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Investigation of The Relationship between Balance and Body Mass Index with Quality of Life and Risk of Fall in Elderly

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Abstract: ***This study aimed to investigate the relationship between balance and body mass index (BMI) with quality of life (QOL) and risk of fall among elderly individuals. The study included 30 community-dwelling older adults aged 60–75 years, comprising 13 males and 17 females, who were cognitively intact and able to communicate effectively. Participants were assessed using Body Mass Index (BMI), the Berg Balance Scale (BBS), the Tinetti Balance and Gait Test, the Modified Fall Efficacy Scale, and the Nottingham Health Profile. Statistical analysis revealed a positive and statistically significant relationship between balance (BBS) and quality of life ($P < 0.05$), between BMI and quality of life ($P < 0.05$), and between balance (Tinetti Balance and Gait) and BMI ($P < 0.05$). However, no statistically significant relationship was found between BMI and risk of fall ($P > 0.05$) among the elderly participants. The findings suggest that balance and body mass index are important factors associated with quality of life in older adults. However, body mass index alone does not appear to be directly related to fall risk in this population. This study contributes to the existing literature by simultaneously examining balance, BMI, quality of life, and fall risk within a single elderly community sample. It also provides evidence highlighting that BMI may influence quality of life independently of its association with fall risk.***

Keywords: Elderly People; Balance; Body Mass Index; Quality of Life & Risk of Fall.

1. Introduction

Elderly person is a person 60 years of age or older who is suffering from the infirmities of aging as manifested by advanced age or organic brain damage, or other physical, mental, or emotional dysfunction, to the extent that the ability of the person to provide adequately for his own care or protection is impaired Regions of the world where there is a high proportion of elderly people [1]. Falling in it is one of the most dangerous and costly problems associated with growing older. Among the problems that the elderly face: heart disease, diabetes, high blood pressure, liver and kidney disorder, urinary tract disorder, lung disease, stroke, in addition to movement problems & arthritis, osteoporosis and also falling down [2].

Fall: An unexpected fall from a high to a lower position with or without injury due to a physical or mental influence. As falling down in the elderly is a frequent and increasing problem that causes a high degree of morbidity and mortality, due to poor postural reactions, and due to degenerative changes that have a significant impact on the lifestyle of the elderly [3],[4] One in three people over the age of 60 who live in the community experience at least one fall every year and 10-15% of that falls are associated with a severe injury[5]. Falling and fear of falling can lead to a deterioration in function and independence, as well as injury, and an increase in health care costs, which is a major reason for hospitalization, and consequently, environmental risks, medications, vision problems, and weakness in strength, gait or balance [6].

Balance: is a skill essential to daily life that requires the complex integration of sensory information regarding the body's position in relation to the surroundings and its ability to generate appropriate movement responses to control body movement [7].

It requires contributions from vision, vestibular sensation, proprioception, muscle strength, and reaction time. There are two types of balance, the first being static balance, which is the balance in which the balance is maintained for one position of the body. The second is dynamic equilibrium, which is the equilibrium concerned with maintaining one's balance during movement, or during the change from one position to another [8].

There are many reasons and factors for assessing risk related to falls in the elderly.For a physician, he takes a history of a fall, and a physical examination as an important part of the functional and environmental assessment of the elderly, and the assessment of gait and balance [4]. Establishing goals, a treatment plan, and a program of multiple exercises, which include balance, strength, proprioception, correct postural and gait training, are useful to avoid falls [6].

Body Mass Index (BMI):It is a person's weight in kilograms divided by the square of their height in meters. Which are measured by the researcher to calculate the body mass index. A high BMI can be an indicator of a high percentage of body fat. BMI can be used to check weight groups that may lead to health problems but are not a diagnostic of body obesity or an individual's health [9].

Quality of life (QOL) is defined by the World Health Organization as an individual's perception of their place in life, their good health, their ability to participate in or enjoy life's events in the context of the culture and the value systems in which they live, and in relation to their goals, expectations and standards, and their concerns [10].

