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Prevalence of Falls among Obese and Non obese Elderly Individuals with Type 2 Diabetes Mellitus - A Cross-sectional Study

Dr. Pradnya Y. Dumore[1], Dr. Shyam D. Ganvir[2]

[1]Assistant Professor, Community Physiotherapy Department, Dr. Vithalrao Vikhe Patil Foundation's College of Physiotherapy, Ahmednagar, Maharashtra
[2]Principal, Dr. Vithalrao Vikhe Patil Foundation's College of Physiotherapy, Ahmednagar, Maharashtra

Corresponding Author: Dr. Pradnya Y. Dumore

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ABSTRACT

Introduction: Ageing is a fundamental process that affects all of our systems and tissues. In older adults, functional fitness is determined by the ability to perform activities of daily living. Elderly is defined as being 65 years of age or older, however the onset of health problems of elderly may occur in early 50s or may be only in 40s. Falls represent the most common mechanism of injury and the leading cause of death from injury, in people older than age 65 years. Type 2 diabetes mellitus is very common in elderly individuals. In that the diabetic neuropathy is most commonly seen complication of type 2 diabetes mellitus with a major impact on the health affected elderly individuals. Therefore, this study is design to make aware about risk of fall among the elderly individuals and its consequences of balance in elderly obese individuals on quality of life.
Methodology: The study design is cross sectional study. 300 samples were taken. Elderly above 65 and with type 2 diabetes mellitus were included. Elderly with stroke, myocardial infarction were excluded. The study setting was rural community.
Procedure: The informed consent form is taken from the individuals. Elderly with history falls were taken. Demographic data with body mass index were taken and divide individuals into obese and non-obese category. After that Timed Up and Go test, Community balance and Mobility scale were administered and Barthel index for activities of daily living were taken. Result: Paired t- test to find out the difference between risk of fall in obese diabetic fallers and Non-obese diabetic fallers. One - way analysis of variance to find out the difference between the components of balance in obese diabetic fallers and Non-obese diabetic fallers. Linear regression to find out the association between the body mass index and activities of daily living (ADL) in obese diabetic fallers. Descriptive analysis of data for Age, Gender, BMI.
Conclusion: This study concluded that the obese elderly individuals with type 2 diabetes mellitus has impaired balance and increased risk of fall than the non-obese elderly individuals with type 2 diabetes mellitus. And also, there were effect of obesity on activities of daily living in elderly with type 2 diabetes mellitus of rural community.
Keywords: Ageing, Elderly, Falls, Type 2 diabetes mellitus, Balance, ADL's

INTRODUCTION

Ageing is a fundamental process that affects all of our systems and tissues.[1] It is a time related deterioration of the physiological functions necessary for survival and fertility.[2] In older adults, functional fitness is determined by the ability to perform activities of daily living. Elderly is defined

as being 65 years of age or older, however the onset of health problems of elderly may occur in early 50s or may be only in 40s. On the other hand, many times we come across the people who are healthy and active, even at the age of 70 years. There are three groups are identified in elderly i. e. young old, middle-old, old-old. Young old group consists of the population between 65 and 75 years of age. The population between middle old age group consists of 75 & 85 years of age are included. Old age group comprises of population older than 85 years of age. [3]

Falls represent the most common mechanism of injury and the leading cause of death from injury, in people older than age 65 years.[1] Falls are a major cause of disability and a preventable cause of death in older people. About 30% of people over 65 years of age fall each year; the incidence of falls in those over 75 years of age is 32–42%.[4] In India, the geriatric population is expected to increase from 76.6 million in 2006 to 173.1 in 2026. This segment of the population aces multiple problems in India. A fall is defined as "inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change to the rest in furniture, wall, or other objects.[5] There are some risk factors associated with the occurrence of falls in elderly i. e. intrinsic and extrinsic factors. Intrinsic factors are poor balance, weakness, foot problems. Extrinsic factors are poor lighting, slippery surface, obstacles.[3] Globally falls are a major public health concern for older adults, and with the growing numbers of older people in populations in all parts of the world, research is urgently needed in order to establish effective policies to reduce risk. Every year one-third of community-dwelling older adults fall.[6] In older people, falls often occur during routine activities, such as walking; descending or climbing steps; transferring on or off chairs, beds, toilets, or in or out of bathtubs; and reaching up or bending down.[7] The etiology of the fall is usually multifactorial, resulting from the interaction between predisposing and precipitating factors, which may be intrinsic and extrinsic. Being a woman, advanced age, the presence of two or more diseases and depressive symptoms stand out as important factors triggering this event among the elderly. Regarding the extrinsic factors, such as type of housing, low illumination, non-adherent carpets, high steps, daytime period, these are characteristics of the elderly population suffering from falls.[8]

