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RESEARCH ARTICLE

FUNCTIONAL GYMNASTICS IN GERIATRIC PATIENTS WITH OBESITY AND OSTEOARTHRITIS. CASE REPORT.

Andreina Del Carmen Zi Marín and Janeth Noemí Vargas Pech.

Intern of the Degree in Physiotherapy, Faculty of Nursing of the Autonomous University of Campeche, Mexico.

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Abstract

Introduction: Obesity is a chronic disease characterized by a high levels of body fat. This is associated in its initial stage with a number of different risk factors: lifestyle and lack of physical activity being the most important, giving rise to. Other conditions including osteoarthritis, diabetes mellitus and hypertension.

Case reports: Two cases of female geriatric patients with obesity in which physical therapy and functional gymnastics applied are presented. The first 70 years with medical diagnosis of spondyloarthritis presenting limited motion of the head and trunk. The second 80 years with medical diagnosis lumbosacral osteoarthritis which limited her mobility and their daily activities.

Discussion: Functional gymnastics in elderly patients with obesity problems is very beneficial from several viewpoints as it helps to improve coordination, muscle strength and self-esteem as well as decrease the risk of falls.

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Introduction:-

Obesity is a multifactorial, complex disease that can occur in both men and women regardless of age; in which there is an excessive increase of adipose tissue in the body, due to the excess calories that are produced during the day or night which being unable to be eliminated is stored as fat (1). Usually it is related to two main factors: genetic and environmental interaction of the person and a lack of balance between the two causes a food intake and energy expenditure imbalance leading to obesity problems. (2)

In Mexico the prevalence of obesity is high, the coordinator of the module on Medicine at the twenty-first International Congress on Advances in Medicine (CIAM) 2019 explained that 7 out of 10 adults are obese and four in 10 teens encounter this problem (3). In the state of Campeche, according to the national epidemiological surveillance system, during 2017 a total of 7,600 new cases were registered compared to 2016. (4)

One criterion used to define obesity is the Body Mass Index, which is obtained by dividing weight in kg by height in meters squared (kg/m²); according to WHO, BMI in overweight adult exceeds the value of 25 kg / m² and obesity <30 kg/m².

In the Body Mass Index, there are 4 degrees of obesity:

1. 18.5 - 24.9 kg/m²: Normal weight
2. 25 - 26.9 kg/m²: Overweight grade I
3. 27 - 29.9 kg/m²: Overweight grade II

Corresponding Author:- Andreina Del Carmen Zi Marín

Address:-Intern of the Degree in Physiotherapy, Faculty of Nursing of the Autonomous University of Campeche, Mexico.

4. 30 - 34.9 kg/m²: Obesity Type I
5. 35 - 39.9 kg/m²: Obesity Type II
6. 40 - 49.9 kg/m²: type III or morbid obesity
7. > 50 kg/m²: Obesity or extreme type IV

Generally, obesity is the result of the combination of various causes and factors contributing to it. Among the principal causes are genetics; family lifestyle; inactivity; unhealthy diet; medical problems such as the symptom of Prader-Willi syndrome, Cushing or other diseases and disorders (5); certain antidepressants, anticonvulsants, antipsychotics, steroids and beta blockers; social and economic problems; age; pregnancy; and lack of sleep cause hormonal changes (6).

Older adults who suffer from this disease have an increased risk of falls but most of them do not register serious injuries. This is because they are protected by the density of your bones and their corpulence. One of the researchers at Syracuse University in New York, Christine Limes (2011) noted that "people who are obese often have difficulty maintaining balance"; however, even though they were not seriously injured after falling it took them longer to recover than others because of their physical condition. (7).

Obesity is associated with many diseases, favoring their appearance and facilitating their progression. Among the most common are cardiovascular disorders, dyslipidemia, ischemic heart disease, hypertension, venous stasis with hypercoagulability, endocrine disorders, type 2 diabetes, subclinical hypothyroidism, dysmenorrhea, urinary incontinence, varicose ulcers and osteoarticular degenerative processes due to excess weight, the latter causing most difficulties in carrying out functional activities. (8).

According to WHO, rheumatic diseases represent the third most important problem in health in developed countries, osteoarthritis being the most common because it affects more than 80% of the population over 65 years. This is the most important cause of functional locomotor disability in people, affecting 9.6% of men and 18% of women over 60 years, women being the most vulnerable to this disease. (9).