1.1 Statement of problem

In the literature, there are few studies on the relationship between balance and body mass index with quality of life and risk of fall in elderly,Few studies have not examined the corelation bet ween thes variable in reducing the risk of falls, so I decided to do this research.

1.2 Research Questions

- What is the relationship between balance and falling in the elderly?
- Does body mass index affect falls down?
- What is the relationship between body mass index and falls down in the elderly?
- Is there a direct correlation between BMI and fall rate in the elderly?

1.3 Hypothesis of the study

- H1: There is a relationship between balance and quality of life in the elderly.
- H2: There is a relationship between body mass index and quality of life in the elderly.
- H3: There is a relationship between body mass index and risk of fall in the elderly.
- H4: There is a relationship between balance and body mass index in the elderly.

1.4 Significance of the study

I took a thread the relationship between (balance, body mass index, quality of life) and risk of falling in the elderly, Because of the increased risk of falling among the elderly, and their great need and dealing with this research reduces the risk of falling in the elderly. Thus, the results of this study may provide a basis for assisting therapists, clinicians, and the elderly in preventing risk of falls and managing balance, as well as improving body strength, posture and gait correction.

2. Literature Review

2.1 Elderly Person

Definition of an elderly person: a person who is 60 years of age or older. And who suffers from various diseases, whether aging diseases, organic brain damage, or any other physical, mental or emotional defect [1]. according to the limit agreed by the United Nations to be 60+ years to refer to an older population [11].

Globally, the population is getting older and most people expect to live in their 60s and beyond. The World Health Organization (WHO) predicts that by 2050, the global population aged 60 and over is expected to reach 2 billion, compared to 900 million in 2015. Today, 125 million people will reach the age of 80 years or over by in 2050, there will be approximately that number (120 million) living in China alone, and 434 million people in this age group worldwide. By 2050, 80% of all elderly people will live in low- and middle-income countries [12].

2.2 The most common diseases that may affect the elderly include:

Cognitive decline: Memory loss becomes common with age, while Alzheimer's disease does not. It is important to recognize early warning signs of Alzheimer's disease, for example difficulty solving problems or making plans, difficulty focusing on the task at hand, or taking longer to complete projects [13].

Oral health problems: Not all elderly people lose their teeth, but problems such as gingivitis that leads to periodontitis, a bacterial infection that affects the gums and the bones supporting the teeth, can be common in the elderly. Proper oral care and seeing a dentist to clean every six months can help ensure that their teeth and gums are as healthy as possible [14].

Heart disease: heart disease is the leading cause of death in adults over the age of 60. Conditions such as high blood pressure and high cholesterol require proper management and good heart care is vital to avoiding developing heart disease in later years [15].

Osteoporosis: The National Osteoporosis Foundation reports that about 54 million adults over the age of 50 have low bone mass or osteoporosis, and that nearly all adults over the age of 60 have some form of arthritis.Exercising regularly and eating a healthy diet can help them protect their bones and joints [16].

Respiratory diseases: Conditions such as asthma, chronic obstructive pulmonary disease (COPD), influenza, or pneumonia can worsen with age. As the elderly are more susceptible to infection, due to a weakened immune system however, there are many medications available that Allows easy breathing [17].

Diabetes: It is estimated that 25 percent of adults aged 60 years or over have type 2 diabetes. The sooner a person realizes they have diabetes, the earlier they start managing blood sugar and making lifestyle changes that can control it better [18].

Vision or hearing loss: Regular checks for vision and hearing are necessary with age. Age-related eye problems such as macular degeneration, cataracts and glaucoma effect of elderly people, and 43 percent of people with hearing loss are 60 years of age or older [19].

The risk of developing Parkinson's disease, urinary incontinence [20], and some types of cancer also increases with age. For example, women become more likely to develop cervical cancer or endometrial cancer, while men are more likely to develop prostate cancer. While it may not be possible to completely prevent cancer, screening tests to detect some types of cancer in the early stages can help treat them effectively [21].

2.3 Defining falls

A fall is defined as an event that causes a person to come to rest under the inadvertent action of the force of gravity. It is the second leading cause of accidental or unintended deaths world-wide. Identification of fall is very important as different type of fall has different measures when it comes to prevention. Fall can be classified as accidental, anticipated physiological fall or unanticipated physiological fall [22].

