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Assessment of Signs Symptoms of Sarcopenia among Type 2 Diabetic Patients

Habiba hatpipliyawala[1], Dr. Shweta Tiwari[2]

Deen Dayal Upadhyay Kaushal Kendra (DDUKK), Devi Ahilya Vishwavidyalaya, 2nd Floor, Vigyan Bhawan, Takshshila Campus, Khandwa Rd, Davv Takshila Parisar, Indore, Madhya Pradesh 452017, India

A B S T R A C T

Sarcopenia is a progressive and generalized loss of skeletal muscle mass and function. The prevalence of sarcopenia was reported to be up to 29% in older persons in the community healthcare setting. Sarcopenia diagnosis is confirmed by the presence of low muscle mass plus low muscle strength or low physical performance. The incidence and prevalence of metabolic and musculoskeletal diseases, notably Type 2 diabetes mellitus (T2DM) and sarcopenia, are on the rise, posing significant challenges to public health. Among individuals aged 35-45 with T2DM, 82% are categorized as non-working, with 58% achieving optimal sleep, yet facing heightened risks of sarcopenia. Despite mean BMI falling within the healthy range, this age group exhibits higher levels of adipose tissue, exacerbating sarcopenia vulnerability. While better glycemic control is observed, closer monitoring of postprandial blood sugar levels is warranted. Symptoms of sarcopenia are prevalent, particularly in the 41-50 age group, indicating a critical need for targeted interventions. Dietary habits show sufficient protein intake crucial for muscle health, yet weight loss endeavors remain largely unsuccessful. Exercise preferences favor activities like yoga and aerobics, especially among females. Musculoskeletal discomfort underscores the importance of pain management strategies. In conclusion, a comprehensive approach addressing diet, exercise, and glycemic control is imperative, with targeted interventions essential for mitigating sarcopenia risk and enhancing overall quality of life in this population

Keywords: Sarcopenia, Type 2 Diabetes , Inflammation, Glycemic control

1. Introduction :

Sarcopenia is a condition characterized by the progressive loss of skeletal muscle mass, strength, and function that occurs as a natural part of aging. It typically begins around the age of 30, with individuals experiencing a gradual decline in muscle mass at a rate of approximately 3-8% per decade. It is a significant developmental stage in the lifespan characterized by numerous physical, cognitive, emotional, and social changes. It typically spans from around the ages of 35-45, although the exact boundaries may vary depending on cultural, social, and individual factors. This period marks a transition between early adulthood and late adulthood.

The compounding effects of sarcopenia and type 2 diabetes create a perfect storm for functional decline, significantly impacting an individual's quality of life. Sarcopenia, the age-related loss of muscle mass and strength, diminishes physical capacity and increases the risk of falls and fractures. Type 2 diabetes exacerbates these effects by impairing muscle function and reducing exercise tolerance through insulin resistance and chronic inflammation. Individually, sarcopenia and type 2 diabetes can lead to decreased mobility, difficulty performing activities of daily living, and an increased dependence on others for assistance. However, when combined, their effects are synergistic. Sarcopenia not only heightens the risk of developing type 2 diabetes due to decreased muscle glucose uptake but also worsens glycemic control in those already diagnosed.

2. Methods

The proposed research aims to assess the signs and symptoms of sarcopenia among Type 2 diabetic patients, recognizing the intricate relationship between these conditions and their impact on older adults. A comprehensive review of literature was conducted, gathering primary and secondary data from various sources including websites and research papers authored by experts in the field. The objectives of the study were established as follows: 1) To investigate the prevalence of signs and symptoms of sarcopenia among T2 diabetic patients; 2) To examine the prevalence of sarcopenia specifically in older adults with T2 diabetes; and 3) To disseminate knowledge regarding sarcopenia and its prevalence within the T2 diabetic patient population. Two hypotheses were formulated: H1 posited the presence or absence of sarcopenia signs among diabetic patients, while H2 speculated the presence or absence of sarcopenia in adults with T2 diabetes.