The Spanish Society of Endocrinology and Nutrition (SEEN) noted that obesity increases nearly seven times the chance of getting osteoarthritis causing injury to the articular cartilage and weakening ligaments and periarticular muscles. The relationship between obesity and osteoarthritis occurs through various mechanisms, the main factor is the weight-bearing joints such as the knees or hips, obviously overweight or obesity increases mechanical stress and, over the long run, damage to the joint cartilage, resulting in decreased joint space and new bone formation in an attempt to repair this damage and therefore articular cartilage osteoarthritis. (10).

Between joints commonly affected by osteoarthritis are the cervical and lumbar spine (spondylosis), hips (coxarthrosis), knees (gonarthrosis), thumbs (rizarthrosis) and the first phalanx joint ball of the foot (11).

In recent years in Argentina and Brazil has implemented the Program for Functional Education (PEP Method or Functional Gymnastics) created by the pedagogue Érica Verderi studying imbalances postural system and its dysfunction in older adults. The main objective is the rescue of conscious and quality movement; restoring the functional capacity of the joint; the stretching and strengthening of the musculature; as well as the support and stabilization of the spine (12). The PEP method focuses on reorganizing the joint function and minimizes overload caused by compensation, lack of mobility and efforts of the activities of daily living; trying to stimulate sensory function, offering greater lift, protection and resistance to the spine and joints in general and the muscle groups; similarly favoring the quality of movement, body posture restoring and improving control of repetitive strain. The main pillars are biomechanics, kinesiology, anatomy and joint physiology; working balance, posture, mobility, strength, endurance and breathing at the same time.

The aim of this study is to present two case reports in geriatric female patients with obesity problems and osteoarthritis who in addition to physiotherapy, received a complementary functional gymnastics program. Both patients gave approval and signed a letter of informed consent for publication, of file data and health problems, in order to publicize their developments and with the view that this information could be very useful in the future for other people with the same health problems.

Presentation of case studies:-

CASE 1. Female patient of 71 years who consulted the physiotherapy center due to pain in the cervico-dorsal area, she said that the symptoms began in mid-September 2018, saying that it did not become important until October and pain crackles in the cervical area intensified, so she went to the doctor; undergoing radiographic studies she was diagnosed with espondiloartritis, and she was referred for physiotherapy to aid better functional recovery. Her complexion is endomorphic with a rise of the left shoulder, head slightly tilted to the right and anteproyección, antepulsion of the shoulders, elbows flexed. (Fig. 1)



Figure 1:-Body Posture. A, Anterior view. B, lateral view. Case 1

When performing physical examination the following anthropometric measurements were obtained, and the results are tabulated in Table 1.

Measurements	Indicators
Current Weight: 76 kg	BMI: 31.63 kg/m2 ----- Obesity Type I
Size: 1.55 cm	WHR: 0.94 ----- High cardiovascular risk

Table 1:-Initial assessment of anthropometric measures. Case 1

On palpation she presented pain in the cervical and dorsal area, contractures trapezius bilaterally in both middle and upper fibers, and hypertrophic paravertebral muscles. Trunk movements were age-appropriate with slight feeling of pain when making inclinations or rotations; and cervical discs were slightly diminished due to the condition and crepitus. Among the functional activities most affected were driving and bending to buckle her shoes. Muscle strength was evaluated by the Daniels scale in which 3/5 was obtained in the muscles of the head and neck, oblique 3/5, -3/5 rectus abdominis and paravertebral -3/5.

She has an active lifestyle, 3 days a week traveling to the city of Merida with her granddaughter accompanying her to school, follow the recommendations of doctors, her diet is balanced due to problems of hypertension and hypothyroidism, physical activity is diminished and in some cases she becomes sedentary all day.