In India, falls are associated with considerable mortality and morbidity. Soft tissue injuries were most common, followed by fractures, especially hip fractures. In previous study of 312 older adults admitted for fall-related injuries, 12% died and 68% required surgical management. Hip, femoral, and pelvic injuries were most common. The mean duration of hospital stay was 12 to 15 days. Documentation of the fall event, cause, and consequences was inadequate. There are psychosocial consequences of fall such as fear of fall, decreased balance confidence, and activity restriction that may affect quality of life.[9]

Although several risk factors are associated with falls, one of the most commonly identified risk factors is impaired balance. Balance is the ability to collect sensory and proprioceptive signals related to a person's position in space and to produce the appropriate motor responses to control body movement. Balance disorders are one of the most important reasons leading to falls. Falling increases, the possibility of death and disability; furthermore, it may cause the loss of independence.[10,11]

Functional independence is related directly to one's capacity of preservation of mobility in daily activities, such as locomotion, sit-to-stand from a chair or getting up from the bed. Mobility demands functional balance as a pre-requisite and equally comprises a complex and a multidimensional task itself.[12]

Diabetes mellitus (DM) is probably one of the oldest diseases known to man. It was first reported in Egyptian manuscript about

3000 years ago. Type 2 DM is the most common form of DM characterized by hyperglycemia, insulin resistance, and relative insulin deficiency. Type 2 DM results from interaction between genetic, environmental and behavioral risk factors.[13] Type 2 diabetes mellitus (T2DM) is the single most disease affecting a large number of elderly populations along with Hypertension. its complications take a major toll on the quality of life of the elderly and the healthcare costs of the society.[14] Older individuals with type 2 diabetes often exhibit greater impairments in posture and gait and are typically at increased risk of falling.[15] Type 2 diabetes mellitus has impact on the sensorimotor and cognitive systems that may contribute to increased fall risk in older adults with type 2 diabetes mellitus.[11]

Sensory System-

It includes the somatosensory, visual and vestibular systems which contribute sensory information required for balance control. These systems provide information about motion of body segment in relation to each other support by using proprioceptive and cutaneous inputs. And also, in the visual system the prevalence of cataracts, which reduces contrast sensitivity, is significantly higher in individuals with diabetes duration of more than 10 years. Older adults with type 2 diabetes and reduced contrast sensitivity have been reported to be 1.41 times more likely to fall as compared to older adults without type 2 diabetes. In the somatosensory system diabetes polyneuropathy occur and it has been considered most dominant mediator between diabetes and falls because reduction in lower limb somato-sensation reduces the ability to detect changes in balance and declines in somatosensory functions can result in balance impairments and increased fall risk in older adults with type 2 diabetes mellitus.[11]

Diabetes mellitus (DM) is a chronic disease whose complications may cause damage to the balance maintenance systems, besides being a strong predictor of self-referred functional limitations, worse performance in lower limb functions and falls. The prevalence of diabetic complications significantly increases with the duration of the disease, age, and poor patient glycemic control level. DM is also associated with geriatric conditions - falls, incontinence, dizziness, vision, hearing and cognitive impairments - and dependence on activities of daily living (ADL).[19] Falls is a major concern for elderly adults with diabetes mellitus. The annual incidence of falls in elderly diabetic individuals was up to 39%. Approximately 30.6% of individuals with diabetes and 19.4% of individuals without diabetes experienced recurrent falls in the Longitudinal Ageing Study. Intensive glycemic control associated with hypoglycemia may be another possible reason for falls.[14]

