of the skin. On the other hand, in this study the isolation of Streptococcus spp. which may be due to its low quantity in the samples in relation to other competing microorganisms. (Delanghe *et al*., 2021)

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In the present study, *Pseudomonas* spp. in 10.53% of the face masks; around this Luksamijarulkul *et al*. (2014), also described the recovery of *Pseudomonas* spp in mask samples (37%). This genus of bacteria is implicated in a diversity of infections, especially associated with susceptible people; likewise, the species of this genus tend to present resistance to antibiotic treatments with relative frequency. (Bennett *et al*., 2017; Estepa, 2014).

On the other hand, the greatest diversity of isolates was recovered from the external part of the mask, these microorganisms from the environment can reach the mask through the hands. A recovered species was *Hafnia alvei*, which is known to be an opportunistic pathogen that causes cystitis. (Gund *et al*., 2021; Orrego *et al*., 2014).

Regarding the internal part of the mask, in one of the isolates the presence of *Escherichia coli* was found, this microorganism has been described as causing gastro-intestinal infections as well as urinary infections. (Orrego *et al*., 2014).

Similarly, the development of species of filamentous fungi was observed in 26.32% of face masks. these are retained in the mouth covers from the environment. Aruna *et al*. (2017), also refer to isolates of filamentous fungi from samples of mouth covers which come from the environment. Because these microorganisms are ubiquitous, their isolation from face masks is expected thanks to the ease with which the spores are retained in them.

The statistical comparison of the CFU/mL of the microorganisms isolated from different sites (internal and external separately) was made according to the type of face mask, but no significant differences were found. This indicates that the means or medians of CFU/mL recovered from both the internal and external parts are the same regardless of the type of mask. However, a greater variety of isolates is observed in those of the disposable type, this may be due to the less care given to them as they are for single use.

On the other hand, no correlation was found between the CFU/mL and the days of use of the mask; however, the original sample was small, so it cannot be ruled out that this type of interaction may exist in a larger sample.

Face masks are protective equipment that prevent the transmission of infectious diseases; however, they also provide humidity and temperature conditions that make it a favorable environment for the development of potentially pathogenic bacterial species. Delanghe *et al.* (2021), point out the accumulation of pathobiont bacteria in the face mask after 4 hours of use and recommend discarding disposable face masks after use.; In addition, they refer to the possibility of causing dysbiosis and subsequent association with acne due to prolonged use of it (greater than 4 hours).

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Conclusions

The face mask is a useful tool in the current situation of the SARS-COV2 pandemic, however, the continuous use of a face mask can create adequate conditions for the proliferation and storage of pathobiont or opportunistic bacterial species that harm health; therefore, the constant replacement or washing of face masks is recommended as a preventive measure.

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Hepatic steatosis and acanthosis nigricans in obese adolescents aged 15 to 19 years with high risk of diabetes mellitus according to the Findrisk test

Esteatosis hepática y acantosis nigricans en adolescentes obesos de 15 a 19 años con alto riesgo de diabetes mellitus según el test de Findrisk

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Abstract

Objective: To determine hepatic steatosis and acanthosis nigricans in obese adolescents from 15 to 19 years of age with a high risk of suffering from Diabetes Mellitus. **Methodology:** Observational, cross-sectional and analytical study. **Results:** The ultrasound revealed that the most frequent hepatic steatosis in this study group was mild with 29.5%. Acanthosis Nigricans in more than two areas was the most frequent in 65.57%, only 6.55% did not have this presence; the highest body mass index (31.5) was found in a 15-year-old adolescent, the largest abdominal perimeter (95.5cm) was identified in the group of adolescents with acanthosis of the neck; The presence of acanthosis and data on hepatic steatosis stands out in the case of moderate steatosis, which occurs in an adolescent with acanthosis in more than two areas, with the highest score on the Findrisk test, body mass index and Abdominal perimeter.