2.3.1 Types of Falls

Accidental falls

The anticipated falls normally occurs if a patient has been identified as fall-prone by scoring at risk of falling. and Accidental falls cannot be predicated using any scale as other types but they can be prevented by modification of the environment by making it safer for all [22].

Anticipated falls and unanticipated falls

The anticipated falls normally occurs if a patient has been identified as fall-prone by scoring at risk of falling. Some factors behind anticipated falls are if one has more

than one diagnoses because this leads to polyphamacy and also a weak or impaired gait [22].

Unanticipated falls occurs under conditions which cannot be predicted before the first occurrence. Unan - ticipated falls cannot be predicted by the use of any scale nor can they be prevented by occurring during their first time [22].

The risk of falling increases for people over the age of 60 due to the risk factors (balance, functional mobility, proprioception, muscle strength, flexibility and fear of falling) that lead to falling [2].

Physiological, physical, social, environmental, and economic risk factors of fall in elderly.

-Physiological risk factors: With advancing age, cells and organs undergo age-related changes that are reflected, among other systems, in the peripheral nervous system, joints, and cardiovascular function. An obvious physiological effect of aging is the decrease in muscle strength attributable to the loss of muscle mass. A decrease in physical ability and poor balance, which increases the risk of falling [2].

-Physical risk factors: The most common injuries that lead to falls in the elderly include fractures, cuts, bruises, and burns, as injuries that require hospitalization consist of fractures of the hip and pelvis. Most elderly people with hip fractures recover slowly and even cause death too much. A recent study found that 80% of older women said they want to die from the experience of losing independence that affects their quality of life [23].

-Social risk factors: older people feel alienated due to their lack of social interests, lack of interest in them, and self-esteem. As ill-treatment sometimes results on the part of those around the elderly, whether intentionally or unintentionally, such as screaming in their faces or exaggerating their blame. Their activities are restricted, fear and anxiety, as well as leisure and long time without having to work, affects their feeling of loneliness and boredom [24].

-Environmental risk factors: The surrounding environment can cause harm or falls in the elderly. Most households contain an environmental hazard such as insufficient lightning, obstacles on the road, door sills, and skidding. Pery floors, electrical wires, unstable carpets, precarious furniture. Lack of important aid Grab rails and grab bars in the bathtub and lack of bed rails and beds are too high [25].

-Economic risk factors: elderly people with low incomes, low education, and inadequate housing are sometimes blackmailed and stripped of their money while they are in a vulnerable state and cannot defend themselves. Whereas, the percentage of the elderly who apply for economic aid is constantly increasing, and the economic problems that the elderly suffer from are due to a lack of financial resources as a result of the elderly person's forced or voluntary retirement. Financial, and this may deepen the feeling of economic insecurity in the face of future developments and make the elderly suffer from anxiety and falls [24].

Prevention risk factor of fall in elderly

Fall prevention is an important consideration for older adults. Given the magnitude of the negative effects from falls, the incidence of falls increased from 8 percent for those without risk factors to 78 percent for those with four or more risk factors [26]. It is therefore necessary to prevent these factors through the use of effective strategies in the elderly who live in the community, which include physical activity, physical exercise and physical activity for at least 150 minutes per week at moderate intensity or 75 minutes at high intensity [27]. which contributes to reducing associated injuries from During falls and its risks, it improves blood circulation and stimulates digestion. It also increases alertness and increases self-confidence. It is recommended that the elderly participate in aerobic therapy. Additionally, there are programs for balance retraining, muscle strengthening, home walks, group exercise programs [28].

Defective diet is essential to healthy aging, diet and lifestyle affect disease and death rates. Therefore, it is important for the elderly to follow a balanced diet rich in nutrients to maintain a good lifestyle and reduce the risk of disease. Regularly adjusting the multiplicity of medications, using more nutritional supplements, and focusing on vitamin D if it is low in blood levels can improve bone and skeletal muscle health [29].

