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Journal of Health Sciences

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Knowledge Area

The works must be unpublished and refer to topics of clinical sciences, nutrition sciences, pharmacology, internal medicine, general medicine, internal medicine, preventive medicine and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, *Prevalence of dementia in the intervening senior citizen the mini-mental test of the Centro Destellos de luz for older adults with an elderly status of 65 to 90 years of the City of Durango*, by LERMA-NIEVES, Esmeralda Margarita, ONTIVEROS-VARGAS, Ángel Adrián, HERRERA-VARGAS, Isela Vanessa and SALAS-NAME, Sagrario Lizeth, with adscription in the Universidad Juárez del Estado de Durango, as the second article we present, *Diagnosis of chronic renal insufficiency by Cockcroft formula in elderly adults with Diabetes Mellitus type ll*, by SARABIA-ALCOCER, Betty, AKÉ-CANCHÉ, Baldemar, VELÁZQUEZ-SARABIA Betty Mónica and LÓPEZ-GUTIÉRREZ, Tomás, with adscription in the Universidad Autónoma de Campeche, as third article we present, *Effects of iron deficiency on the ovarian cycle. Experimental model*, by VIEYRA-REYES, Patricia, MARIEZCURRENA-BERASAIN, María Antonia, BARBABOSA-PLIEGO, Alberto and VÁZQUEZ-CHAGOYÁN, Juan Carlos, with assignment at the Universidad Autónoma del Estado de México, as last article we present, *Uses, effects and consequences of fluoride present in the consumption of drinking water. La Noria community, Pinos Zacatecas*, by GONZALEZ-GARCIA, Arcelia, GONZÁLEZ-MARTÍNEZ, Lilia, MARTINEZ-ORTIZ, Rosa María and HERNÁNDEZ-SALAS, Claudia, with adscription in the Universidad Autónoma de Zacatecas.

Content

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Prevalence of dementia in the intervening senior citizen the mini-mental test of the Centro Destellos de luz for older adults with an elderly status of 65 to 90 years of the City of Durango

Prevalencia de demencia en el adulto mayor mediante el test minimental del Centro Destellos de luz para adultos mayores con un rango de edad de 65 a 90 años de la Ciudad de Durango

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Abstract

Dementia is one of the neurocognitive disorders that most affect the elderly population, and refers to severe damage to executive functions and is classified according to the condition. (Esparza, 2005). The objective of the research is to identify the prevalence of dementia in the elderly in an age range of 65 to 90 years old in the Destellos de Luz Center in the City of Durango, as well as its main risk factors and the characteristics of people with dementia using the MiniMental Test. The type of methodology implemented is of mixed type and case studies using. In which a cognitive impairment was obtained as a result in the three participants. More than 50% of the population of older adults evaluated suffer from undetected dementia.

Dementia, Elderly, Mini-Mental Test

Resumen

La demencia es una de las afectaciones neurocognitivas que más afectan a la población de la tercera edad, y hace referencia al daño severo de las funciones ejecutivas y se clasifican según el padecimiento. (Esparza, 2005). El objetivo de la investigación es identificar la prevalencia de demencia en el adulto mayor en un rango de edad de 65 a 90 años de edad en el Centro de Destellos de Luz en la Ciudad de Durango, así como sus principales factores de riesgo y las características de las personas con demencia mediante el Test MiniMental. El tipo de metodología implementada es de tipo mixto y estudios de caso utilizando. En la cual se obtuvo como resultado en los tres participantes un deterioro cognitivo. Más del 50% de la población de los Adultos mayores evaluados padece de demencia no detectada.

Demencia, Adulto mayor, Test Mini-Mental

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Introduction

Cognitive impairment is one of the main alterations manifested by the elderly and given its increase in the progressive mortality rate in the population, it has been decided to evaluate neurocognitive functions. Until a few years ago, cognitive impairment was related to neurodegenerative diseases such as Parkinson's, Alzheimer's and senile dementia. (Cancito. et.al, 2016).

The following research is focused on the prevalence of dementia in older adults using the MiniMental Test in the Destellos de Luz Centre for older adults in the State of Durango and its main objective is to know the main risk factors for dementia according to age, sex and schooling. It is considered of utmost importance to know the functioning of the nervous system, as well as the structures involved with neuropsychological aspects related to dementia and cognitive impairment.

During normal or pathological ageing the most common amnestic dysfunction is cognitive impairment influencing the capacity for new learning and the recall of valuable information for everyday life.

The study on the prevalence of dementia was conducted using the MiniMental test which is a battery that aims to accurately assess areas such as temporal orientation, spatial orientation, repetition, memory, attention, calculation and finally language resulting in cognitive impairment or dementia.

Justification

Dementia refers to severe damage to cognitive functions, in this study in the elderly, it is a term used to encompass chronic diseases such as: memory loss, alterations in language, spatial orientation, visual recognition, etc.

It is one of the pathologies related to ageing in the elderly, due to this, various health specialists have proposed alternatives for cognitive improvement in which the main priority is an adequate intervention and thus improve the well-being of the elderly with dementia.

According to studies carried out by the World Health Organisation, almost 7% or 8% of older adults present some type of cognitive deterioration. In recent years, according to studies that have been carried out, cognitive deterioration has increased rapidly, and it is estimated that in the future 30% of older adults will present some type of dementia.

Older adults with dementia present some symptoms such as: depression, sleep disturbances, tract signs, corticospinal, confabulation, hemianopsia, pseudobulbar signs and aphasia (Gutiérrez et al., 2014).

Some research such as "Relación entre educación, envejecimiento y deterioro cognitivo en una muestra de adultos mayores de Arequipa" in which 280 subjects were evaluated by means of the MiniMental Test, where a significant relationship between age and cognitive impairment was shown, observing that the lowest score was related to the low educational level, in addition, it was observed that subjects with higher educational level showed higher scores (Abarca et al, 2008, p 2).

Thus, it is considered important to evaluate the neurocognitive functions of the older adult using the Mini-Mental Test in order to identify the levels of dementia in which the older adult may be immersed, and thus make appropriate intervention programmes. As well as for the benefit of their quality of life, this test will allow to identify if it is necessary to go to a Specialist Doctor, Psychiatrist, Psychologist, Geriatrician, Human Communication Therapist, etc., as well as to raise awareness among close relatives for the benefit of the elderly person.

To this end, intervention plans have been proposed with the aim of the well-being of older adults, as well as promoting a dementia-friendly society worldwide by making dementia a public health priority, thus improving public attitudes and those of health professionals.

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Problem

Memory problems currently affect 50% of adults over the age of 65, while dementia affects only 5-10% of the population. As we know memory is a complex mental process by which we fix, retain and produce everything that was once in our day-to-day life making it conscious to later create our experience, therefore, we can say that memory is a fundamental part to develop an independent and productive life making the information already registered to adapt to other neuropsychological functions remaining intact such as attention, language, visual and auditory. Therefore, if there is damage in any of these areas, they interfere with the proper functioning of memory, which could represent dementia. (Pérez, 2005)

When this event occurs (either dementia or cognitive impairment) it happens when the supply of both oxygen and nutrients to the brain is interrupted and may be due not only to cerebrovascular pathology such as thrombosis or embolism, but also to haemorrhage and brain injury such as hypoxia-ischaemia following cardiac arrest or severe arterial hypotension. Dementia can present itself in different ways in each older adult, depending on its aetiology, however, some of the following characteristics may be present: staggered progression, with indeterminate course, some neurological signs and symptoms such as decreased strength or paralysis, problems in memory, concentration, depression associated with dementia, epileptic seizures, as well as acute confusion. And in some others, hallucinations, delusions, irritability with physical and verbal aggression, restlessness and incontinence may occur. (Pupo, et. al, 2011).

It is important to know about the changes that develop in ageing in order to attend to the needs that may arise later on, raising awareness of the multidisciplinary work involved in this stage of life. The aim of this document is to demonstrate the prevalence of dementia in the elderly.

Hypothesis

H_0: More than 50% of the older adult population between 65 and 90 years of age attending the Destellos de Luz Centre in the State of Durango suffers from undetected dementia.

Hi: There is no prevalence of dementia in the older adult population at the Destellos de Luz Centre for older adults with an age range of 65 to 90 years old.

General objective: To determine the prevalence of dementia in older adults at the Destellos de Luz Centre using the MiniMental Test.

Specific objectives:

- To identify the current state of neurocognitive functions using the MiniMental Test.
- To know the total score of the MiniMental test and its relationship with the years of study, sex, and age of the participants.

Background

There is currently an increase in the number of people being diagnosed with dementia each year, however, one of the important areas to significantly reduce the overall rate of people with cognitive impairment or dementia is prevention.