Acanthosis nigricans, Hepatic steatosis, Findrisk test

Resumen

Objetivo: Determinar la Esteatosis hepática y Acantosis nigricans en adolescentes obesos de 15 a 19 años de edad con alto riesgo de padecer Diabetes Mellitus. **Metodología:** Estudio observacional, transversal y analítico. **Resultados:** El ultrasonido revelo que la Esteatosis hepática más frecuente en este grupo de estudio fue la leve con un 29.5%. La Acantosis Nigricans en más de dos áreas fue la más frecuente en un 65.57%, solo el 6.55% no tuvo presencia de esta; el mayor índice de masa corporal (31.5) se presentó en un adolescente de 15 años, el perímetro abdominal con más amplitud (95.5cm) se identificó en el grupo de adolescentes con acantosis en nuca; La presencia de acantosis y datos de esteatosis hepática, se destaca en el caso de la Esteatosis moderada la cual se presenta en un adolescente con acantosis en más de dos áreas, con el más alto puntaje en el test de Findrisk, índice de masa corporal y perímetro abdominal.

Acantosis nigricans, Esteatosis hepática, Test de Findrisk

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Introduction

Adolescence is the transition from childhood to adulthood, in which numerous and profound changes occur in the individual as a biological and social being and in his or her total integrity. According to the concepts conventionally accepted by the World Health Organisation, adolescence is the stage between the ages of 10 and 19.

Diabetes mellitus type 2 is a chronic disease that represents one of the main causes of morbidity, mortality and disability in Mexico. Methods to prevent it have been sought; as part of this search, the clinical term prediabetes was recently identified as a high risk factor for developing diabetes (REDD). It is estimated that between 40 and 50% of the population carrying this factor will develop type 2 diabetes mellitus. Type 2 diabetes mellitus is a severe, progressive, multisystemic disease, with the potential to develop chronicity, characterised by sustained elevation of glucose with impaired intermediary metabolism of carbohydrates, proteins and fats, with a relative or absolute deficiency in insulin secretion and varying degrees of insulin resistance.

Diabetes, defined as type 2 diabetes associated with obesity, is a growing public health problem not only in adults but also in children and adolescents. (15) Early and timely detection of this series of disorders, using non-invasive markers that indicate their presence or possible development, is of utmost importance for preventive intervention in the population at risk and to avoid complications in the future.

The skin, the largest organ of our body, serves as a reflection of the metabolic alterations generated by obesity, facilitating the identification and timely diagnosis of pathologies such as acanthosis nigricans. On the other hand, acanthosis nigricans (AN), closely related to Diabetes Mellitus 2, has been considered by some researchers as a clinical marker to recognise those obese patients at higher risk of triggering metabolic events such as Diabetes Mellitus 2 and metabolic syndrome among others. Acanthosis Nigricans is a physical sign associated with obesity and Insulin Resistance and has been found in 90% of obese adolescents with Diabetes Mellitus.

Acanthosis Nigricans has been considered a predictor sign of IR, as increasing insulin increases the affinity for insulin-like growth factor receptors in the skin, exerting effects on cell proliferation of dermal fibroblasts, melanocytes and keratinocytes. Acanthosis Nigricans is now more common in young people, especially in populations with high rates of insulin resistance, diabetes mellitus and obesity.

Obesity is now considered to be the main aetiological factor in non-alcoholic fatty liver disease (NAFLD) and a risk factor for progression to more advanced forms of the disease such as steatohepatitis and cirrhosis. Hepatic steatosis is a common finding in obese children, and its pathophysiology is not well understood, although we know that insulin resistance and hypertriglyceridaemia are implicated in its development, with the time of progression playing an important role. Hepatic steatosis (HS) is the initial phase of the entity known as non-alcoholic fatty liver disease (NAFLD), characterised by the abnormal accumulation of fat in hepatocytes. It is the most common metabolic disorder in the liver, resulting from an imbalance between hepatocyte synthesis and secretion of triglycerides. Depending on the percentage of hepatocytes affected, HD is classified as mild, when less than 25% of hepatocytes are affected, moderate, 25-50%, and severe, when more than 50% of hepatocytes are affected.