2.4 Definition balance

Balance is a complex process involving the coordinated activities of multiple sensory, motor, and biomechanical components. The position of the body in relation to gravity and the surrounds is sensed by combining visual, vestibular, and somatosensory inputs. Balance movements involve motions of the ankle, knee, and hip joints, which are controlled by the coordinated actions of ankle, thigh, and lower trunk muscles [30].

Two types of balance

Static balance is the ability to maintain postural stability and orientation with centre of mass over the base of support and body at rest Dynamic balance is the ability to maintain postural stability and orientation with center of mass over the base of support while the body parts are in motion [8].

Balance in elderly people

Balance is necessary for the individual to maintain posture, respond to voluntary movements, and respond to external disturbances. The individual's center of mass must remain within the changing support base. Due to balance disorders, the elderly to have a deterioration associated with the sensory and vestibular systems that lead to problems in the inner ear, dizziness, difficulty concentrating and poor ability to adapt to changes in their environment to maintain balance. Also, these strikes lead to problems with correct gait. The elderly, in particular, rely on vision to maintain balance and stability [31].

Body Mass Index

Body mass index (BMI) is a mathematical value that allows an estimate of human body mass by taking weight and height into account. and it is closely correlated with total and percent body fat assessed by more fundamental measures of body composition [32].

Body Mass Index (BMI)calculate

BMI is calculated as the ratio of an individual's weight

in kilograms divided by the square of his height in meters (BMI = kg / m2). The BMI provides a useful measure of body fat percentage and obesity [33].

Body mass index measurement tools

The tools needed to measure BMI are a scale to determine weight, a tape measure to determine height, and a calculator. If a person is not sure exactly how to estimate BMI [34].

Figure 1: Electronic balance for body weight

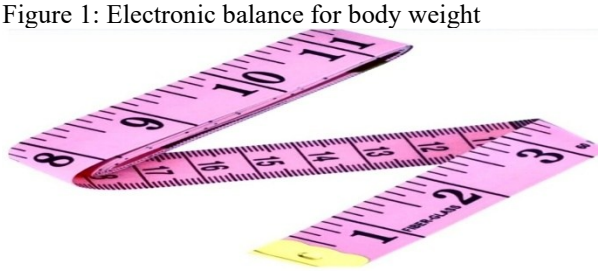

Figure 2: Tape measure

After calculating the BMI, it is compared to the following table

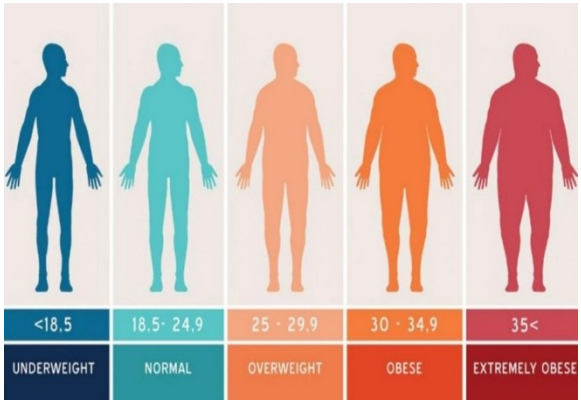

Figure 3: Body Mass Index (BMI) Classification

Table 1: Body Mass Index (BMI) Classification

Weight Categories	BMI (kg/m²)
Underweight	< 18.5
Healthy Weight	18.5 – 24.9
Overweight	25 – 29.9
Obese	30 – 34.9
Severely Obese	35 – 39.9
Morbidly Obese	≥ 40

This table indicates that people with a very high or very low index are more vulnerable to health risks, and people with a normal index are less likely.

Body Mass Index in elderly people

BMI has an important role to play in explaining differences in weight, especially in the elderly who have a very low index (underweight), or a very high index (obes), which is the most common [9].

Increased obesity in elderly people (over 60 years) is a risk factor for the elderly, due to the compatibility of various factors: inactivity, wrong eating habits, and basal metabolism and nutritional need reduction.This condition has become a serious problem due to the increasing numbers of elderly residents worldwide. Weight management is extremely important for the elderly due to the risks of disability, imbalance, and diseases that they are exposed to the most [35].