During the first sessions scales were applied in order to assess the overall functionality of the patient, with the following results: In the Tinetti Scale that helps evaluate balance and gait to prevent the risk of falling (being a score: -19 increased risk of falls and +19 reduced risk of falls) a score of 18 resulting in increased risk of falls was obtained. (Fig. 2)

TINETTI SCALE (BALANCE SECTION)		TINETTI SCALE (GAIT SECTION)	
1	0 = Leans or slides in chair 1 = Steady, safe	10	0 = Any hesitancy or multiple attempts 1 = No hesitancy
2	0 = Unable to without help 1 = Able, uses arms to help 2 = Able without use of arms	11	Step length and height 0 = Foot drop 1 = Step through right 1 = Step through left
3	0 = Unable to without help 1 = Able, requires > 1 attempt 2 = Able to rise, 1 attempt	12	Foot clearance 0 = Foot drop 1 = Left foot clears floor 1 = Right foot clears floor
4	0 = Unsteady (stutters, moves feet, trunk sway) 1 = Steady but uses walker or other support 2 = Steady without walker or other support	13	Step symmetry 0 = Right and left step length not equal 1 = Right and left step length appear equal
5	0 = Unsteady 1 = Steady but wide stance and uses support 2 = Narrow stance without support	14	Step continuity 0 = Stopping or discontinuity between steps 1 = Steps appear continuous
6	0 = Begins to fall 1 = Stutters, grabs, catches self 2 = Steady	15	Heel 0 = Marked deviation 1 = Mild/moderate deviation or uses w. aid 2 = Straight without w. aid
7	0 = Unsteady 1 = Steady	16	Trunk 0 = Marked sway or uses w. aid 1 = No sway but flex. knees or back or uses arms for stability
8	0 = Discontinuous steps 1 = Continuous 0 = Unsteady (grabs, stutters) 1 = Steady	17	Walking time 0 = Heels apart 1 = Heels almost touching while walking
9	0 = Unsafe (misjudged distance, falls into chair) 1 = Uses arms or not in smooth motion 2 = safe, smooth motion	18	
Balance score: 18/18		Gait score: 9/12	
A		B	
Total Score = Balance + Gait score: 18/28			

Figure 2:-A, Tinetti Scale for balance. B, Tinetti Scale for the march. Case 1

Katz index used to evaluate the independence of a person as to the realization of the basic activities of daily living was obtained as a result "Independent in all but one of these functions." (Fig. 3)

Katz Index of Independence in Activities of Daily Living		
ACTIVITIES	INDEPENDENCE NO supervision, direction or personal assistance	DEPENDENCE WITH supervision, direction, personal assistance or total care
BATHING	<input checked="" type="checkbox"/> Bathes self completely or needs help in bathing only a single part of the body such as the back, genital area or disabled extremity.	<input type="checkbox"/> Needs help with bathing more than one part of the body, getting in or out of the tub or shower. Requires total bathing.
DRESSING	<input checked="" type="checkbox"/> Gets clothes from closets and drawers and puts on clothes and outer garments complete with fasteners. May have help tying shoes.	<input type="checkbox"/> Needs help with dressing self or needs to be completely dressed.
TOILETING	<input checked="" type="checkbox"/> Goes to toilet, gets on and off, arranges clothes, cleans genital area without help.	<input type="checkbox"/> Needs help transferring to the toilet, cleaning self or uses bedpan or commode.
TRANSFERRING	<input checked="" type="checkbox"/> Moves in and out of bed or chair unassisted. Mechanical transferring aides are acceptable.	<input type="checkbox"/> Needs help in moving from bed to chair or requires a complete transfer.
CONTINENCE	<input type="checkbox"/> Exercises complete self control over urination and defecation.	<input checked="" type="checkbox"/> Is partially or totally incontinent of bowel or bladder.
FEEDING	<input checked="" type="checkbox"/> Gets food from plate into mouth without help. Preparation of food may be done by another person.	<input type="checkbox"/> Needs partial or total help with feeding or requires parenteral feeding.
		Result: B. Independent, Except In One.
CLASSIFICATION A. Independent In The 6 Functions B. Independent, Except In One C. Independent, Except In Bathing And Other Function D. Independent, Except In Bathing, Dressing And Other Function E. Independent, Except In Bathing, Dressing, Toileting And Other Function F. Independent, Except In Bathing, Dressing, Toileting, Transferring And Other Function G. Dependent on the 6 Functions		

Figure 3:-Katz Index. Case 1

And the application of the Short Physical Performance that helps to indicate the possibility for the patient to perform certain movements or activities related to coordination and balance (being the highest score 12 <12 lower physical performance) a result 7 points was obtained. (Fig. 4)