Obesity is a major independent and modifiable risk factor for T2DM and many epidemiological studies have suggested a progressive increase in the prevalence of T2DM with obesity.[12] Obesity prevalence on a global scale is alarming, and efforts to control their spread represent a priority of the public health agenda. Obesity is clearly driving a parallel epidemic of associated chronic diseases in all age-groups, including type 2 diabetes, hyperlipidemia, hypertension, atherosclerosis, obstructive sleep apnea, and liver dysfunction. Considerable attention is currently being focused on the consequences of obesity in vulnerable populations at both ends of the age spectrum, namely in youth and in the elderly.[15]

Obesity is defined as the accumulation of body fat in early childhood and therefore >3 times in adults.[13] More importantly, indexes of obesity play an unusual role in screening T2DM and determining high risk individuals. Several measurements of obesity, including body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR) and waist-to-stature ratio (WSR), are significantly associated with T2DM. BMI is the marker most commonly used to identify the risk of future T2DM.[12]

Type 2 diabetes mellitus (DM) is known to be closely associated with lifestyle and obesity and has a prevalence that increases with age.[16]

According to Rebecca J. 2014 The prevalence of overweight and obesity in adults continues to increase in many countries across the world. It is estimated that around 65 million adults aged 20 years and over in the United States (US) and 11 million adults in the United Kingdom (UK) will be obese (Body Mass Index [BMI] ≥30) by 2030. Obese individuals had a 31% higher risk of having fallen, but no higher risk of a fall related injury compared to healthy-weight individuals. Obese fallers also had a 57% higher risk of believing nothing could be done to prevent falls; a 41% higher risk of using four or more medications; a 30% higher risk of experiencing moderate or extreme pain or discomfort; were 26% less likely have walked for two or more hours in the last week; and were less likely to think they were doing enough physical activity. Older obese individuals have an increased risk of falls and obese fallers have a higher prevalence of pain and inactivity than fallers of a healthy weight.[17]

In India, a high prevalence of central obesity and overweight has been recorded in urban areas. Though the prevalence of obesity (BMI ≥30) is usually lower than that observed in the western population, the overweight category (BMI ≥25) includes almost a third to half the population in every survey. Women and men are equally affected. The majority of previous studies have focused on the relationship between obese status and falls; however, the underweight condition is also associated with disproportional body composition, diminished mobility, and reduced stability, all of which may have detrimental effects on falls. Studies have investigated the relationship between falls and obese groups, whereas few studies have been conducted in underweight groups.[18,19]

Few studies has been suggested that obesity increases fall risk, based on diminished static balance and increased fall-related injury risk. According to Noah J. Rosenblat Eightysix subjects (42 obese) reported falls occurring during the previous year (retrospective falls), and over the following year responded to biweekly communications inquiring whether they fell or stumbled (prospective falls/stumbles). Because trips represent the largest fall cause by community-dwelling adults, we also analyzed outcomes and recovery strategies of 25 women (13 obese) after laboratory-induced trips. Obese and healthy weight women retrospectively reported similar fall rates (40.9% vs 40.5%; P.97). Similar percentages of healthy weight and obese women prospectively fell (64.7% vs 64.3%; P.98) and stumbled (38.9% vs 14.3%; P.24).[18,23]

Obesity can lead to social and economic burdens such as higher risk of depression, lower health related quality of life physical health measures, having a lower income. When looking at factors associated with falling in healthy elderly people, the use of medication, diseases, body composition and decreased muscle strength were all associated with falling.[21]

Diabetes mellitus (DM) is leads to, poor glycemic control and impairments in locomotor function. Apart from these impairments, diabetes medication and/or polypharmacy may cause damage to the balance maintenance systems, besides being a strong predictor of self-referred functional limitations, worsening performance in lower limb functions and falls. The prevalence of diabetic complications significantly increases along with the duration of the disease, age and poor patient glycemic control.[22]