2.6 Definition Of Quality Of Life (QOL)

Quality of life is the interaction between the conditions of life and personal values and personal satisfaction with life, as is the individual's perception of his status in life in the context of his culture and community and concerns about mental health and personal beliefs. As the World Health Organization (WHO) pointed out in 1995, it describes the quality of life as an individual's perception of his or her own situation in life in the context of culture, the patterns of values in which he lives, and the extent or incompatibility of this with his goals, expectations and interests for mental health, independence and personal and social relationships. Individual self-circumstances of his life. Regarding health also, QOL contains subdivisions such as (HRQOL) which are functional effect of a medical condition and / or its consequent therapy upon a patient. HRQOL is thus subjective and multidimensional, encompassing physical and occupational function, psychological state, social interaction and somatic sensation [36].

Domains of quality of life

The concept of QOL is broad and composed of four domains including: a person's physical health, psychological state, and social and environment relationships [37].

-Physical health: activities of daily living, dependence on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, and work capacity.

-Psychological state: bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality/religion/personal beliefs, thinking, learning, and memory and concentration.

-Social relationships: personal relationships, social support, and sexual activity.

-Environment: financial resources, freedom, physical safety and security, health and social care: accessibility and quality, home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation/leisure activities, physical environment (pollution/noise/traffic/climate), and transport.

Quality of life in elderly people

The elderly people are more prone to problems that can reduce their quality of life. They are more likely to have multiple health, social and psychological disorders due

to poor physical and mental functions. Loneliness, impaired sexual activity and chronic metabolic disorders are some of the reasons that can lead to emotional distress in them. Also, poor economic, cultural and educational conditions can lead to poor quality of life for older people. As well as, burden of diseases will be increased obviously [38].

3. Methodology

3.1 Study design

This study is an observational (corelational study).

3.2 participants

The study included 30 elderly individuals between the ages of 60-75 years.

3.3 Place of the Study

The study carried out at Palestine (Hebron and its villages); the study was done between February 2021-May 2021.

3.4 Inclusion Criteria

- The age between 60 - 75 years.
- Participants are male and female.
- Elderly people in the community who were cognitively intact and able to communicate effectively with others.

3.5 Exclusion Criteria

- Elderly people with chronic diseases (heart, lung, and malignant tumors).
- Foot pain (rheumatoid arthritis).
- Total hip or knee replacement walking problems.
- Elderly people with neurological disorders.
- Elderly people in the community who were not cognitively intact and unable to communicate effectively with others.

3.6 Instrumentations

3.6.1 Tests and scales applied

First, the demographic and clinical data of the participants will be recorded after we have five assessment tests that will be applied later. The first test: Body Mass Index is to estimate the amount of fat in the human body. The second test: the bike balance table to determine the balance performance. The third test Tinetti balance and gait to assess the gait and balance in older adults, Test Four: The Modified Fall Efficacy Scale will assess how confident elderly people feel in their ability to do activities within a certain scale. The fifth final test: the Nottingham Health Profile to determine quality and we will score this evaluation is performed with all patients and controls only once.

-Body Mass Index (BMI)

Body Mass Index (BMI): BMI is used to estimate the amount of fat in the human body using measuring tools, which are: (a regular scale to measure weight and a regular tape measure to measure height) (BMI = a person's weight (kg) / height (m2)). Based on the most used BMI for weight status, the World Health Organization classifies adults as: Underweight: BMI <18.50, Normal Weight: BMI = 18.50 - 24.99, Overweight: BMI 25.00 - 29.99, and Obesity Mass Index For a body of 30.00 kg / m2 [39].

-Balance Scale (BBS)

Berg Balance scale was used the most widely used clinical scale to assess the performance of balance It is widely used for the dynamic and static balance capabilities of a person especially in neurological conditions, created by Katherine Berg, and divided into a category (Sit balance, permanent balance, dynamic balance), It consists of (14) activities divided into (sitting balance 1, standing balance 9, dynamic balance 5) and has a special score (0-4) ,4 normal ,0 Needs help (independent) The highest score can be obtained is 56 [40].