Recent studies have shown a close association between hepatic steatosis and obesity in childhood. However, the higher or lower prevalence of juvenile hepatic steatosis will depend on the population studied, with estimates of less than 10% in the general population, compared to an estimated 70-75% in the obese juvenile population. 16 The prevalence of this disease is higher in peripubertal children who are overweight (BMI > 85th percentile) or obese (BMI > 95th percentile), or in males compared to age-matched females with similar BMI. Being of Hispanic origin is a risk factor, while being black appears to be a protective factor. Clusters of families with obesity, insulin resistance, NAFLD or type 2 diabetes mellitus are common and should be suspected in children with this history (17).

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The most widely used DM risk scale in Europe is called FINDRISC (Finnish Diabetes Risk Score). This scale, based on the collection of clinical information on risk factors, allows an acceptable prediction of the 10-year incidence of DM. It uses a simple, validated, 8-item questionnaire and, most importantly, does not include laboratory variables. It requires information on age, sex, weight and height, waist circumference, use of blood pressure (BP) medication, personal history of blood glucose disorders, physical activity, family history of DM and daily fruit and vegetable consumption. Its most recent version classifies between 0 and 26 points as follows: < 7 points, low risk; 7-11, slightly elevated risk; 12-14, moderate risk; 15-20, high risk; > 20, very high risk. It can be filled in personally by the respondent and also serves as a "mini-intervention", as it provides information on what the risk factors for DM are in a way that is easy to understand. If the score obtained is high (> 14), a blood test for DM is recommended.

Methodology

Observational, cross-sectional, analytical study. All obese adolescents aged 15-19 years at high risk for type 2 diabetes mellitus were studied during the period July 2021 to May 2022.

Results

The present study was conducted in a sample of 61 obese adolescents aged 15-19 years, 62% of whom were obese. In terms of age, the 18-year age group stands out.

According to the abdominal perimeter (AP), males had a mean of 102.91 centimetres and females 94.42 centimetres.

It was found that only 1.6% exercised regularly for at least 30 minutes a day, and only 23% of those who consumed vegetables and/or fruit said they did so every day.

None of the patients studied had a history of taking antihypertensive drugs or a history of high glycaemia values.

All patients had at least one family member with a diagnosis of type 1 or type 2 diabetes (parents or siblings).

Ultrasound revealed that the most frequent hepatic steatosis in this study group was mild steatosis, which was present in 29.5%.

Table 1 shows that Acanthosis Nigricans in more than two areas was the most frequent in 65.57% of the adolescents, only 6.55% had no Acanthosis Nigricans; the highest body mass index (31.5) was found in a 15 year old adolescent, the largest abdominal circumference (95.5cm) was found in a 15 year old adolescent, and the largest abdominal circumference (95.5cm) was found in a 15 year old adolescent. 5cm) was identified in the group of adolescents with acanthosis on the nape of the neck; finally, the Findrisk test score range was 14 to 15, with a mean of 14.63 for the group with acanthosis in more than two areas.

Acanthosis Burke Scale	Patient's age (years)	Body Mass Index BMI (kg/m2)	Abdominal girth BP (cm)	Findrisk Total Score
No Acanthosis	Adolescents 4 (6.55%)	4	4	4
Average	17.25	30.27	87.88	14.25
Minimum	16	30	86	14
Maximum	18	30	89	15
Nuca	Adolescents 6 (9.83%)	6	6	6
Average	16.67	30.76	94.27	14.5
Minimum	15	30	88	14
Maximum	19	31	105	15
Armpit	Adolescents 10 (16.39%)	10	10	10
Average	17.5	31.44	95.5	14.2
Minimum	16	30	86	14
Maximum	19	35	103	15
Knee	Adolescents 1(1.63%)	1	1	1
Average	15	31.5	87	14
Minimum	15	32	87	14
Maximum	15	32	87	14
More than 2 areas	Adolescents 40 (65.57%)	40	40	40
Average	17.45	34.3	99.9	14.63
Minimum	15	30	86	14
Maximum	19	46	120	15

Table 1 Variables studied in adolescents aged 15 to 19 years old

The presence of acanthosis and data of hepatic steatosis is highlighted in the case of moderate steatosis, which occurs in an adolescent with acanthosis in more than two areas, a group that presented the highest mean of the Findrisk test (14.63), as well as BMI and BP.