It is possible that the ambient temperature may lead to a seasonal variation in the incidence of falls. People tend to hurry more in colder weather, and mild hypothermia and slowed responses are more common. Equally, people tend to be less active in winter, the hours of daylight are shorter and vitamin D deficiency is more likely.[24]

Most homes contain potential hazards that could increase the risk of falls. It has been reported that many older people attribute their falls to trips or slips inside the home or immediate home surroundings.[25]

Prevention strategies for fall are if risk factors advanced age, strategy for it is can be used to identify high-risk Populations, living alone, strategy for it can be used to identify high-risk populations, Possible change of living arrangements, Inactivity of elderly Exercise, education can be given.[24]

The aim of the study was to find out the prevalence of falls among obese elderly individuals with type 2 diabetes mellitus.

MATERIALS & METHODS

The Study Design is Cross-sectional Study. Study Setting was Physiotherapy OPD, Falls Clinic. 300 sample size were taken. Elderly with age above 65 years old, all males and females with type 2 diabetes mellitus were included. Elderly with Only participants with normal glucose status or prediabetes (fasting glucose >126mg/dL and/or 2-hour OGTT >200 mg/dL) included and individual should walk 10m included. Elderly with History of stroke, myocardial infarction, clinically significant arrhythmia or other cardiac disease, nephropathy, severe hypertension (i. e., systolic BP > 200, diastolic BP > 110 mmHg or the use of three or more antihypertensive medications), seizure disorder, kidney or liver transplant, renal disease, any other neurological disorders.

METHODS

This study was conducted in the Department of Community Physiotherapy at OPD and falls clinic in the community physiotherapy OPD. The study protocol was approved by the Institutional Ethical Committee of College of Physiotherapy. The assessment was done on elderly individuals with type 2 diabetes mellitus were enrolled in the study. Written informed consent was obtained from all participants after the explanation of the details of this study and its benefits and risk in their own language the patient able to understand. After approval of the Ethical committee, the recruitment initiated. Subjects were selected based on Inclusion and Exclusion criteria by convenient sampling technique. The demographic data were obtained from assessment form, and Self-structured falls flyer was circulated among elderly individuals in community for recruitment of elderly individuals with falls and falls structured questionnaire was administered on the elderly individuals then patients were divided into two groups obese fallers and non-obese fallers on the basis of WHO body mass index classification, then TUG test was administered to check the risk of fall and also CBM scale for balance and Barthel Index to check the activities of daily of living in elderly individuals with type 2 diabetes mellitus was taken.

STATISTICAL ANALYSIS

Paired t-test to find out the difference between risk of fall in obese diabetic fallers and Non-obese diabetic fallers. One - way analysis of variance to find out the difference between the components of balance in obese diabetic fallers and Non-obese diabetic fallers. Linear regression to find out the association between the body mass index and activities of daily living (ADL) in obese diabetic fallers. Descriptive analysis of data for Age, Gender, BMI.

RESULT

This study examined the 300 elderly individuals with type 2 diabetes mellitus. Table 1 shows the demographic data regarding diabetes level, BMI, history of fall, socioeconomic status. The average age for male was 72.5 years and in for female 68.2. There were 167 female participants, in which obese participants were 59 and non-obese participants were 108. Among 133 male participants, 26 were obese participants and 107 non-obese. 60% of participants suffered at least one fall in the last one year. Females were at greater risk of falling, as were participants in older group. On the basis of BMI classification elderly were divided into two groups obese