Cognitive intervention is one of the activities which can stimulate or increase cognitive reserve and have a buffering effect on rapid cognitive decline. (WHO, 2020)

Preventive intervention can provide cognitive stimulation in which the main focus will be on cognitive training through specific tasks designed to improve or stimulate specific executive functions and thus prevent or delay the onset of age-related cognitive decline, dementia or cognitive impairment. (WHO, 2020)

The prevalence of dementia in the elderly, according to the sources reviewed in the study, refer to common aspects involved in the subject, such as gender, age, level of education, etc. They show that the prevalence of dementia is related to functional status, as well as to the way of life they lead, which will be explained below.

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In another study carried out in Chile (Muñoz, Et. Al, 2015) called "Criterios de valoración geriátrica integral en adultos mayores con dependencia moderada y severa en centro de atención primaria en Chile" in which the main purpose was to present a comprehensive geriatric assessment for patients with moderate and severe dependency care carried out in Primary Health Care (PHC) which is the basis of the Chilean public health system, The MiniMental Test was used for this purpose and was applied with the main objective of assessing cognitive impairment and determining which factors had an influence, finding that the influence of the educational factor is statistically significant and with differences of up to 7 points between groups with more and less years of schooling, determining that education was an important factor in the prevalence of cognitive impairment (Muñoz, et al., 2015)

Finally, in the city of Monterrey, Mexico in 2006, an investigation was carried out using the MiniMental test, which was called "Cognitive capacity of patients in a geriatric outpatient service in Monterrey, Mexico". Its objective was to evaluate older adults to detect the prevalence of dementia, for which a sample of 142 people was taken, resulting in 59% of patients presenting cognitive impairment, with common characteristics of being older, with low schooling and moderate depression. (Cárdenas et al., 2006).

The articles reviewed reveal that the subject of this research is the assessment in the elderly to determine the prevalence of dementia, thus considering the importance of the evaluation of executive functions in the elderly, therefore, according to the sources mentioned, it can be said that there are more studies on dementia in the elderly in which the results obtained were that the prevalence of dementia has common characteristics such as age and years of study (low schooling).

Therefore, the research to be carried out is of great importance in order to have more knowledge about the prevalence of dementia in older adults who attend the Destellos de Luz centre and thus, to carry out an adequate intervention plan for the older adults who live there.

Older adults

According to the World Health Organisation (WHO), the older adult is a person with changes that constitute and influence ageing. These changes are not usually linear or uniform and are therefore associated with the person's age in years, independently of good physical and mental functioning. It is therefore important to develop a plan where public health ageing is important to consider strategies that counteract the losses associated with older age, but also to reinforce the recovery, adaptation and psychosocial growth of the person. (WHO, 2015)

Theoretical framework

Cognitive impairment

During normal or pathological ageing, amnestic dysfunction is a most common cognitive impairment in a deterioration of the older adult's quality of life, as well as the capacity for new learning and recall of valuable information. Memory impairment is associated with age, in which a decline in memory is described as a phenomenon that occurs with "abnormality" in older adults, which is where most cases of early stage cognitive impairment or other disease occur. Early detection of frequent memory disorders is of great importance, as well as diagnosis for early intervention. (Casanova, 2004)

Cognitive impairment in older adults

Cognitive impairment is a clinical syndrome characterised by the loss or impairment of mental functions in different neuropsychological behavioural domains, such as memory, orientation, calculation, comprehension, judgement, language, visual recognition, behaviour and personality. Viewed as a geriatric syndrome, it is an impairment of any dimension of higher mental functions, which the patient complains of, but which may or may not be corroborated by neuropsychological tests, and which is usually multifactorial, such as: depression, hearing and visual deficits, hypothyroidism, adverse effects of medications, among others give rise to a single manifestation. This syndrome merits a comprehensive evaluation to determine whether the patient has dementia, or some other problem that can be resolved (IMSS, 2012).

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Executive functions

Executive functions refer to the capacity to organise, plan and verify behaviour in order to reach a determined objective, they tend to work independently but when there is an imbalance they work together in the needs that are required of them, in the vital cycle of life, imbalances occur in Older Adults presenting more difficulties in being able to have an "active" and healthy ageing, preventing them from reaching a bearable lifestyle. (Betancourt, et.al. 2020).

The main characteristic of executive functions is their independence of the "input", that is, the executive mechanism that coordinates information coming from different input systems, either perceptions from different sensory modalities, or processing such as attention, memory, emotions, as well as the output, i.e., motor programmes (Verdejo, 2010).

Memory

Memory is the brain's ability to store the consequences it learns from what it experiences. It is a fundamental capacity of the brain. Memory reflects both what existed and what exists, which involves a process of recalling as well as updating or recognising what was previously assimilated. Memory is of great importance as it is one of the important processes for the acquisition of specific learning. (Tomás, 2012)

Language

Language makes sense in social interaction and in everyday contextualised use, whether in conversation, writing or speaking, satisfying needs and learning. The use of language, the duration of the exchanges, the enrichment of the context and the degree of satisfaction that is presented in the older adult will be fundamental at the moment of generating a good communication and social adaptation. (Calsimiglisa & Tusón, 1999).

MINIMENTAL TEST

The MiniMental test is a battery whose field of application is oriented to patients of geriatric age, helping for the clinical examination of the cognitive mental state by making a brief, quantitative and objective measurement evaluating areas by means of a series of questions and tasks, which are grouped in eleven categories. The areas of exploration of the MiniMental Test are: Temporal orientation, spatial orientation, fixation, attention and calculation, memory, nomination, repetition, comprehension, reading, writing and drawing. (Foltein, et.al, 2002).

Research methodology

The present study is exploratory, non-experimental, observational and cross-sectional, with a descriptive and correlational statistical analysis. The complex variable, dementia, was analysed and years of study were used to categorise academic performance, in addition to the signal variables of age, gender and degree.

The methodological perspective for the research is of a mixed type, by means of a case study, as it will be based on a description of the Minimental Test and its quantitative results.

It was carried out over a period of 12 months of collection and evaluation, in order to subsequently carry out the analysis of the results and fulfil the stated objectives.

Procedure

First of all, we select those people who have the characteristics of inclusion, three women were chosen, who were given a letter of consent explaining why the test will be applied and what the research aims to achieve, then we ask the person if they would like to participate voluntarily. Subsequently, the MiniMental Test is applied, which lasts approximately 15 minutes. After the results are obtained, a table is created where the results of the participant are shown, in which it is made known which areas were evaluated and the score obtained by the person. At the end, a percentage of people with dementia is calculated.

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The participants are older adults between 65 and 90 years of age from the Destellos de Luz centre in the State of Durango. Data analysis will be classified according to gender, age, educational level and outcome (whether dementia is present or not).

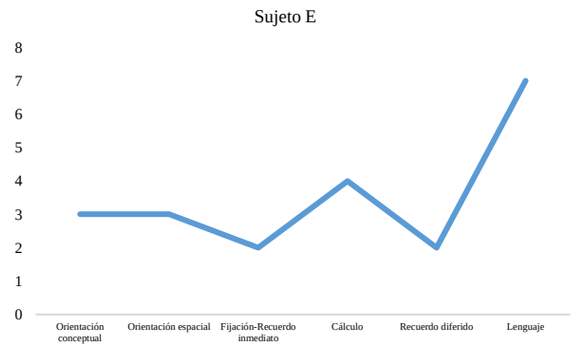
Inclusion, exclusion and elimination criteria, sample size and sampling method are shown in the table below.

Inclusion	Exclusion	Elimination
Women between 65 and 90 years of age	Women under 65 and over 90	Women taking medication that impairs cognitive functioning
		Women already diagnosed with a pathology.

Table 1 Inclusion, exclusion and elimination criteria

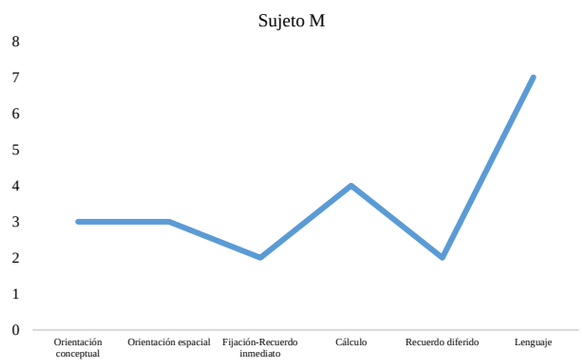
Analysis and Results

According to the MiniMental Test, a score between 9 and 12 is considered to be manifestations of dementia, and 27 or more is considered to be within the normal range.



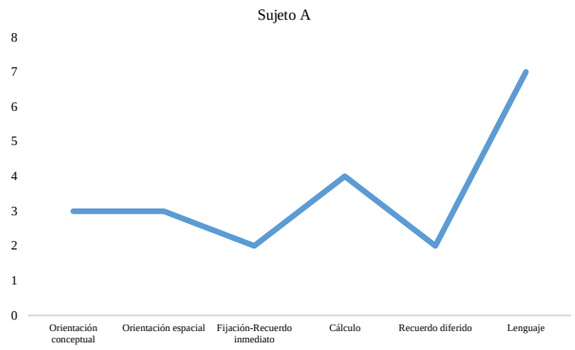
Graphic 1 Results obtained subject of evaluation E

Female test subject, 65 years old with only primary education, scored 0 points in the area of conceptual orientation, obtaining at the end 15 points out of a total of 30 points.