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Acanthosis	Ultrasound Result	Adolescents	Percentage
No acanthosis	Normal	4	100 %
Nuca	Normal	5	83.3 %
	Mild hepatic steatosis	1	16.7 %
	Total	6	100 %
Armpit	Normal	10	100 %
Knee	Normal	1	100 %
More than 2 areas	Normal	22	55 %
	Mild hepatic steatosis	17	42.5 %
	Moderate hepatic steatosis	1	2.5 %
	Total	40	100 %

Table 2 Hepatic Steatosis due to the presence of Acanthosis

Inferential statistics

Findrisk Test Score				Ultrasound Result	Acanthosis
Spearman's Rho	14	Ultrasound result	Correlation coefficient	1,000	0.419
			Sig. (unilaterla)	-	0.011
			N	30	30
		Acanthosis	Correlation coefficient	0.419	1,000
			Sig. (Unilateral)	0.011	-
			N	30	30
	15	Ultrasound Result	Correlation coefficient	1,000	0.276
			Sig. (unilateral)	-	0.067
			N	31	31
		Acanthosis	Correlation coefficient	0.276	1,000
			Sig. (Unilateral)	0.067	-
			N	31	31
Correlation is significant at the 0.05 level (one-sided).					

Table 3 Correlation Hepatic Steatosis and Acanthosis nigricans

Acanthosis and hepatic steatosis show a significant correlation in the condition of a Findrisk Test score of 14, as shown in table 3.

Conclusions

According to the data found and analysed, it was observed that there is a correlation between acanthosis nigricans and hepatic steatosis in obese adolescents, with moderate and high risk factors for diabetes mellitus according to the Findrisk test, and that the higher the BMI and abdominal perimeter, the greater the risk of advanced hepatic steatosis. Ultrasound is therefore recommended for those patients who meet the risk factors and to continue evaluating the progression of the disease, as well as to establish a timely and multidisciplinary treatment, since all these preventive measures will be the basis for a healthy life in adulthood.

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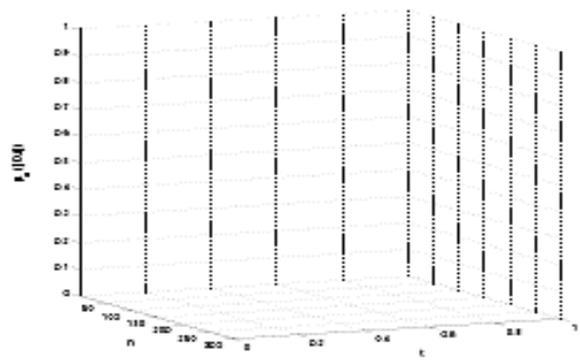

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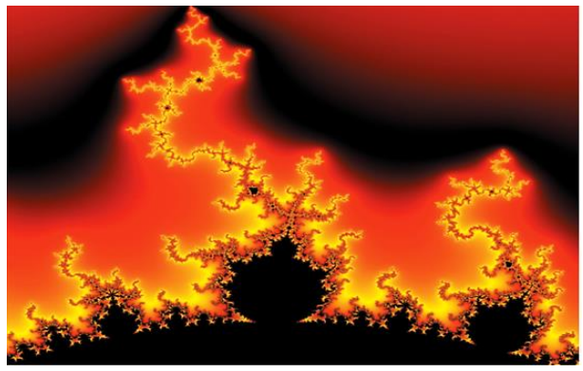

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