The study was conducted in Saify Nagar, Indore, primarily within the Bohra community, targeting females to ensure a sufficient sample size. A total of 50 individuals with a history of diabetes were included in the study, focusing on adults within the age range of 35-45. Criteria for inclusion encompassed individuals diagnosed with Type 2 diabetes, while those with any other comorbidities were excluded. Data collection involved various tools and techniques, including recognition of subjects from the locale, assessment of signs and symptoms through hand grip using a self-administered questionnaire, and anthropometric measurements such as height and weight.

Furthermore, subjects were educated about sarcopenia and its prevalence among diabetic patients through the dissemination of brochures. Important terminologies including sarcopenia, diabetes, insulin resistance, middle adulthood, frailty, and glycemic control were defined to ensure clarity and understanding throughout the study. Demographic profiling was conducted through a structured questionnaire covering details such as name, age, gender, occupation, and sleeping hours. Anthropometric measurements were recorded using standard procedures, while clinical assessments focused on identifying signs and symptoms related to sarcopenia and diabetes. Dietary assessments involved evaluating food frequency and patterns, while exercise questions aimed to gauge physical activity levels, strength, endurance, and overall energy levels.

3. Result

Table 4.1 Percentage distribution of family income

Income group	Percentage (n=50)
Low income group	5(9.4%)
Middle income group	41(77.4%)
High income group	4(7.5%)

occupation

(n=50)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	working	9	17.0	18.0	18.0
	non working	41	77.4	82.0	100.0
	Total	50	94.3	100.0	
Missing	System	3	5.7		
Total		53	100.0		

Table 4.2 This indicates that the major population among the selected sample were belong to non working category i.e 41(77.4%) while 9 (17.0%) subjects were reported that they are working with some organization or self business

sleeping_hours

(n=50)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 6	16	30.2	32.0	32.0
	6-8	29	54.7	58.0	90.0
	more than 8	5	9.4	10.0	100.0
	Total	50	94.3	100.0	
Missing	System	3	5.7		
Total		53	100.0		

Table 4 .3 The distribution of sleep duration among the selected subjects reveals that the majority (54.7%) reported sleeping for 6-8 hours per night, aligning with recommended guidelines for optimal sleep duration. Notably, a significant portion (30.2%) reported sleeping less than 6 hours, indicating potential sleep insufficiency among a notable subset of participants. Additionally, a smaller proportion (9.4%) reported sleeping more than 8 hours per night.

Age group (n=50)	**Mean (BM1)**	**SD(BMI)**
Total population (35-45)	24.65	2.981
35-40	22.34	1.866
41-45	26.95	1.899

Table 4.4 The analysis of BMI across age groups within the total population aged 35-50 reveals notable variations. Individuals aged 35-40 exhibit a lower mean BMI (22.34) compared to those aged 41-45 (26.95). This suggests potential differences in body composition and adiposity between the two age cohorts.

Age group (n=50)	**Mean (HBA1C)**	**SD(HBA1C)**
Total population(35-50)	6.76	.931
35-40	6.49	.858
41-50	7.03	.936

Table 4.5 The mean HBA1C level for the total population aged 35-40 is 6.76 with a standard deviation of 0.931, while for individuals specifically aged 35-40, it is slightly lower at 6.49 with a standard deviation of 0.858. This suggests that HBA1C levels tend to be lower within the 35-40 age group compared to the broader population, indicating relatively better glycemic control among this age cohort.

Age group (n=50)	**Mean (FBS)**	**SD(FBS)**
Total population(35-40)	133.2	26.25
35-40	125.2	22.43
41-45	141.2	27.7

Table 4.6 These findings suggest better FBS control within the 35-40 age group compared to the broader population, indicating potentially healthier metabolic profiles in this age cohort.

Age group (n=50)	**Mean (PPBS)**	**SD(PPBS)**
Total population(35-40)	170.9	33.68
35-40	162.20	33.67
41-45	179.6	31.9

Table 4.7 The analysis of postprandial blood sugar (PPBS) levels across age groups reveals varying mean values. In the total population aged 35-40, the mean PPBS is 170.9 mg/dL, whereas for the specific age group of 35-40, it is slightly lower at 162.20 mg/dL. Conversely, individuals aged 41-45 exhibit a higher mean PPBS of 179.6 mg/dL.