-Tinetti balance and gait test

The Tinetti balance and gait test is a simple test that is widely used in elderly patients to facilitate its administration and measures resident gait and balance (Yelnick & Bonnan 2008). The advantages of the Tinetti assessment tool are divided into two parts, the balance assessment and the gait assessment, in which the purpose of the test is explained to the person to check their balance and see how they move. Depending on a person's ability to perform specific tasks, the test scores 10 to 15 minutes for completing the tasks. The range is from 0 to 2 represents the weakest, and 2 represents independence. The individual scores are then grouped to form three scales; Generally speaking, gait score, total balance score, gait score and joint balance are announced. Whereas, the maximum score that can be obtained for the gait component is 12 points. The maximum balance component is 16 points. The maximum total number of points is 28 points [41].

-Modified Fall Efficacy Scale

The Modified Fall Efficacy Scale (MFES) is a visual analog scale of 14 activities, in which items are scored from 0 to 10, with 0 meaning " not confident/not sure at all" 5 being "fairly confident/fairly sure" and 10 being "completely confident/completely sure". Total the ratings (possible range = 0 – 140) and divide by 14 to get each subject's MFES score. Scores of < 8 indicate fear of falling, 8 or greater indicate lack of fear. This scale does not take long and can be completed in less than 5 minutes [42].

- Nottingham Health Profile (NHP)

The Nottingham Health Profile (Nottingham Health Profile, NHP) was used to assess the quality of life of cases; It consists of two parts that can be used independently of the other. But Part 1 is the most used part consists of 38 phrases grouped into (6) subsections to assess energy level (3), pain (8), emotional reaction (9), and sleep (5). Social isolation (5), physical abilities, and scores range from 0 "worst health" to 1 "best health". It takes about 5 minutes to complete [43].

3.7 Statistical Analysis

After collecting the study data, the researchers reviewed it in preparation to be entered to the computer. The data has been statistically processed, by extraction the numbers, the percentages. The hypotheses have been examined at the level of $\alpha = 0.05$, by the following statistical tests: (Pearson Correlation), By using the computer with statistical packages for Social Sciences (Spss).

4. Results

Table 2: The descriptive data of (sex , age , energy level , pain , emotional reaction , sleep ,social isolation , physical abilities)

Variables	Number	Valid percent
Sex		
Male	13	43.3
Female	17	56.7
Age		
63 and less	14	50.0
64-68	8	28.6
69 and above	6	21.4
Energy level (EL)		
Good health	30	100.0
Pain (P)		
Indicating poor	5	16.7
Good health	25	83.3
Emotional reaction (ER)		
Good health	30	100.0
Sleep		
Indicating poor	3	10.0
Good health	27	90.0
Social isolation		
Good health	30	100.0
Physical abilities (PA)		
Indicating poor	7	23.3
Good health	23	76.7

The hypotheses examination:

The first hypothesis:

There was no relationship at α=0.05 between Berg Balance and quality of life in the elderly.

We used (Pearson correlation) for the relationship between Berg Balance and quality of life in the elderly.

Table 3: The results of (Pearson correlation) for the relationship between Berg Balance and quality of life in the elderly.

	Number	Pearson Correlation	Sig
Berg Balance * quality of life in the elderly	30	0.634**	0.000

The results of analysis in the table above indicated that there was (Positive) relationship between Berg Balance and quality of life in the elderly. Whenever the score of the Berg Balance increased, the score of the quality of life in the elderly increased.

The second hypothesis:

There was no relationship at α=0.05 between body mass index and quality of life in the elderly.

We used (Pearson correlation) for the relationship between body mass index and quality of life in the elderly.

Table 4 : The result of (Pearson correlation) for the relationship between body mass index and quality of life in the elderly.

	Number	Pearson Correlation	Sig
body mass index * quality of life in the elderly	30	-0.436*	0.016

The results of analysis in the table above indicated that there was (negative) relationship between body mass index and quality of life in the elderly. Whenever the score of the body mass index increased, the score of the quality of life in the elderly decreased.

The third hypothesis:

There was no relationship at α=0.05 between body mass index and risk of falls in the elderly.