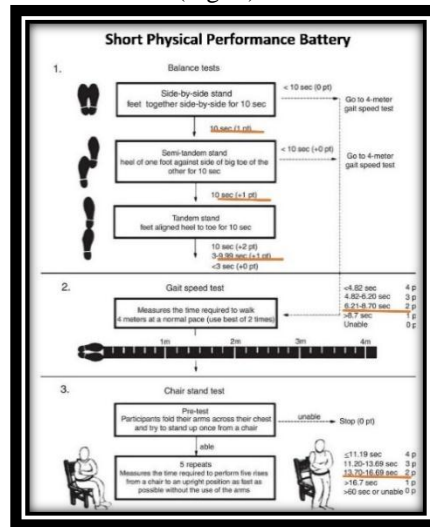


Figure 4:-Short Physical Performance Test. Case 1

Case 2. Female patient 80 years old with medical diagnosis of lumbosacral osteoarthritis, went to the area of physical therapy about a year and a half ago, she received physiotherapy at a conservative level, but at the beginning of March 2019 she began to show a progressive deterioration in her mobility and strength, so we chose to expose her health problem and its evolution to this treatment. Depending on the visual analog scale (VAS) she referred moderate pain "6" with a sharp qualitative aspect in the lumbosacral area, radiating in the hip and in both lower limbs, attributed to domestic work. She complained of feeling tired, of not being able to stand in an upright position, and the presence of tingling and numbness in the feet. During walking she observed a feeling of snap and crackle in her knees.

When performing physical examination the following values of anthropometric measurements were obtained, and the results are tabulated in Table 2.

Measurements	Indicators
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Current weight: 70 kg	BMI: 31.5 kg/m ² ----- Obesity Type I
Size: 1.49 cm	WHR: 0.95 ----- High cardiovascular risk

Table 2:-Initial assessment of anthropometric measures. Case 2

She has an irritable mood, she does not follow nutritional recommendations from her doctor, she has nil physical activity and her self-esteem is very low. She has diabetes mellitus type II and controlled hypertension, and urinary incontinence.

In standing and walking she supported herself with a walking stick; adopting a stance free ascent of the right shoulder, slight lateral tilt of the head to the left side, protruding abdomen, position of palms in internal rotation, genu varus and slight right ankle in eversion. (Fig. 5) Her gait was claudicante, having difficulty performing the swing phase, immediately passing phase support. The left foot is not completely lifted.

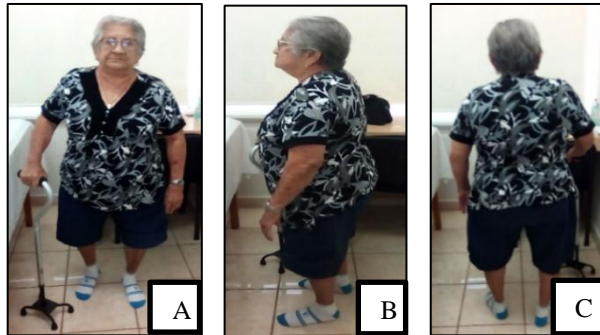


Figure 5:-Body Posture. A, Anterior view. B, lateral view. C, Rear View. Case 2

Physical examination found pain on palpation of the spinous processes of the lumbar vertebrae in the iliac crests; and bone structures of the medial tibial plateau of the left knee and at the lateral edges of the patella the left lower limb. muscle spasms in the latissimus dorsi in their vertebral and iliac portions forming the lumbosacral spine, trapezius muscle aponeurosis in its three fibers; and pain in the area right popliteal area. Presented limitation active movements of the spine, hip and left knee, with crepitus joint; presenting moderate restriction of activities of daily living such as trunk inclination, grooming, dressing, bathing and even to stand and walk.