Graphic 2 Results obtained with evaluation subject M

Female test subject, 76 years old, with a bachelor's degree education, obtained a score of 0 in deferred recall, obtaining 14 points out of a total of 30 points at the end of the test.



Graphic 3 Result of evaluation subject A

Female evaluation subject, 90 years old and with primary education, obtained a score of 3 in deferred memory and in immediate memory, obtaining at the end of the test a score of 21 out of a total of 30 points.

The results obtained from the three evaluation subjects were that subject E obtained a total score of 15 points, giving as a result the subject with the lowest points obtained, presenting according to the MiniMental Test, cognitive deterioration without being dementia, subject M obtained a total of 14 points giving as a result according to the evaluation items of the MiniMental Test, cognitive deterioration and subject A obtained a score of 21, giving as a result a pathological suspicion.

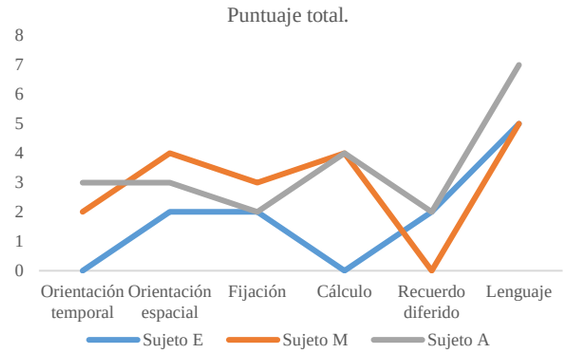
According to the specific objectives, they were fulfilled because it was possible to identify the cognitive characteristics and their relationship with dementia by means of the MiniMental Test.

The test, as well as to know the total score and its relationship with the years of study. It should be noted that there were no manifestations of neurological damage in any of the participants.

Test MiniMent	Normal conditions Score 27 or more	Pathological suspicion 24-27	Cognitive impairment 12-24	Dementia 9-12
Subject E			14 points	
Subject M			15 points	
Subject A			21 points	

Table 2 Table of contrasts

The users of the Centro de Destellos de Luz del Estado de Durango are in the most fundamental stage of intervention, since by means of the Mini-Mental Test it was observed that they have not yet reached the first level of dementia, and this makes the study important since it is possible to intervene in time, in addition to promoting neurocognitive stimulation workshops in the other care centres for the elderly, previously carrying out evaluations of this type that allow us to identify the primary needs of each of the users.



Graphic 4 Total score

Therefore, the hypothesis that more than 50% of the older adult population between 65 and 90 years of age attending the Centro Destellos de Luz in the State of Durango suffers from undetected dementia is approved.

It can be concluded that the three evaluation subjects obtained as a result a cognitive impairment, as stated in the specific objectives, it can be seen that the years of study in this research are not related to dementia, so that the evaluations can be extended and thus know in depth what are the factors involved in cognitive impairment.

Conclusion

To conclude, carrying out this type of study reflects the clear need for the participation of the Human Communication Therapist in these care centres for the elderly, as he/she is a health professional trained to improve the neurocognitive capacity of our older adults, as well as to extend the field of work of the same.

The results obtained in this research reveal that of the three participants, none of them had dementia as a result, being at a fundamental stage for prevention and intervention and slowing down the progression towards dementia.

It was also noted that each of them were not taking medication and had not been previously assessed by a health professional, so they did not have a diagnosis as such.

In the absence of curative treatment, an approach is needed that includes both pharmacological and non-pharmacological interventions aimed at optimising cognition, behaviour and function of dementia patients, as well as addressing the needs of caregivers, although dementia patients are not based on a systematised or structured technique. (French et al., 2003)

Since there is still no cure for dementia, the recommendation would be early intervention as well as prevention.

The evidence found shows that physical activation, cognitive stimulation, social participation, among others, allows the individual (in this case the elderly) to improve cognitive performance and slow the progression of dementia in early stages (Ayala, 2020).

In summary, as a recommendation in the Destellos de Luz Centre, it is important the neuropsychological evaluation of mental health conditions in older adults, in order to subsequently create neurocognitive stimulation programmes for older adults, since a therapeutic approach that includes prevention is of great importance.

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Diagnosis of chronic renal insufficiency by Cockcroft formula in elderly adults with Diabetes Mellitus type ll

Diagnóstico de insuficiencia renal crónica por fórmula de Cockcroft en adultos mayores con Diabetes Mellitus tipo ll

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Abstract

Objective: To determine the diagnosis of Chronic Renal Insufficiency, by Cockcroft formula, in type II diabetic patients aged 40 to 80 years old from the community of Santa Cruz, Hecelchakán during the period from August 2020 to July 2021. Materials and methods: This is a prospective, cross-sectional, descriptive and observational study in which the diagnosis of renal failure in any of its 5 stages will be investigated. Patients were asked for laboratory tests of plasma creatinine, weight and age, to later calculate the creatinine clearance using the Cockcroft and Gault formula and classify the stage of renal failure in which each patient is to formulate plans of practice of according to your state. Results: We found 10 cases with chronic kidney disease in stage 1, 3 men and 7 women, in stage 2 8 patients were found, 2 men and 6 women, and 5 patients with stage 3, all of them female. Conclusions: In the community of Santa Cruz, Hecelchakán, there is a prevalence of 3.9% in diabetes mellitus, 42 people who come monthly from a total population of 1,060 according to the November 2020 population census.

Chronic renal failure, Cockcroft formula, Type ll Diabetes Mellitus

Resumen

Objetivo: Determinar el diagnóstico de Insuficiencia Renal Crónica, por fórmula de Cockcroft, en los pacientes diabéticos tipo II en edad de 40 a 80 años de la comunidad de Santa Cruz, Hecelchakán durante el periodo de agosto de 2020 a julio de 2021. Materiales y métodos: Se trata de un estudio prospectivo, transversal, descriptivo y observacional que investigará el diagnóstico de insuficiencia renal en cualquiera de sus 5 etapas. Se solicitaron a los pacientes exámenes de laboratorio de creatinina plasmática, peso y edad, para posteriormente calcular la depuración de creatinina mediante la fórmula de Cockcroft y Gault y clasificar la etapa de insuficiencia renal en la que se encuentra cada paciente para formular planes de practica de acuerdo con su estado. Resultados: Se encontraron 10 casos con enfermedad renal crónica en etapa 1, 3 hombres y 7 mujeres, en etapa 2 se encontraron 8 pacientes, siendo 2 hombres y 6 mujeres, y 5 pacientes con etapa 3, todos ellos del sexo femenino. Conclusiones: En la comunidad de Santa Cruz, Hecelchakán, existe una prevalencia de 3.9 % en diabetes mellitus, 42 personas que acuden de manera mensual en una población total de 1,060 según el censo de población noviembre 2020.

Insuficiencia Renal Crónica, Fórmula de Cockcroft, Diabetes Mellitus tipo II

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Introduction

Type II Diabetes Mellitus (Type II DM) is one of the main causes of Chronic Renal Failure in our country. Sustained hyperglycemia, as well as poor metabolic control, lead to a progressive and declining condition of renal function. The improvement in the control of blood glucose and the most effective therapeutic measures to correct hypertension, which frequently accompanies this metabolic disorder, can reduce the development of end-stage renal disease among diabetics.

Chronic kidney disease (SRI) has acquired the proportions of a true epidemic, whose full spectrum is just beginning to be understood. Considering the demographic trend, it has been projected that, in the year 2030, there will be approximately 2.2 million patients that will require dialysis or transplantation.

Among the causes that lead to chronic renal failure, Type II Diabetes Mellitus occupies the first-place accounting for 40% of patients who enter renal replacement therapy.

In the community of Santa Cruz, Hecelchakán, diabetic patients are people of low resources and low level of education, some still attached to traditional medicine to heal their illnesses; all these factors lead to poor compliance with the pharmacological and dietary measures implemented, which leads to a constant rise in blood glucose levels.

Chronic Renal Insufficiency (CRF) is defined as the progressive, permanent, and irreversible loss of the Glomerular Filtration Rate (GFR) over a variable time, sometimes even years, expressed by a reduction in estimated creatinine clearance < 60 ml / min / 1.73 m^2.

Strictly speaking, any decrease in GFR below normal could be considered as renal failure, but for practical purposes renal failure is defined as a GFR <60 ml / min / 1.73m^2, corresponding to phases 3,4 and 5.