We used (Pearson correlation) for the relationship between body mass index and risk of falls in the elderly.

Table 5: The results of (Pearson correlation) for the relationship between body mass index and risk of falls in the elderly.

	Number	Pearson Correlation	Sig
body mass index * risk of falls in the elderly	30	-0.347	0.060

The results of analysis in the table above indicated that there was no relationship between body mass index and risk of falls in the elderly.

The fourth hypothesis:

There was no relationship at α=0.05 between Tinetti balance and gait and between body mass index in the elderly.

We used (Pearson correlation) for the relationship between Tinetti balance and gait and between body mass index in the elderly.

Table 6: The results of (Pearson correlation) for the relationship between Tinetti balance and gait and between body mass index in the elderly.

	Number	Pearson Correlation	Sig
Tinetti balance and gait * body mass index in the elderly	30	-0.506**	0.004

The results of analysis in the table above indicated that there was (negative) relationship between Tinetti balance and gait and between body mass index in the elderly. Whenever the score of the Tinetti balance and gait increased, the score of the body mass index in the elderly decreased.

5. Discussion

Elderly people most developed world countries have accepted the chronological age of 60 years as a definition of 'elderly' or older person. regardless of that person's individual history or where in the world they , According to UN : 60+ years will be referred as the older population or elderly. Young old – upto 75 years. • Old old – up to 85 years. • Very old- over 85 years . However, families and communities often use other socio-cultural referents to define age, including family status (grandparents), physical appearance, or age-related health conditions.

I conducted my study to investigate the relationship between balance and body mass index with quality of life and risk of fall in elderly.

Through my study to investigate the relationship between balance and BMI with quality of life and risk of falls in the elderly, I found many studies talking about balance, BMI, quality of life and the risk of falls in the elderly,but I did not find studies that show the relationship between these variables in the elderly.

The results of the statistical analysis in my study indicated that there was (positive) relationship between

Berg balance and the quality of life in the elderly,Whenever the score of the Berg Balance increased, the score of the quality of life increased they have. And there was also a (negative) relationship between BMI and quality of life, Whenever the score of the body mass index increased, the score of the quality of life in the elderly decreased. It also indicated that there was no relationship between BMI and risk of falls in the elderly. And there was a (negative) relationship between Tinetti balance and gait and BMI. Whenever the score of the Tinetti balance and gait increased, the score of the body mass index in the elderly decreased.

In a previous study "The relationship between risk factors for falling and the quality of life in older adults", included one hundred sixteen elderly aged 60 and olde. They have reported the result of their study a positive correlation between quality of life and balance(Berg balance) , general health perception and ,muscle strength and a negative correlation between balance and fear of falling. They concluded that the risk factors for falls (balance, functional mobility, muscle strength, fear of falling) in older adults are associated with quality of life [44].

On the other hand, I conducted my study "Investigating of the relationship between balance and body mass index with quality of life and risk of fall in elderly" included 30 elderly between the ages of 60 and 75 years. The result of the statistical analysis of the relationship between balance and quality of life in the elderly, indicated that there was (positive) relationship between Berg balance and quality of life in the elderly.Whenever the score of the Berg Balance increased, the score of the quality of life in the elderly increased. And there was (negative) relationship between balance and fear of falls in the elderly.whenever balance increased ,the fear of falls in the elderly decreased.

By looking at the result of the previous study and the result of my study You see that there is an agreement between them. In terms of the existence of a (positive) relationship between balance (Berg balance) and quality of life in elderly people.

Erik in their study "Body mass index and quality of life well-being in a community of older adults",included elderly.they have reported in the result of their study the 1326 Older obese adults have a lower quality of life than those who are overweight or a normal body mass index. And this study indicated that the low quality of life associated with obesity leads to the loss of millions of people in the world every year.The higher the BMI, the lower the quality of life they have [45].

In another study "The relationship between body mass index and quality of life in community-living older adults living in the United States" included 22,827 elderly.They have reported in the result of their study that the BMI of those who are underweight, overweight, obese, and morbidly obese compared to the normal BMI group.Excess weight is associated with many chronic conditions, especially in the elderly.They are found that BMI has a negative effect on the quality of life as it increases [46].