The following functional scales were applied: In Tinetti Scale a result is obtained in balance 7 points and 5 points up, obtaining a total of 12 points, presenting an interpretation of a high risk of falling. (Fig. 6) Katz Index was obtained as a result "Unit functions in the six activities of daily living: bathing, dressing, health, mobilization, sphincter control and power." (Fig. 7)

TINETTI SCALE (BALANCE SECTION)			TINETTI SCALE (GAIT SECTION)		
1	0 = Leans or slides in chair 1 = Steady, safe	1	10	0 = Any hesitancy or multiple attempts 1 = No hesitancy	0
2	0 = Unable to without help 1 = Able, uses arms to help 2 = Able without use of arms	1	11	0 = Foot drop 1 = Step through right 1 = Step through left	0 0 1
3	0 = Unable to without help 1 = Able, requires > 1 attempt 2 = Able to rise, 1 attempt	1	12	0 = Foot drop 1 = Left foot clears floor 1 = Right foot clears floor	0 0 0
4	0 = Unsteady (stagger, moves feet, trunk sway) 1 = Steady but uses walker or other support 2 = Steady without walker or other support	1	13	0 = Stopping or discontinuity between steps 1 = Steps appear continuous	0 1
5	0 = Unsteady 1 = Steady but wide stance and uses support 2 = Narrow stance without support	1	14	0 = Marked deviation 1 = Mild/moderate deviation or uses w. aid 2 = Straight without w. aid	0 1 1
6	0 = Begins to fall 1 = Stagger, grabs, catches self 2 = Steady	1	15	0 = Marked sway or uses w. aid 1 = No sway but flex. knees or back or uses arms for stability	0 1
7	0 = Unsteady 1 = Steady	0	16	0 = Heels apart 1 = Heels almost touching while walking	0 1
8	0 = Discontinuous steps 1 = Continuous 0 = Unsteady (grabs, staggers) 1 = Steady	0			
9	0 = Unsafe (misjudged distance, falls into chair) 1 = Uses arms or not a smooth motion 1 = safe, smooth motion	1			
Balance score: 7/16			Gait score: 5/12		
A			B		
Total Score = Balance + Gait score: 12/28					

Figure 6:-A, Tinetti Scale for balance. B, Tinetti Scale for the march. Case 2

Katz Index of Independence in Activities of Daily Living		
ACTIVITIES	INDEPENDENCE NO supervision, direction or personal assistance	DEPENDENCE WITH supervision, direction, personal assistance or total care
BATHING	<input type="checkbox"/> Bathes self completely or needs help in bathing only a single part of the body such as the back, genital area or disabled extremity.	<input checked="" type="checkbox"/> Needs help with bathing more than one part of the body, getting in or out of the tub or shower. Requires total bathing.
DRESSING	<input type="checkbox"/> Gets clothes from closets and drawers and puts on clothes and outer garments complete with fasteners. May have help tying shoes.	<input checked="" type="checkbox"/> Needs help with dressing self or needs to be completely dressed.
TOILETING	<input type="checkbox"/> Goes to toilet, gets on and off, arranges clothes, cleans genital area without help.	<input checked="" type="checkbox"/> Needs help transferring to the toilet, cleaning self or uses bedpan or commode.
TRANSFERRING	<input type="checkbox"/> Moves in and out of bed or chair unassisted. Mechanical transferring aides are acceptable.	<input checked="" type="checkbox"/> Needs help in moving from bed to chair or requires a complete transfer.
CONTINENCE	<input type="checkbox"/> Exercises complete self control over urination and defecation.	<input checked="" type="checkbox"/> Is partially or totally incontinent of bowel or bladder.
FEEDING	<input checked="" type="checkbox"/> Gets food from plate into mouth without help. Preparation of food may be done by another person.	<input type="checkbox"/> Needs partial or total help with feeding or requires perenteral feeding.
		Result: Independent, Except in Bathing, Dressing, Toileting, & Transferring, and Other Function
CLASSIFICATION		
A: Independent In The 6 Functions		
B: Independent, Except In One.		
C: Independent, Except In Bathing And Other Function		
D: Independent, Except In Bathing, Dressing And Other Function		
E: Independent, Except In Bathing, Dressing, Toileting And Other Function		
F: Independent, Except In Bathing, Dressing, Toileting, Transferring And Other Function		
G: Dependent on the 6 Functions		

Figure 7:-Katz Index. Case 2

Treatment applied to both patients

Monitoring for 6 weeks with the cervical spondylosis patient was carried out, physiotherapy was used to control or eliminate the pain caused osteoarthritis in different joints of the body. Among the therapies used was the warm moist compress placed for 10 minutes on the treated area because it acts to level increasing blood circulation and oxygenation and at muscle level the relaxing of the tissues as well as the application of trabert currents, placing the electrodes parallel to the column with the anode placed above and cathode below on the cervical spine for 15 minutes with the polarity change activated, due to its main analgesic effect that causes selective stimulation on thick nerve fibers of fast conductivity on high frequency.