fallers and non-obese fallers. The average range of BMI in male was 22.34 and in female 31.56 Table 2 shows that the general prevalence of falls 60% and falls in obese 28.33% and non-obese 71.66%. Table 3 shows that the level of balance in obese elderly and non-obese elderly individuals which shows that balance was more impaired in obese elderly individuals than in non-obese elderly individuals which was statistically significant (<0.02) (p=0.05). Table 4 shows that the risk of fall using TUG test shown the increases in obese fallers elderly individuals than the non-obese fallers which shows statistically extremely significant (0.001) (p=0.05). Table 5 shows that the association between BMI and activities of daily living in obese elderly individuals with type 2 diabetes mellitus which shown that the negative correlation was found between them (0.18) (p=0.05). Statistically it was not significant. Table 6 shows that the association between both balance and risk of fall in obese and non-obese fallers elderly individuals with type 2 diabetes mellitus which shows statistically extremely significant i.e. (0.001) (p=<0.05). Graphical presentation also shown the prevalence of falls, gender wise prevalence of falls level of balance, risk of fall in both obese fallers and non-obese fallers elderly individuals with type 2 diabetes mellitus.

Tables and Graphical Presentation

Table 1: Baseline characteristic of all the participants

Sr.no	Characteristic	Mean	SD
1.	N=300 (Male= 133, Female= 167)	-	-
2.	Age Male Female	 72.5 68.2	 +9.25 +2.225
3.	BMI Male Female	 22.34 31.32	 0.141421 0.98
4.	Socioeconomic status	Grade IV	-
5.	BSL Level	226.99	+10.60
6.	History of falls	1 year	-

Table 2: Prevalence of falls in Diabetic Elderly Individuals

Prevalence of falls (General) 60% Prevalence of falls in obese 28.33% Prevalence of falls in Non-obese 71.66%	Females =167 Obese= 59 Non-Obese=108 Male=133 Obese=26 Non-obese=107

Table 3: Level of balance in elderly obese and non-obese individuals.

CBM Scale components	Obese	Non obese	p Value
1. Unilateral Stance	1.51	2.36	<0.02
2. Tandem Walking	1.38	2.34	
3. 180 Tandem Pivot	1.4	2.38	
4. Lateral Foot Scooting	1.21	2.23	
5. Crouch and Walk	1.35	2.13	
6. Lateral Dodging	1.32	1.86	
7. Walking & Looking	1.33	2.32	
8. Forward and Backward Walking	1.23	1.74	
9. Descending stairs	1.08	1.67	
10. Step-up	1.2	2.33	

Table 4: Risk of fall in obese & non-obese

	OBESE	NON-OBESE	p Value
TUG TEST Score	18.08584	16.62406	<0.001

Table 5: Association of BMI with activities of daily living in obese fallers elderly individuals

Sr. No	BMI (mean)	ADLs (mean)	p value
1.	31.3292	99.86	<0.18

Table 6: Association between outcomes in obese and non -obese

Sr. No	Measures	Obese	Non obese	p value
1.	CBM Scale	1.301	2.141176	
2.	TUG Score	18.08584	16.62406	<0.001

DISCUSSION

This study was done in rural community, over a period of one year. The principal aim of study was to find out the prevalence of falls among obese and non-obese elderly individuals with type 2 diabetes mellitus.

The objectives of this study were to investigate the level of balance in obese and non-obese elderly individuals in type 2 diabetes mellitus and gender wise difference in prevalence of falls in diabetic elderly individuals, also effects of obesity on activities of daily living in elderly individuals with type 2 diabetes mellitus. The present study shown that the 60% of prevalence of falls in diabetic elderly individuals in rural community. With the aging process, the human body goes into physiological decline, culminating with decreased bone density and muscle mass, postural instability, impaired visual and auditory capacity, and increased drug consumption. These changes, isolated or associated to environmental risks, may predispose the individual to fall, a sentinel event in the life of elderly people, reducing functional capacity. [9]

SA Dsouza et. al, 2014 study on falls in Indian older adults were reviewed to determine the prevalence, consequences, risk factors, and interventional strategies for falls. This study found that the prevalence of falls in Indian older adult ranges from 14% to 53%. Falls result in considerable morbidity and mortality. [9]