On the other hand, I conducted my study included 30 elderly. It was the result of a statistical analysis of the relationship between body mass index and quality of life in the elderly, indicated that there was (negative) relationship between body mass index and quality of life in the elderly. Whenever the score of the body mass index increased, the score of the quality of life in the elderly decreased.

By looking at the results of the two previous studies and the result of my study, you see that these results are consistent with the result in my study. Whenever the score of body mass index (BMI) increased, the score of the quality of life in the elderly decreased.

In previous a study " Nutritional Status, Body Mass Index, and the Risk of Falls in Community-Dwelling Older Adults". included 120,185 elderly and they reported in the result of their study that the elderly who were malnourished were more likely to fall than those who were well-nourished. observed that the less nutrition or malnutrition, the higher the risk of falls, and the better nutrition the lower the risk of falls in the elderly. but no association or relationship was observed between BMI and the risk of falls [47].

A prevoius study " Associations between obesity and overweight and fall risk, health status and quality of life in older people". included Survey of a representative sample of community based .They have reported in the result of their study the elderly people who are overweight and obese have a higher risk of falling, compared to elderly people with a healthy weight.they indicated that the higher the BMI, the greater the fall in the elderly , and the elderly who suffer from obesity have a higher prevalence of pain and lack of activity compared to those of a healthy weight [48].

On the other hand, I conducted my study included 30 elderly .It was the result of a statistical analysis of the relationship between body mass index and risk of falls in the elderly, that there was no relationship between body mass index and risk of falls in the elderly .

By looking at the results of the two previous studies, you see that the result of the first previous study is consistent with the result of my study in that there is no relationship between BMI and the risk of falling. While the result of the second previous study did not correspond with my study, as the size of the sample that was selected in the second previous study was a survey of a representative sample of elderly people at the level of a large community in the state of New South Wales in Australia, and their ages were between 65 years and over. As for my study, I conducted it on a sample size smaller than the size of the second previous study sample, and it included 30 elderly in Palestine (Hebron and it's villages) between the ages of 60-75 years, and for this reason it is possible to difference between their studies and my study.

Cancela in their study " Relationships Between Body Mass Index and Static and Dynamic Balance in Active and Inactive Older Adults " it included 160 elderly ,they have reported in the result of their study that there is a relationship between balance and BMI, and to they add the amount of physical activity as a possible contributing factor affecting this relationship, but it is

not well established. and this study indicated that the higher the balance (static, dynamic), the lower the body mass index (BMI) in the elderly [49].

In another study "The Effects of Body Mass Index on Balance, Mobility, and Functional Capacity in Older Adults", it included 149 elderly aged 60 to 70 years.They have reported in the result of their study that the body mass index (BMI) is an important factor affecting balance, mobility and functional capacity in the elderly, and this study also observed a relationship between BMI and balance, where BMI negatively affects balance [50].

On the other hand, I conducted my study included 30 elderly.It was the result of a statistical analysis of the relationship between balance and body mass index in the elderly, that there was (negative)relationship between balance and body mass index in the elderly.Whenever the score of the balance (Tinetti balance) increased, the score of the body mass index in the elderly deceased.

By looking at the results of these previous studies and the result of my study, you see that these results are consistent with the result in my study.Whenever the score of the balance increased, the score of the body mass index in the elderly deceased.

6. Conclusion

The findings indicate that balance performance and body mass index are significantly associated with quality of life among elderly individuals, suggesting that better balance and appropriate BMI levels may contribute to improved overall well-being. A significant relationship was also observed between balance measures and BMI, reflecting their interrelated influence on physical function. However, no significant association was found between body mass index and fall risk, indicating that other factors may have a more direct impact on predicting falls in older adults.

7. Recommendations

- I recommend a larger sample size to obtain a generalization of sample results.
- I recommend more studies about of the lower extremity muscle strength and its relationship with body mass index.
- The role of physical therapy for the elderly must be enhanced because of its large and vital role in the health of the elderly.

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