It has been estimated that at least 6% of the adult population of the United States has chronic kidney injury with a GFR> 60 ml / min for 1.73m2 of SC (stages 1 and 2), and therefore is at imminent risk of experiencing further deterioration progressive of this function. In addition, about 4.5% of the population of that country suffer from chronic kidney disease in stages 3 and 4.

Diabetic nephropathy is the first cause of terminal stage nephropathy in the United States, and one of the leading causes of morbidity and mortality related to DM. Patients with Diabetes Mellitus type 1 develop diabetic nephropathy in 30-40% of cases, while in patients with type II DM this percentage is reduced to 10-20%.

Although renal disease is less frequent in patients with type II DM, these are usually detected within the first 10 years following the clinical diagnosis. According to results of other investigations, the male sex is more predisposed to develop microalbuminuria. Another study mentions that it is likely that between 20-40% of patients with type II DM will progress to diabetic nephropathy in a period of approximately 10 years.

Nephronal loss, regardless of its etiology, causes adaptive responses in the remaining nephrons that lead to hypertension and glomerular hyperfiltration, passage of proteins to the urinary space with proteinuria, intrarenal activation of the renin angiotensin system (RAS), tubular activation with tubulointerstitial involvement, transdifferentiation of tubular epithelial cells to myofibroblasts and finally fibrosis of the renal parenchyma with definitive loss of function.

The pathogenesis of diabetic nephropathy is related to chronic hyperglycemia. CRF is a progressive disease that evolves in different stages in which clinical manifestations are increasing. These stages are established based on renal function measured by the estimated glomerular filtration rate.

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Stage	Description	VFG	Action
1	Kidney injury with normal or increased VFG	≥ 90	Dx and Tx Tx of concomitant pathologies. Reduction of risk of cardiovascular disease.
2	Kidney injury with mild decrease in VFG	60-89	Progression estimation.
3	Moderate decrease in VFG	30-59	Complication evaluation and tx.
4	Severely decreased VFG	15-29	Preparation for renal function substitution tx.
5	Renal insufficiency	< 15 or on dialysis	Replacement.

Table 1 Stages of CRI: an action plan with a clinical approach
Source: Tierney, McPhee, Papadakis (2005) Diagnóstico clínico y tratamiento. 40ª edición. Editorial Manual Moderno

It is advisable to measure the GFR, either with the formula of the clearance or the estimated according to the formulas of Cockroft-Gault or MDRD.

Cockcroft and Gault formula

$$\text{VFG: } \frac{(140 - \text{age}) \times \text{weight (kg)}}{\text{PCr} \times 72} \quad (1)$$

For women, the estimated VFG is multiplied by 0.85 because the muscle mass is smaller.

Methodology

A prospective, cross-sectional, descriptive, and observational study was conducted within the period from August 2020 to July 2021, Rural Medical Unit of Santa Cruz, Hecelchakán. All patients between 40 and 80 years of age with type II DM who attended their monthly control at the UMR Santa Cruz were included, excluding all those who did not meet the previously established criteria.

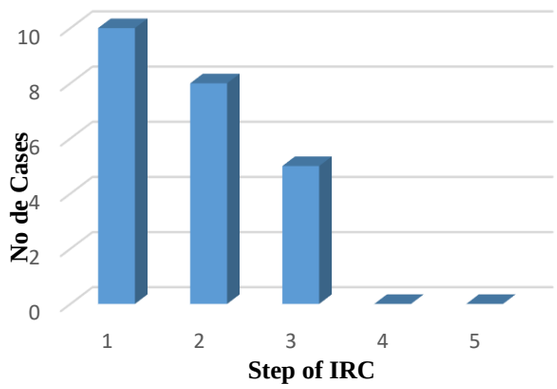
Results

The study was carried out in the Santa Cruz Rural Medical Unit, Hecelchakán, during the period from August 2020 to July 2021.

The community of Santa Cruz is made up of a population of 1,060 inhabitants, of which, within the age group of 40 to 80 years comprise 239 people, distributed by sex in 121 men and 118 women, according to the November 2020 population census.

The percentage of type II DM in the studied age group is 17.57%; that is, out of a total of 239 people, 42 have DM2. A total of 23 patients were included in the study, who met the inclusion criteria, 5 men and 18 women.

A total of 5 patients with CRF were found (defined as stages 3, 4 and 5). That is, in 21.73% CRF was developed within the group of diabetic patients studied. The rest of the patients were in stages 1 and 2, with 10 patients in stage 1, representing 43.47% and 8 patients in stage 2 with 34.78%. (Graphic 1).



Graphic 1 Classification according to the K / DOQI 2002 guidelines of the National Kidney Foundation

In Graphic 2, we can see that we find 9 patients who have a time of evolution of type II DM that goes from 1 to 5 years, 39.13%; in the range of 6-10 years of evolution were 9 patients, 39.13%; 3 patients with a duration of type II DM of 11-15 years, 13.04 and only 2 with an evolution of 16 years and more, being 8.69%. Among the 5 patients who presented renal failure, 1 was a diabetic with 1-5 years of evolution of type II DM, 20%: 3 patients with an evolution of 6-10 years, being 60% and 1 person with 16 and more years of DM2, with 20%.

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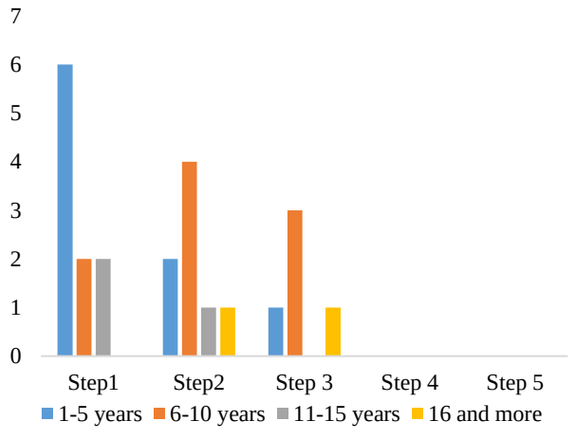
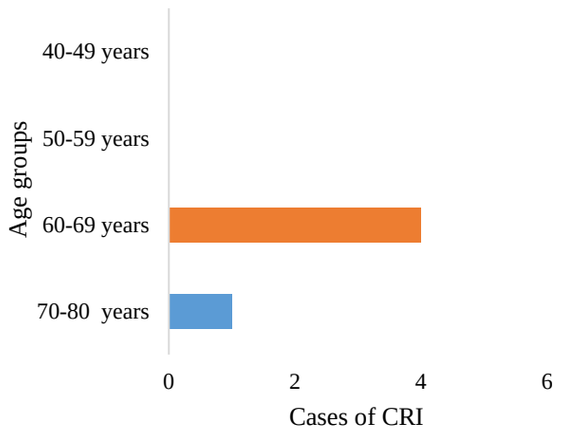


Graphic 2 Predominance of CKD according to the time of evolution of DM2

Regarding the predominance by age, in Table 2 we can find that 4 cases of CRI were found (stages 3, 4 and 5) in the age group of 60-69, with 80% and only 1 case in the group of 70-80 years, 20%. The rest of the cases (which are not considered CRF because they correspond to stages (1 and 2) were distributed as follows: 9 patients in the age range of 40-49, 6 patients aged 50-59 years, 2 patients in the group of 60-69 and 1 patient without CKD in the group of 70-80 years (Graphic 3).

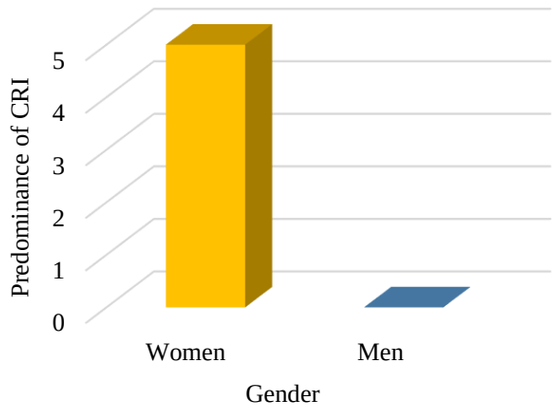
Age groups in years	No. of cases with irc
40- 49	0
50- 59	0
60- 69	4
70- 80	1

Table 2 Predominance of CRI cases according to the age group



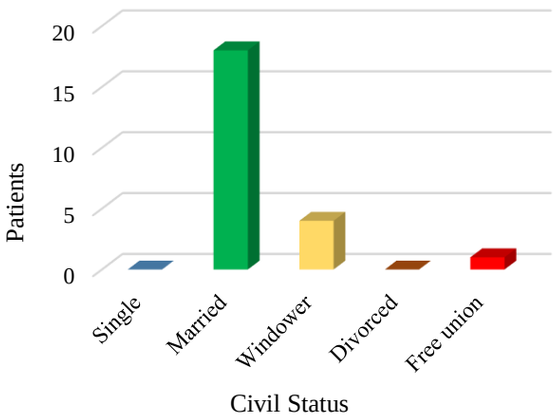
Graphic 3 Predominance of CRI cases according to the age group