Our study also found the gender wise prevalence in diabetic elderly individuals which shown more prevalence in elderly female with type 2 diabetes mellitus than in male elderly with diabetes mellitus. In our study female participants were more than (F=167) the male (M=133). Fernanda dos Santos et. al. 2019 study on to identify the prevalence and factors associated with falls in the elderly population living in rural areas. In this study, the majority of the elderly who suffered falls were female (62.0%) the probability of falling was 40.0% higher in relation to the opposite sex, that is, 1.4 times higher than in the men. The higher prevalence of falls among women, it was due to the lower quality and strength of muscle mass in women as well as the prevalence of chronic diseases may increase the likelihood of frailty in women.[8]

In our study we also found that the level of balance decreased in the obese fallers elderly (mean=1.30) than the non-obese fallers elderly (mean= 2.14), this difference was found between both the groups. Because older individuals have impaired balance control, particularly those that were frail. Obese individuals show faster body sway during upright stance than normal weight individuals, suggested that they also have difficulty controlling balance.[28]

Lee et. al 2020 study on to determine whether body mass index–based obesity was associated with decreased balance and whether instability has relationships with the main risk factors for falls. In this study total of 317 participants were categorized based on their body mass index. Clinical balance assessments were performed using the Berg Balance Scale, Timed Up and Go test, and Short Physical Performance Battery. This study found that the elderly population with obesity exhibited poor balance performing ability, and it was associated with the decreased strength of the lower limbs and impaired postural stability and also study showed that the body mass index–based obesity can be regarded as a fall risk.[29]

Svetlana Knorr et. al. 2010 study on community balance and mobility scale in community dwelling persons after stroke. In this study they taken 44 participants (N=44; 24 men, 20 women;). The main outcome measure taken was community balance and mobility scale, TUG TEST, Berg balance scale to examine the convergent validity and sensitivity to change, respectively. This study shown that the moderate to high convergent validities (rho=.70 to .83, P<.001) were observed among the CB&M, BBS, and TUG and CB&M was valid and sensitive to change in assessing functional balance and mobility in ambulatory stroke survivors with moderate to mild neurologic impairments. (Validity of the Community Balance and Mobility Scale in community-dwelling persons after stroke.30

Kimberly J. et. al. 2016 study on the Community Balance and Mobility Scale (CB&M) was increasingly used to evaluate walking balance following stroke. In this study they have removed the 5 items. The resulting stroke-specific item unidimensional CB&M (CB&M Stroke) fit Rasch model expectations, with no item response bias, acceptable targeting (13% floor effects and 0% ceiling effects), and moderate-to-strong sensitivity to change at 6-month post discharge (SRM0.63; 95% confidence interval1.523, 0.142) and 12 months post discharge (SRM0.73; 95% confidence interval2.318, 760). This study found that the CB&M Stroke shows promise as a clinical scale for measuring change in walking balance in ambulatory community-dwelling adults post stroke. In our study CB&M scale was used to checked the level of balance in elderly with type 2 diabetes mellitus.[27] Our study also shown that the risk of fall increased in obese fallers (mean=18.085) as compared to the no-obese fallers (mean=16.62) and there is negative correlation between the obesity and activities of daily living in elderly with type 2 diabetes mellitus were found. This is due to the excessive body weight can introduce or exacerbate chronic health conditions such as diabetes, cardiovascular disease, hypertension and arthritis. As many of these conditions are associated with weakness and instability, it could be expected that excessive body weight would be associated with falls in older people.

Takashi Sakurai, et.al. 2011 study on to clarify the explanatory factors for disability in Japanese diabetic elderly. In this study they have investigated disability and functional limitations among 317 elderly people with type 2 diabetes recruited in a large-scale prospective study of the Japanese Elderly Diabetes Intervention Trial. In this they assessed basic activities of daily living (ADL) and instrumental ADL (IADL) were total score of the Barthel index and the Tokyo Metropolitan Institute of Gerontology Index of Competence, respectively. This study identified several factors predicting the future decline of basic ADL and IADL in diabetic elderly patients, and provided a conceptual framework that might help to clarify the pathways leading to disability.[30]