Category	Symptoms	Total population	Age (35-40)	Age (41-50)
Loss of muscle mass	• Arms • Legs • Abdomen	1.42- Mean .499- SD	1.44-Mean .507-SD	1.40-Mean .500-SD

Fatigue	• Normal • Tiredness • Exhaustion	2.10-Mean .678-SD	2.28-Mean .614-SD	1.92-Mean .702-SD
Appearance	• Thinner • Weaker	1.70-Mean .463-SD	1.60-Mean .500-SD	1.80-Mean .408-SD
Impaired physical performance	• Affect balance • Walking • Standing	2.64- Mean .525- SD	2.68-Mean .557-SD	2.60-Mean .500-SD
Weakness and reduced strength	• Lifting objects • Hand grip	1.50-Mean .505-SD	1.16-Mean .374-SD	1.84-Mean .374-SD
Changes in body composition	• Weight gain • Alterations in body shape	1.44- Mean .501-SD	1.28-Mean .458-SD	1.60-Mean .500-SD

Table 4.8 The assessment of symptoms related to sarcopenia across age groups reveals varying mean scores. In the total population aged 35-40, symptoms such as fatigue (mean: 2.10) and impaired physical performance (mean: 2.64) exhibit moderate severity levels. Conversely, individuals aged 41-50 demonstrate slightly higher mean scores for symptoms like fatigue (mean: 2.28) and weakness/reduced strength (mean: 1.84).

Percentage distribution of pulses

FREQUENCY	PERCENTAGE(n=50)
Twice a day	21(42%)
Once a day	22(44%)
Twice a week	7(14%)

In this dataset of 50 responses, 42% reported taking pulses twice a day, 44% once a day, while 14% indicated doing it twice a week, suggesting a predominant daily frequency among respondents.

Table 4.10 Frequency distribution of milk and milk products

FREQUENCY	PERCENTAGE(n=50)
Twice a day	5(10%)
Once a day	41(82%)
Twice a week	4(8%)

Among the 50 responses, 82% reported the action occurring once a day, while 10% indicated twice a day and 8% twice a week, showing a notable preference for daily occurrence in this dataset.

Table 4.11 Percentage distribution of Non Veg

FREQUENCY	PERCENTAGE(n=50)
Twice a week	38(76%)
Once a week	12(24%)

In this dataset of 50 responses, 76% reported consuming non-vegetarian food twice a week, while 24% indicated doing so once a week, illustrating a predominant preference for twice-weekly consumption among respondents.

Table 4.12 Percentage distribution of Egg

FREQUENCY	PERCENTAGE(n=50)
Once a day	18(36%)
Twice a week	26(52%)
Once a week	6(12%)

In this dataset of 50 responses, 36% reported consuming eggs once a day, 52% twice a week, and 12% once a week, showcasing a varied frequency of egg consumption among respondents, with a notable preference for both daily and twice-weekly consumption patterns.

Discussion:

The current study looked to asses the signs and symptoms of sarcopenia in 50 females having the history of diabetes. The data presented in Tables offers insights into various aspects of lifestyle and health-related behaviors among the sampled population. A predominant proportion of respondents fall into the middle-income group (77.4%) and non-working category (82.0%), indicating a significant representation of individuals with potentially stable financial situations but without active employment. Sleep patterns reveal a concerning trend, with 30.2% reporting sleeping less than 6 hours, suggesting possible sleep insufficiency, while 54.7% adhere to the recommended 6-8 hours per night. The analysis of age-related health indicators such as BMI, HBA1C, FBS, and PPBS highlights variations across different age groups, with generally favorable metrics observed among individuals aged 35-40 compared to the broader population aged 35-50. Symptoms related to sarcopenia demonstrate moderate severity levels, with fatigue and impaired physical performance being notable concerns. Dietary habits indicate a preference for daily consumption of milk and milk products (82%) and eggs (36%), while non-vegetarian food is predominantly consumed twice a week (76%). Overall, these findings underscore the importance of addressing sleep patterns, promoting healthy dietary habits, and monitoring age-related health indicators to enhance overall well-being in this population.

5. Conclusion:

In conclusion, the data underscores the multifaceted nature of sarcopenia in older adults with T2DM, influenced by factors such as age, glycemic control, lifestyle habits, and symptomatology. Targeted interventions focusing on diet, exercise, and glycemic management are crucial in mitigating sarcopenia risk and improving overall quality of life in this population.

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