In the distribution of cases of chronic renal failure according to the gender of the patients. We observed that no case of CRI was developed in the male sex, while 5 cases were detected in the female sex. (Graphic 4)



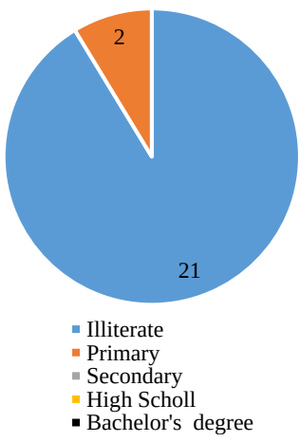
Graphic 4 Predominance of CRI (Stages 3, 4 and 5) according to gender

The marital status of the patients, we obtained 0 singles, 18 married, which corresponds to 78.26%; 4 widowed patients, 17.39%; no patient divorced and 1 in free union, 4.34%. (Graphic 5)



Graphic 5 Classification of the civil status of the patients

The division of diabetic patients according to their level of education. We found a total of 21 illiterate patients, being 91.3%: and 2 patients with primary education, 8.69%. (Graphic 6)



Graphic 6 Classification of the degree of schooling of patients

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Conclusions

In the study conducted in the Rural Medical Unit of the community of Santa Cruz, Hecelchakán, during the period from August 2020 to July 2021, 42 patients with type II DM were reported, of which 23 met the inclusion criteria.

The stage classification of renal failure was performed to assess how many have developed chronic renal failure, finding that 43.47% are in stage 1 with 10 cases. In stage 2, 8 cases were found with 34.78%. In stage 3 it was 21.73% reporting 5 cases. No case was classified within stages 4 and 5.

It was determined that the patients who developed CRF had an evolution time of type II DM that ranges from 6 to 10 years.

The age group where the existence of renal failure predominated was that of 60-69 years, with 80% of those affected in this age group.

The genus that presented more chronic renal failure, with a decrease in GFR <60 ml / min, was the female sex with 100% of cases.

The predominant marital status among patients with DM2, including those with CRF, was that of married (a) with 78.26%.

The level of education that predominated was illiteracy, representing 91.30% among patients and 100% in those who developed CRI.

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Effects of iron deficiency on the ovarian cycle. Experimental model

Efectos de la carencia de hierro en el ciclo ovárico. Modelo experimental

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Abstract

Iron is a vital trace element involved in more than 400 chemical reactions and is a structural component of several proteins and enzymes. It is even an indispensable cofactor for hormone synthesis, forming the heme group of cytochromes necessary for the structure of steroid hormones. It has been experimentally demonstrated that iron deficiency anemia alters the ovarian cycle; however, it is not known whether iron deficiency can alter the ovarian cycle without reaching the anemia level. Aim: to determine the effects of iron deficiency on the ovarian cycle. Methods: a rat model of iron deficiency from gestation to adulthood (70 days postnatal) was used. Ten adult female rats with iron deficiency were used to obtain samples for vaginal cytology. Samples were analyzed microscopically to determine the phases of the ovarian cycle based on the most abundant cell type. Contribution: Iron deficiency leads to a shortening of the metestrus/diestrus phase and a lengthening of the proestrus; this could lead to fertility changes associated with variations in the duration of the phases of the ovarian cycle.

Iron, Ovarian cycle, Female

Resumen

El hierro es un elemento traza necesario para la vida, actúa en mas de 400 reacciones químicas y forma parte estructural de diversa proteínas y enzimas. Es incluso un cofactor indispensable para la síntesis de hormonas y conforma el grupo hemo de citocromos requeridos para la formación de hormonas esteroideas. Se ha demostrado experimentalmente que la anemia por deficiencia de hierro altera el ciclo ovárico, sin embargo, se desconoce si padecer deficiencia de hierro sin llegar a niveles de anemia, puede alterar el ciclo. Objetivo: determinar el impacto de la deficiencia de hierro sobre el ciclo ovárico. Metodología: se empleó un modelo de deficiencia de hierro en rata, desde la gestación hasta la edad adulta (70 días postnatales). Diez ratas hembras adultas deficientes de hierro se emplearon para obtener muestras para citología vaginal. Las muestras fueron analizadas al microscopio para establecer las fases del ciclo ovárico con base en el tipo celular más abundante presente. Contribución: la deficiencia de hierro induce el acortamiento de la fase de metaestro/diestro e incrementa proestro; esto podría causar alteraciones de fertilidad vinculadas a las variaciones en la duración de las etapas del ciclo ovárico.

Hierro, Ciclo ovárico, Hembras

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Introduction

Iron is abundant throughout the universe as a trace element in nuclear stable forms; on Earth it is about as abundant as oxygen. Iron-containing ferrous compounds were likely available for the development of organisms during the first billion years on the planet (Williams, 2012). Early metabolic processes contained iron ions (II) that oxidized oxygen ions released from organic compounds. Over time, cells began to use oxidized iron ions to deliver oxygen. The evolution of iron transfer systems in eukaryotes and multicellular organisms may have coincided with the increase in oxygen concentration on Earth 2.5 billion years ago (Williams, 2012). As the systems evolved, iron was involved not only in oxygen transport, but also as a cofactor in redox reactions, cell replication, and respiration, as well as in the electron transport system (Toxqui et al., 2010).

It is known that about 400 chemical reactions are occurring in the body that depends on iron as a catalyst for the formation of its products. Most of these reactions would be affected by decreasing iron levels in the body. (Ganz, 2003). Free iron is toxic to biological processes and contributes to oxidative stress, making biological iron transfer systems very challenging. (Frazer & Anderson, 2014). The total body iron content in a person of 1.70 meters tall and weighing 70 kilograms is estimated at 3.5 to 4 grams for women and 4 to 5 grams for men. (Beard, Dawson, & Pinero, 1996). Most of the body's iron is recycled from red blood cells, the rest is supplied through food. (Ganz & Nemeth, 2006). There are two main types of dietary iron: a) heme iron or heme group is formed by an iron atom in the ferrous state, Fe2, divalent, linked to a protoporphyrin molecule consisting of four pyrroles linked by methyl bonds forming a tetrapyrrole ring. This is the prosthetic group of various proteins and enzymes such as hemoglobin and cytochromes. Heme iron is present in red meat and animal foods. (B. Silva & Faustino, 2015; Stuart et al., 2003). (b) Non-heme iron, organic or ferric iron of trivalent character, Fe3, occurs in nature as part of inorganic salts. It is found in large quantities in vegetables, especially in green leaves such as spinach. (Stuart et al., 2003). Humans absorb between 15 and 25% of heme iron (Monsen et al., 1978) and 5 to 10% of non-heme iron (Monsen, 1988).

This, combined with other foods that modify iron absorption, makes it´s difficult to calculate the dietary intake of this element (Monsen et al., 1978; Hallberg, 1981); in addition to the variations in their requirements during the different stages of life and physiological status, as shown in Table 1.

Age	mg/day	Adults	mg/day
6-12 months	0.96	Adults men	0.86
13-24 months	0.61	Pregnant 1 trimester	0.8
2-5 years	0.7	Pregnant 2 y 3 trimester	6.3
6-11	1.5	Breastfeeding women	1.3
12-16 girls	2.0*	Women of reproductive age	2.3
12-16 boys	1.8	Post menopausal women	0.96

Table 1 Daily iron requirements by age group
*Source: Adapted from Abbaspour and Hurrell 2014 (8). * The requirements by sex between 12-16 years may vary according to the age of menarche, in which case 2.3 mg per day will be contemplated in females*

It is estimated that 1.6 billion people worldwide suffer from anemia, of which approximately half are caused by iron deficiency (ID), so this nutritional deficiency should not be extrapolated to the prevalence of anemia (Viteri, 1998). The most affected age groups are represented by children and pregnant women (McLean, Cogswell, Egli, Wojdyla, & de Benoist, 2009); with menstrual losses being the main cause of ID in women of childbearing age and gastrointestinal bleeding in postmenopausal women and adult males (McIntyre & Long, 1993). ID is associated with: headache, pallor, fatigue, dyspnea, alopecia, and cognitive dysfunction (Lopez, Cacoub, Macdougall, & Peyrin-Biroulet, 2016). This nutritional deficiency also affects reproduction, pregnancy, and childbirth (Burke, Leon, & Suchdev, 2014). Returning to the heme group, it is known that some of the cytochromes differ from each other along with their chemical structures, which ensures that the cytochromes have variable reducing potentials and are located at different points in the respiratory chain to optimize electron transfer. Cytochrome P450 is a completely different group of enzymes; instead of oxidizing their substrates, they incorporate a molecular atom; therefore, they are monooxygenases, not oxidases like the other cytochromes.