In case 2 the physical therapy program consisted of 18 sessions of 1 hour, the patient attending 3 times a week. Electrotherapy was applied using a Trabert type stream, placing the electrodes in parallel with the cathode (proximal) into the vertebral bodies L2 - L3 - L4, and the anode (distal) in the L5 vertebral bodies - S1 with a time application of 15 minutes with changing polarity.

Both patients undertook a number of functional exercises related to Functional Gymnastics accompanied by retro music in order to work globally and to the rhythm of the sound with the aim of all the joints and movements of the body, with the patient in the sitting position, using the main movements of the head, upper and lower limbs and trunk. (Fig. 8)



Figure 8:-PEP Method / Functional Gymnastics with music: (A) Case 1 working with shoulders; (B) Case 1 performing flexo-extension header, Case 2 performing lateral tilt head; (C) Case 1 performing diagonal arms; (D) Case 2 making circles with the trunk; (E) Case 2 performing trunk movements forward and forth; (F) Case 1 with locking arms up-down; (G) Case 1 alternating feet forward-backward; (H) Case 2 ending with breaths.

Results:-

In case 1, an increase in the coordination of the patient was achieved, as well as an increase in the speed of walking and the strengthening of the paravertebral muscles, thus improving the movements of the trunk and head that in turn decreased the articular crepitus in the head neck rotation. She managed to improve her posture by aligning her shoulders symmetrically, slightly reducing the antepulsion of the shoulders with the elbows in extension (Fig. 9).



Figure 9:-A, Anterior view. B, Side view.

On physical examination the following values of anthropometric measurements were obtained, and the results are tabulated in Table 3.

Measurements	Indicators
Current Weight: 72 kg	BMI: 30 kg/m ² ----- Obesity Type I
Size: 155 cm	WHR: 0.95 ----- High cardiovascular risk

Table 3:-Final evaluation of anthropometric measurements. Case 1

According to scales applied subsequently to performing the functional exercises method the following results were obtained: On a scale of Tinetti 20 points was obtained resulting in a reduced risk of falls; the Katz index stayed the same result as the first application of the test "Independent in all but one of these functions." showing no change because she did not have many complications of her daily activities; the application of the physical performance test registered 9 points, obtaining an improved coordination and balance.

In case 2 the lumbosacral pain decreased in the right knee to a grade "2" as measured by the Eva scale; there was an increase range of joint movement of the spine, specifically in the flexo-extension and rotation, and also in her ability to integrate into her activities of daily life.

Because the exercises maintained flexibility, improved balance and increased muscle strength in the lower limbs both static and dynamic; displacement capacity was more stable and the distance of the quickest steps with the use of the cane; there was a favorable outcome in blood pressure as during the exercise it remained in the normal range, without presenting dizziness, tiredness, fatigue or weakness.

On physical examination the following values of anthropometric measurements were obtained, and the results are tabulated in Table 4.

Measurements	Indicators
Current Weight: 67 kg	BMI: 31.25 kg/m ² ----- Obesity Type I
Size: 1.49 cm	WHR: 0.95 ----- High cardiovascular risk

Table 4:-Final evaluation of anthropometric measures. Case 2

Subsequent to performing functional exercises the following results were obtained:

In Tinetti Scale: 12 points in equilibrium, and 8 points in walking, a total of 20 points indicating a lower fall risk.

In the Katz Index she obtained the result of "Independence" in the activities of food and clothing, except for the activities of health, mobilization, continence and bathroom, observing further progress compared to the first assessment obtained a total dependence in all daily activities.

Both patients were signed off because they no longer had pain, strength and the arches of passive movements and activities were in a functional range according to their age and they were given a program with therapeutic exercises and articulation hygiene to follow. Both patients obtained intrinsic and extrinsic motivation to keep doing the

exercises that were important to their process of improvement. Weight reduction obtained in our study was smaller than expected but the short duration of the program it must be taken into account, and the chronic nature of their condition stabilizing their weight.