Rebecca J et. al. 2014 study on to determine whether overweight and obese individuals have higher reported fall and fall injury risk than individuals of healthy weight, and to examine the influence of BMI on health, quality of life and lifestyle characteristics of fallers. They have included the community-based individuals aged 65 years and older in New South Wales was surveyed regarding their history of falls, height, weight, lifestyle and general health within a 12-month period. This study found that the Obese individuals had a 31% higher risk of having fallen, but no higher risk of a faller related injury compared to healthy-weight individuals and Older obese individuals have an increased risk of falls.[17]

Patricia Pereira De Oliveira et al, 2012 study on to compare the frequency and risk of falls based on the functional mobility test in diabetic and non-diabetic elderly individuals. In this study both diabetic and non-diabetic groups responded to a structured questionnaire about health and fall risk and underwent mobility assessment test (Timed up & go test). This study found

a higher frequency of falls in patients with DM2 than in those without DM2, and also a worse performance in TUG test in diabetic patients ($p<0.05$) was observed. Mechanism suggested that this was due to the poor glycemic control in this population (all subjects were hyperglycemic). Thus, the suggested mechanism of insulin therapy as a factor increasing the risk for falls.[31]

Anne Shumway-Cook et al, 2000 study found that the TUG is a sensitive and specific measure for identifying community dwelling adults who are at risk for falls.[32]

The present study also found the correlation between the balance and risk of in obese fallers and non-obese fallers elderly with type 2 diabetes mellitus which shown that the balance was correlated with risk of fall in elderly individuals (<0.001). If the balance was impaired in elderly the chances of falls increase in elderly with type 2 diabetes mellitus. Mechanism suggested that the balance is the ability to collect sensory and proprioceptive signals related to a person's position in space and to produce the appropriate motor responses to control body movement. When this ability deteriorates, due to both disease and the normal aging process, the risk of falling increases in the elderly.

Kose N. et.al.2005 study on to investigate risk factors of fall and to examine their correlations with balance, depression, cognitive impairment and mobility skills in elderly. In this study 30 elderly individuals were included. Risk factors for fall were obtained through individual interviews and observation. Cognitive function was assessed by Mini Mental State Examination (MMSE). The Geriatric Depression Scale (GDS) was used for determining the depression status of the elderly. Balance of the subjects was evaluated by the Berg Balance Scale (BBS) and the Get Up and Go Test (GUGT). Additionally, mobility skills were assessed by River-mead Mobility Index (RMI). This study was found the correlations among all parameters were evaluated and shown that the impairment of cognitive function, balance and mobility skills, and depression increases the risk of falling.[33]

Our study shows that the decreased level of balance, increased risk of fall in obese elderly individuals with type 2 diabetes mellitus than the non-obese elderly individuals with type 2 diabetes mellitus this was due to the obesity in elderly individuals which leads to impairment of balance and because of impaired balance it increases the risk of fall as elderly were diabetic, poor glycemic control in elderly with type 2 diabetes mellitus. And activities of daily living were not affected by in obese elderly individuals of rural community because as the outcome measure for ADLs used was Barthel index and it included very basic components (bathing, grooming, dressing). As elderly individuals with rural community they were able to performed all these basic activities of daily living that's why the negative correlation found between the BMI AND ADLs.

CONCLUSION

This study concluded that the obese elderly individuals with type 2 diabetes mellitus has impaired balance and increased risk of fall than the non-obese elderly individuals with type 2 diabetes mellitus. And also, there were effect of obesity on activities of daily living in elderly with type 2 diabetes mellitus of rural community.

Future Scope

Falls in elder individuals are significant cause of morbidity and mortality. The cause of falling in old age is often multifactorial and may require a falls prevention rehabilitative strategy. This study also found the obese diabetic elderly individuals for that exercises can be given to prevent from further complications of obesity. As all the elderly were diabetic, exercises for improvement of balance and holistic approach of rehabilitative strategies can be given, it will reduce the chances of risk of fall in diabetic elderly individuals in future.

Declaration by Authors

Ethical Approval: Approved

Conflict of Interest: The authors declare no conflict of interest.

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