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Currently, of the fifty-seven human P450s, fourteen are known to metabolize cholesterol. One of them, CYP51, is involved in its biosynthesis and thirteen in its degradation. Of these thirteen, seven P450s are involved in bile acid biosynthesis (7A1, 27A1, 46A, 7B1, 39A1, 8B1, and 3A4) and six in steroid hormone biosynthesis (11A1, 17A1, 21, 19A1, 11B1 y 11B2) (Pikuleva, 2006). The biosynthesis of steroid hormones, including mineralocorticoids, glucocorticoids, estrogens, and androgens, accounts for the daily elimination of about 50 mg of colesterol (Turley & Dietschy, 1982). Of the six P450s involved in steroidogenesis, only one, CYP11A1, is expressed in steroidogenic tissues (adrenal glands, ovaries, testes, placenta, and brain) (Mellon & Griffin, 2002); Of the six P450s involved in steroidogenesis, only one, CYP11A1, is expressed in steroidogenic tissues (adrenal glands, ovaries, testes, placenta, and brain); catalyzes the conversion of cholesterol to pregnenolone; in turn, CYP11A1, CYP 17A1, CYP 21, CYP 19A1, CYP 11B1 and CYP 11B2 act on pregnenolone to form steroid hormones. CYP11A1 enzymatic activity has also been detected in the pancreas and skin (Morales, Cuellar, Ramirez, Vilchis, & Diaz-Sanchez, 1999). Hence the importance of iron in the synthesis of steroid hormones, in addition to being a cofactor for the synthesis of neurotransmitters, such as dopamine and serotonin, which stimulate at the hypothalamic level the secretion of gonadotropin-releasing hormone (GnRH) and thus the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) (Unger et al., 2007).

Many reports on the effects of ID at the gestational level and in infants have been carried out (Burke et al., 2014; Gambling & McArdle, 2004; Idjradinata & Pollitt, 1993; Lozoff, Jimenez, & Smith, 2006; Lozoff, Kaciroti, & Walter, 2006), but little information is available on the effect of ID on follicular development and ovulation during the ovarian cycle. The ovarian cycle is regulated by two pituitary-derived gonadotropins: FSH and the luteinizing hormone, LH. FSH induces follicular development to the preovulatory stage as a prelude to producing and releasing a mature oocyte. FSH increases CYP19A1 expression in granulosa cells to produce estradiol-17β (E2) from androgens produced in intrathecal cells (Robker & Richards, 1998; J. M. Silva & Price, 2000).

E2 increases the expression of follicular development marker genes including Ccnd2, a cell cycle regulator gene to induce follicular development. When dominant follicles reach a preovulatory state, E2 induces transient LH secretion from the pituitary gland (Wesson, Miller, & Ginther, 1980). LH induces the expansion of cumulus oocytes complex (COC), the resumption of meiosis in oocytes from phase I to metaphase II (oocyte maturation), and ovulation (Su, Wigglesworth, Pendola, O'Brien, & Eppig, 2002). Kim et al, 2018 showed that iron-containing mineral compounds affect menstrual cycle and hormone concentration in humans (Kim et al., 2018). Other research reveals that 50% of the patients studied who suffer from anemia present amenorrhea (Pafumi et al., 2011). There is only one report that analyzed the ovarian cycle, follicular development, and ovulation in mice suffering from anemia (Tonai et al., 2020). However it is not known what effects iron deficiency, without reaching the degree of anemia, has on the ovarian cycle.

Methodology

Animals and diet

Wistar rats were maintained under standard vivarium conditions: 12:12 light/dark cycle (lights on at 05:00 a.m.), temperature controlled at 22 ± 2°C and free access to food and water. To obtain the study subjects, twenty dam rats of 3 months of age or 250 grams of weight were used. Fourteen days prior to mating conditions, ten rats were subjected to an iron-deficient diet, consisting of 10 ppm FeSO4 (Laboratory diet AIN-76W/10). The other ten rats received a control diet with 100 ppm FeSO4 (AIN-76W/100 laboratory diet). Twenty-one days post-mating, the offspring were obtained. At weaning, 21 postnatal days after birth, ten female offspring from iron-deficient dams and ten female offspring from the control group were randomly separated and fed the same diet as their mothers until reaching adulthood at postnatal day 70.

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Exfoliative cytology

There are several techniques to perform exfoliative cytology. The following procedure is based on a modification of the technique used in the article "Determination of the stages of the ovarian cycle" (Martínez, 2005). Cytological samples were taken from all control and iron-deficient females at the same time (7:00 am), using the following materials: Pasteur pipettes, 0.10% PBS, slides, coverslips, and Papanicolaou stain.

Procedure

- The rat was positioned on a surface holding it by the base of the tail, elevating it, thus leaving the front paws on the surface and the visualization of the vaginal introitus.
- The Pasteur pipette was loaded with 2 µL of PBS at 0.10%.
- The tip of the loaded pipette was introduced into the vaginal introitus, discharging the content and suctioning; without removing the pipette, the content was discharged and suctioned again.
- The pipette was withdrawn and the sample was applied on a slide and allowed to dry.
- The sample was stained using the Papanicolaou technique.
- The sample was observed with the aid of a microscope identifying the phase of the ovarian cycle.

The data were collected, and an analysis of the possible changes observed during the entire ovarian cycle in each rat was performed, followed by a comparison of the cycles of each study group.

Ethical considerations

The present investigation was subjected to the guidelines of NOM-062-ZOO-1999; technical specifications for the production, care, and use of laboratory animals.

Experimental subjects were kept in captivity, with appropriate handling according to the standard in its category B: experiments that cause minimal discomfort or stress, e.g., momentary restraint of the animal for clinical observation purposes; blood sampling; and injection of substances by intravenous, subcutaneous, intramuscular, intraperitoneal, or oral routes. Acute studies are those without animal survival when the animal is completely anesthetized. use of euthanasia methods with rapid unconsciousness of the subject; for example, an overdose of anesthetics. Short periods of abstinence from water or food are equivalent to what could occur naturally.

Results

Classification of ovarian cycle stages according to pattern and cellular predominance
Depending on the cellular predominance, each stage of the ovarian cycle can be identified, being in the metestrus/diestrus stages where there is the greatest predominance of leukocytes, in the proestrus of epithelial cells, and in the estrus of squamous cells. After obtaining and processing the sample as detailed in the methodology, the smears were observed under the microscope and it was found that in control and iron-deficient rats, the cellular patterns are similar. Figure 1 shows the cellular pattern obtained from control subjects, where the cellular predominance in each stage can also be seen.

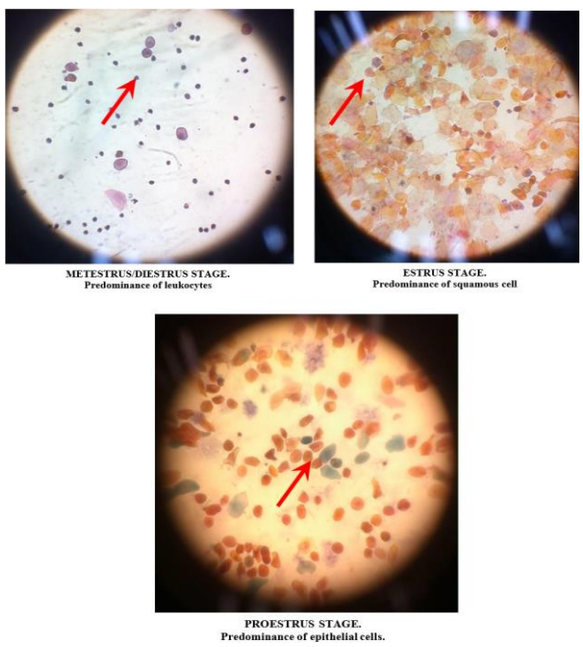

Figure 1 Typical cell patterns that are seen during the ovarian cycle

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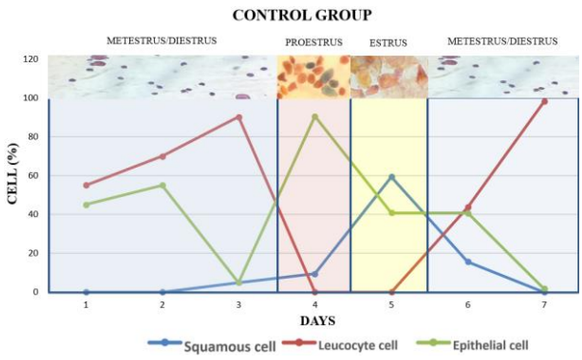
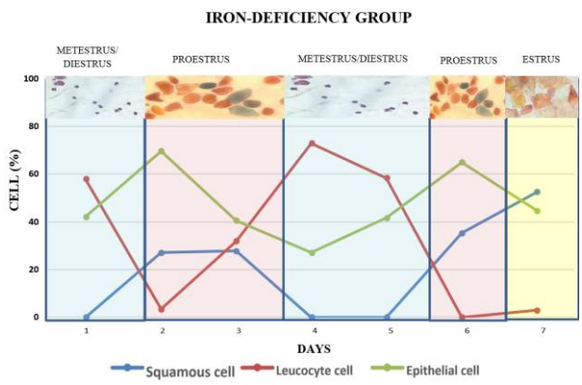
As previously mentioned, the ovarian cycle begins in the estrus stage, which is the cellular desquamation. In women, it is translated as menstruation. This is followed by the metestrus/diestrus stage in which ovulation occurs and few epithelial cells and abundant leukocytes are seen. Finally, in the proestrus stage, there is an increase in epithelial cells. In this regard, it was found in control rats (Graphic 1) and in iron-deficient rats (Graphic 2) that the sequence of stages of the cycle is not altered.