Discussion:-

The changes most frequently related to aging are mainly the decline in physical activity, the tendency to immobility. With them various diseases appear with more frequency that compromise physical and mental health, functional capacity and the social life of persons. Obesity is one of the risk factors associated with the onset of osteoarthritis and the risk of falls in older adults, as well as favoring its rapid progression, so it is important to make the patient aware of the damage that overweight can cause and the lack of physical activity in their life. Greater weight leads to greater effort on the part of the joints when performing the movements.

As people age they present a lack of self-esteem because of the progressive loss of autonomy and self-confidence. However, feeling good about yourself improves relationships, adapting to changes that can present and enjoy old age with an adequate quality of life. Given increased life expectancy the integration of physical activity is essential. The conservation of muscle mass and strength represents an important factor in maintaining posture, balance and gait. Incorporating physical activity in older adults brings benefits independently, maintaining a good quality of life. The importance of physical exercise in the treatment reduces mobility limitations and elasticity, leading the patient to carry out its activities independently; as not performing any physical activity means that joints tend to be rigid, with more over stress, causing pain.

It has been shown that are many beneficial effects of exercise in the elderly; Avila (2004) shows that exercise in older adults rather than cause any harm manages to have good benefits in health. Noting that the continued practice of exercise improves function and independence, as well as being beneficial for the mood and quality of life of patients. (13) In addition to that, there are benefits in socio-emotional level, which are usually associated with feeling good and slowly reducing the consumption of medication. For this reason, Sanchez (2002) mentions that the elderly who exercise continuously favor interpersonal relationships, reach a better balance of sleep and increased security against falls. (14)

The World Health Organization (WHO) and the International Society of Hypertension included in their treatment recommendation performing physical exercise in order to reduce blood pressure values. The ideal exercises proposed for an effective program are activities like walking, running, swimming, and dancing. However, following the protocol of Érica Verderi Functional Gymnastics with ball in sitting position, the patients responded effectively in addressing imbalances which can be compromising for the elderly; the functionality of the joints were maintained, as motion exercise, movement of joints that make up the human body such as the spine, shoulders, elbow, hip, and knee, were integrated; the functional capabilities of daily life were also recovered; and essentially normal range of blood pressure values were maintained.

Lopez (2015) in turn mentions that with physical activity various physiological factors improve, oxygen consumption, cardiac output, blood pressure, helping to control pain in diseases such as osteoarthritis so long as the exercise is dosed according to the person to whom it is applied, this was proved with the results obtained, since the pressure of the patient did not go up or down during the exercises applied. (15)

Perez (2016) emphasizes that physical activity either through aerobic exercise of low intensity or functional exercise helps improve the metabolic system, which considerably reduces the risk of premature death by disease resulting from obesity, as well as obtaining some benefits such as improving the immune system, cardiovascular system, respiratory system, and generally increasing the basal metabolism because of physical activity there is a greater expenditure of carbohydrates and lipids, thus helping to improve the quality of life of the person in both the physical and psychological aspects. (16)

Conclusion:-

The results indicate the possibility of including functional gymnastics in cases with certain characteristics, as they are the most suitable in geriatric patients due to limitations may occur in daily life. A distinction was made between the protocol Gymnastics Functional and proposed by the OMSS program, concluding that physical activity proposed by Érica Verderi is a safe method for the elderly that can maintain physical fitness as well as prevent and even

reverse changes in body composition associated with aging, showing that exercise is achieved with a better quality of life, which includes various benefits such as improved functional independence, improved self-esteem, thus achieving better fitness and a more healthy aging process.

Three proposals for the inclusion of functional gymnastics were obtained:

1. The first proposal is to include this program in physiotherapeutic treatment in all elderly patients.
2. The second proposal is to follow up on elderly patients who have participated in this program during their physiotherapy treatment, offering weekly group therapy sessions in the physiotherapy center, and when necessary, providing follow-up in their homes.
3. The third proposal is to include this exercise program as a preventive treatment in nursing homes for the elderly, in retirement homes, Mexican Social Security Institute (IMSS), Institute for Social Security and Services for State Workers (ISSTE), Center for Rehabilitation and Special Education (CREE), and in other types of groups or meetings aimed at older adults.

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