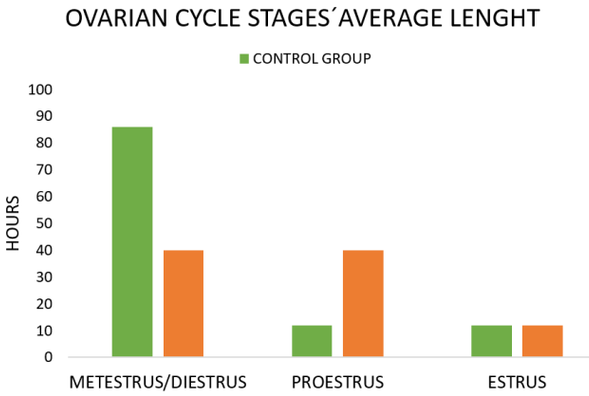


Graphic 1 Cell percentage obtaine by exfoliative cytology in rats from the control group



Graphic 2 Cell percentage was obtained by exfoliative cytology in rats from the iron deficient-group

In experimental models, the average duration of the metestrus/diestrus stage is 86 hours, proestrus 12 hours, and estrus 12 hours. The proestrus stage is seen to lengthen in iron-deficient females; in these individuals, the period might last up to 42 hours (Graphic 3). However, the metestrus/diestrus phase is shortened to 40–42 hrs. Despite these changes, the total duration of each cycle is between 108 and 110 hours.



Graphic 3 Duration of the metestrus/diestrus (shortening) and proestrus (lengthening) stages in the study groups

Discussion

According to the cellular predominance, the cellular patterns in each stage of the ovarian cycle were analyzed. When evaluating the results, it can be seen that the cellular pattern in both: control and iron-deficient females is similar, which indicates that the deficiency of this trace element does not affect this level. The same occurs when observing the sequence of the stages of the cycle, since no alterations in the order of the phases were observed between the study groups. It is interesting to mention that variations were found in the duration of the metestrus/diestrus and proestrus phases in iron deficient females, which may justify its indirect participation in hormonal regulation (M. Hidiroglou 1979). It has been described that iron intervenes in the synthesis of some neurotransmitters, such as dopamine and noradrenaline, which use it as a cofactor for tyrosine hydroxylase and tryptophan hydroxylase in the case of serotonin. These neurotransmitters stimulate the secretion of gonadotropin-releasing hormone (GnRH) at the hypothalamic level (Unger et al., 2007). Thus, alterations in GnRH pulses could be indirectly modified by iron deficiency and lead to problems in the release of the two main gonadotropins, luteinizing hormone (LH) and follicle-stimulating hormone (FSH) in the anterior pituitary; however, further studies are lacking. Both LH and FSH promote sex steroid synthesis in association with follicular growth and ovulation. It is worth mentioning that FSH stimulates follicle maturation to favor fertilization and LH intervenes in follicle release. Therefore, iron deficiency could intervene in alterations that impact fertility processes.

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Changes in the length of the phases of the cycle were found in the metestrus/diestrus and proestrus stages, which show a lengthening and shortening, respectively. These changes are probably caused by estrogenic overstimulation, which is influenced by defects at the hypothalamic level in the stimulation of GnRH, which controls FSH and LH pulses, but more research is needed to confirm this. Our group has reported that iron-deficient subjects, both females and males, uptake lower levels of this trace element in gonads, indicating the presence of possible alterations in its function since iron is an essential element for cellular homeostasis (Vieyra-Reyes, Oros-Pantoja, Torres-Garcia, Gutierrez-Ruiz, & Perez-Honorato, 2017).

This could potentially be involved in the advancement of changes in the stages of the ovarian cycle, leading to the development of reproductive issues like those seen in iron-deficient patients.

On the other hand, both iron overload and iron depletion (data not yet published by our research group) favor oxidative stress at central and peripheral levels, which could lead to the development of reproductive alterations. In addition, about the brain, it has been demonstrated that iron deficiency alters synaptic plasticity; therefore, it would be advisable to study whether these alterations in the phases of the cycle are caused by plastic variations at the hypothalamic level. In addition, it has been published that iron excess favors the disruption of follicular development and steroidogenesis, however, there are no data regarding iron deficiency itself.

Due to the findings demonstrated in the present study, it is observed that iron deficiency can be a constant that alters fertility processes. For this reason, it is important to perform a timely and accurate diagnosis of iron levels, mainly in women of childbearing age.

In Mexico, even in our days, the culture orients and values women based on procreation and family formation, where maternity is a sociocultural aspect of categorical influence in daily life. In both the public and private sectors, the cost of medical care generated by the presence of alterations in the menstrual cycle and infertility is high and, unfortunately, not linked to iron levels in the body.

Therefore, the present study has social scopes that could be taken into account in clinical practice guidelines; innovation and research development scopes, through intentional search protocols for the aforementioned alterations; and clinical scopes that could be put into practice through diagnostic tests from menarche or before the onset of active sexual life, thus contributing to the reduction of costs in the health sector.

Conclusions

Due to changes in the length of the ovarian cycle's stages, iron deficiency shortens the metestrus/diestrus phase's duration and lengthens the proestrus, which may affect fertility.

Perspectives

- Determine hormone levels to identify the point at which the hypothalamic-pituitary-ovarian axis is altered.
- Identify dopamine, norepinephrine, and serotonin levels and correlate them to variations in the ovarian cycle.
- Establish the conception rate in females with iron deficiency.
- Measure the histological expression of gonadotropin receptors in reproductive organs.

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Uses, effects and consequences of fluoride present in the consumption of drinking water. La Noria community, Pinos Zacatecas

Usos, efectos y consecuencias del Flúor presente en el consumo de agua potable. Comunidad La Noria, Pinos Zacatecas

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Abstract

Fluorine is essential for human beings, since it has an essential function in the formation of bones and tooth enamel. Although it is also present in medicines, anesthetics, pesticides, industrial waste. Also in fertilizers and iron minerals, in drinking water and in high concentrations it is harmful. This research presents the case of the La Noria Community, Pinos Zacatecas in which drinking water containing fluoride is consumed, which produces effects on its in habitants, the consequences above all are on the enamel and dentin.

Objectives: To investigate the use, effects and consequences of fluoride present in the intake of drinking water by the human being.

Methodology: Retrospective research, a questionnaire was applied through a directed interview. Qualitative and quantitative analysis was carried out. Random sample for 80 people with an age range between 3 to 70 years of both genders.

Contribution: Know the uses, effects and consequences of fluoride present in the consumption of drinking water. The Noria, Pinos Zacatecas.

Fluorine, Effects, Consequences

Resumen

El flúor es indispensable para el ser humano, ya que tiene una función esencial en la formación de los huesos y esmalte dental. A pesar de que también se encuentra presente en medicamentos, anestesia, plaguicidas, desechos industriales. También en fertilizantes y minerales de hierro, en el agua potable y en concentraciones elevadas resulta perjudicial. En esta investigación se presenta el caso de la Comunidad La Noria, Pinos, Zacatecas en la cual se consume agua potable que contiene flúor, misma que produce efectos en sus habitantes, las consecuencias sobre todo son en el esmalte y la dentina.

Objetivos: Indagar en el uso, efectos y consecuencias del flúor presente en la ingesta por consumo de agua potable el ser humano.

Metodología: Investigación retrospectiva, se aplicó un cuestionario mediante una entrevista dirigida. Se procedió al análisis cualitativo y cuantitativo. Muestra aleatoria para 80 personas con un rango de edad de entre 3 a 70 años de ambos géneros.

Contribución: Conocer los usos, efectos y consecuencias del Flúor presente en el consumo de agua potable. La Noria, Pinos, Zacatecas.

Flúor, Efectos, Consecuencias

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Introduction

Nowadays, water is indispensable for human beings; it is considered a universal and irreplaceable solvent in the correct functioning of their biochemical processes. Fluoride is indispensable for the human being, since it has an essential function in the formation of bones and dental enamel. It is also present in medicines, anesthetics, pesticides, industrial wastes, as well as fertilizers and iron ores. Fluorides are the most abundant halogenated compounds in the earth's crust. Fluorine is known as the most electronegative chemical element. We know that the fluoride ion forms compounds and reacts with most organic and inorganic molecules. Thus, it maintains a close relationship with enamel and dentin as they are bound by hydroxyapatite (*calcium phosphate*) which is dissolved by acids from bacterial decomposition, due to the consumption of drinking water. Fluoride ions form fluorapatite with dental enamel, which is less soluble in acids than hydroxyapatite, giving greater resistance to enamel. However, in high concentrations it causes dental fluorosis or skeletal fluorosis, which results from the excessive accumulation of this substance and makes bones fragile and brittle. Fluoride has both beneficial and detrimental effects on human health, with a narrow range between intakes associated with its beneficial health effects and adverse effects. Effects on bone are considered the most relevant for the assessment of adverse effects of long-term exposure of humans to fluoride. Skeletal fluorosis affects millions of people in several regions of Mexico and other countries.

At present, there are places where people ingest water whose fluoride concentration is not optimal for human consumption. In this work we present a study for the community of "La Noria, Pinos Zacatecas", which presents adverse and harmful effects and consequences due to the ingestion of water from the sources that supply this population. Fluorides have been present for decades; however, one of the most frequent consequences is the staining of enamel due to the consumption of drinking water in the aforementioned community.

The WHO and Environmental Protection Agency's recommendation for fluoride in drinking water is 1.5 mg/L. WHO recommends the reference value for fluoride in drinking water of 1.5 mg/L (WHO, 1993, 1996) Norma Oficial Mexicana NOM-179-SSA1-2020, agua para uso y consumo humano frecuente (Official Mexican Standard NOM-179-SSA1-2020, water for frequent human use and consumption). It is known that worldwide the fluoridation of drinking water, artificially, affects only 5.7% of the population, according to the study by Cheng et al.

Methodology

A retrospective research method was carried out, with the purpose of finding out the risks of direct water consumption from the aquifers in "La Noria, Pinos Zacatecas". Also, cross-sectional. A questionnaire was applied to obtain information on the current situation of the community regarding water consumption and its effects.

The sample was randomly selected for 80 people, with an age range of 3 to 70 years, both sexes. A questionnaire was applied by means of a guided interview. Then we proceeded to the qualitative and quantitative analysis.

Results and discussion

The results obtained in the present work, considering that a total of 80 people were interviewed, the following was found:

Responses	Total number of respondents	% it represents
Once a day (500 ml average)	40	50
2 times a day (1 liter per day)	18	22.5
3 times a day (2 to 3 liters)	22	27.5

Table 1 Number of times drinking water is consumed in the community of La Noria

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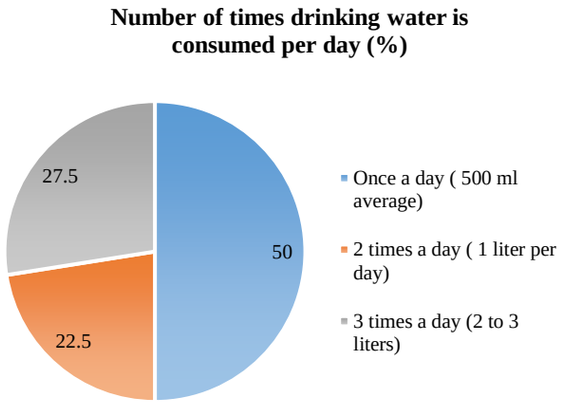

Figure 1 Graph of results corresponding to Table 1

In this graph it can be observed that the majority of people in the community at least do it 1 time a day. The percentage between 2 and 3 times a day is different, but in a minimal proportion.

The analysis corresponding to question 2 shows the following result.

Responses	Total number of respondents	% it represents
Consumption of potable water from well	72	90
Consumes another type of water (jug water)	5	6.25
Consumption of boiled water	3	3.75

Table 2 Type of water consumed.

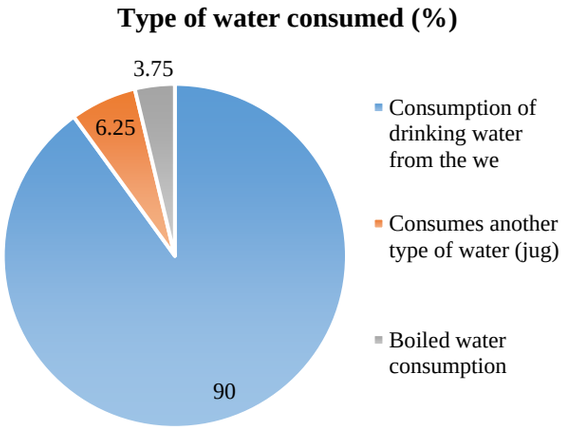

Figure 2 Graph of results corresponding to Table 2

In this analysis it can be observed that the majority of the population consumes drinking water from the community well. A minimal percentage boils it or consumes it from a jug. This may indicate that the socioeconomic issues within the community may be complicated, which prevents them from acquiring and/or consuming previously treated water (jug water) or due to customs and traditions.

Responses	Total number of respondents	% it represents
Stained dentin	40	50
Caries	30	37.5
Tooth wear	10	12.5
None of the above	0	0

Table 3 Effects you have observed when consuming water from the well

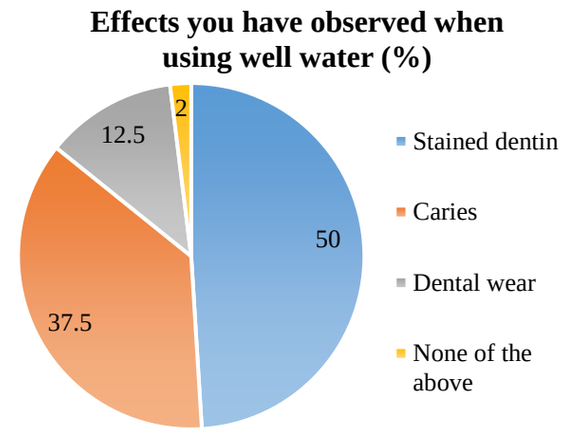

Figure 3 Graph of results corresponding to table 3

From this last graph we find that of the people who answered, only 2 do not present any type of problem. It could be inferred that they perhaps correspond to people who began to drink jug water at an early age. For the rest there is a concordance with the results found in Table 2, of which the majority consumes water from wells and a very low percentage from jugs. This implies that there is some type of effect on their teeth due to its use. Most of the people in the community have pigmented enamel, and caries also represents a considerably high percentage. It is important to mention that we only focused on this aspect and not on the bones.

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Conclusions

The effects and consequences of the ingestion of drinking water containing fluorides present risks of various diseases in the aseo-skeletal system. Also bone wear, and stained dentin. Dental and skeletal fluorosis are manifested as chronic ingestion. In children, adolescents and adults, the consequences of water consumption in the community of La Noria, entails ailments and certain effects of diseases due to over-ingestion of fluorides, through fluoridated drinking water, since the deterioration of health is proportional to the dose and the time of intake of the consumption of the same. Drinking water fluoridation does not have a significant impact when it is used for sporadic consumption. However, it does have an impact on its efficacy, or rather, on the effect of dentin stained by caries due to the consumption of water intake for prolonged periods of time.

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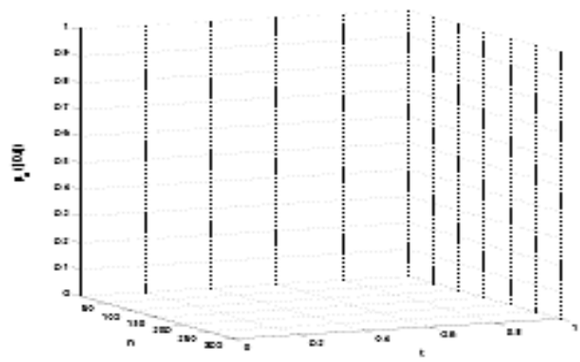

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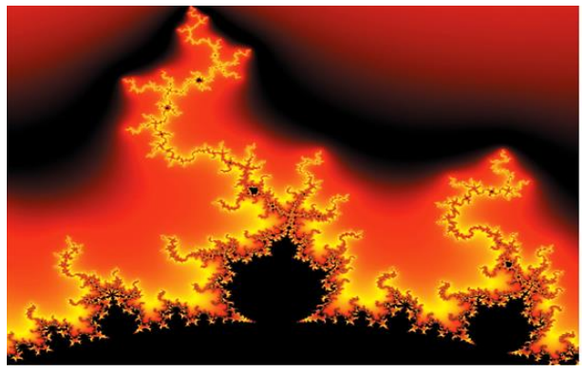

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