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Research Article

Walk And Dexa Test Predicts T2dm By Appendicular Right Lateralisation Loss

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Abstract

Background: T2DM causes sarcopenia is a well-known condition now. Sarcopenia is being assessed by DXA and WALK test. We have assessed in our study that whether left cerebral dominance is hampered in T2DM and are we able to diagnose it via DXA and WALK test.

Aims/Study Design: DXA and walk test is done in T2DM and compared with normal person of similar age groups to predict loss of left cerebral dominance.

Materials and Methods: DXA and WALK test is used to compare Lean Muscle Mass (Sarcopenic Diabetic vs. Normal), Comparison of Grip Strength, Comparison of Gait Speed, to calculate and correlate the Arm Lean (L/R) vs. Grip Strength, Comparison of Android vs. Gynoid Lean Distribution in T2DM patients (n = 22) with history more than 5 years with mean HBA1C of 7.5 and compared with normal persons (n = 22).

Results: Many combinations were compared and corelated with each other of T2DM and normal person. Statistically significant correlations were seen of right leg, right grip strength when compared with right side and also with normal subjects.

Conclusions: In T2DM, Loss of right appendicular lateralisation (left cerebral dominance) as indicated by DEXA and walk test can predict left cerebral dysfunction in near future but fMRI may give a better prospective and objectivity with excellent corelation between these tests.

Keywords: Dexa; T2DM; Walk Tests; Left Cerebral Dominance

Introduction

DEXA and walk tests performed in T2DM in North Indian population was lacking since long ago. Cerebral lateralisation is being widely assessed by WADA test, fMRI tests, EEG of brain and many more [1]. If by any means these costly affairs be skipped and lateralisation can be assessed by a universal cheap method (like just WALK test and then confirm it by DXA test) specially in T2DM cases then it might be possible that we can predict the T2DM as such way before the clinical emergence of T2DM.

Visceral-obesity is based on our body's four molecular-level components-water, fat, protein, and minerals body components [2]. Human-body is a model of three-compartments, fat-mass (FM), lean-mass (LM), and bone-mineral-content (BMC) these three are analysed by Dual-X-ray-absorptiometry (DXA) [3-7]. Authors have presented study on Fat mass and bone mineral content previously and predicted T2DM. Now this study is based on lean mass of body and to get knowledge on cerebral dominance loss in T2DM.

Asian-Indians have an increased susceptibility and rising prevalence to T2DM (T2DM) and insulin-resistance compared with Europeans [8-14]. with lower BMIs than Europeans [15] but greater waist-to-hip ratios and abdominal-fat [16,17] than Europeans.

Material and Methods

This is a cross-sectional-study of 44-patients (22 normal-subjects and 22 T2DM patients), taken from diabetic-clinic of department-of-medicine KGMU-UP. T2DM patients (n = 23) with history more than 5 years with mean HBA1C of 7.5 and compared with normal persons (n = 22). Normal subjects and self-reported diabetic patients were taken for this study and convenient sampling done. Self-reported diabetic patients were classified as known diabetic subjects.

DEXA scans

DEXA-procedure was done at the Department-of-Radiodiagnosis, KGMU-Lucknow-UP {Osteosis (Model-number HTB-1003 SERIAL-NUMBER 2201009 MANUFACTURER-POSCOM-Co-LTD)}. Central-abdominal-fat was calculated by the construction of an abdominal-window as described by Carey-et-al 18. The upper margin of this window was fixed at the lower-border of the second-lumbar-vertebra (L2) and the lower-margin at the lower-border of the fourth-lumbar-vertebra (L4). The lateral-margins were fixed in alignment with the outer edges of the ribcage so as to exclude most of the lateral-subcutaneous-fat.

Statistical analysis

Various fat measures and anthropometric variables as independent variables were performed. All analyses were done using Windows-based SPSS Statistical Package (version 10.0; SPSS-Chicago-IL), and P values < 0.05 were considered significant.

Results

Lean Muscle Mass Comparisons (Sarcopenic Diabetic vs. Normal)

Group	n	Mean (g)	Median (g)	SD (±)	Mann-Whitney U test
Sarcopenic Diabetic	22	3000.09	2757.0	1300.02	p-value: 0.336
Normal	22	3038.50	2961.5	716.65	

Table 1: Comparison of Left Arm Lean.

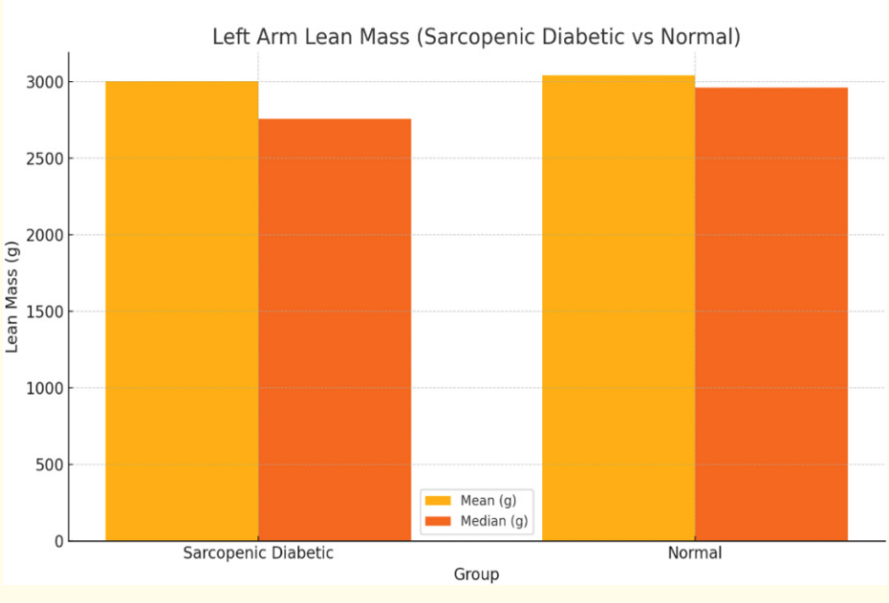

Figure a

When including all ages, the difference in Left Arm Lean Mass between Sarcopenic Diabetic and Normal groups is not statistically significant (p = 0.336). Both groups show comparable means, but Sarcopenic Diabetics exhibit greater variability.

There is no statistically significant difference in Right Arm Lean Mass between Sarcopenic Diabetic and Normal groups (p = 0.916). Although the Sarcopenic Diabetic group had a slightly higher mean, the distributions were similar.

Group	n	Mean (g)	Median (g)	SD (±)	Mann-Whitney U test
Sarcopenic Diabetic	22	3230.73	3013.5	1256.62	p-value: 0.916
Normal	22	2911.55	3038.5	798.83	

Table 2: Comparison of Right Arm Lean.

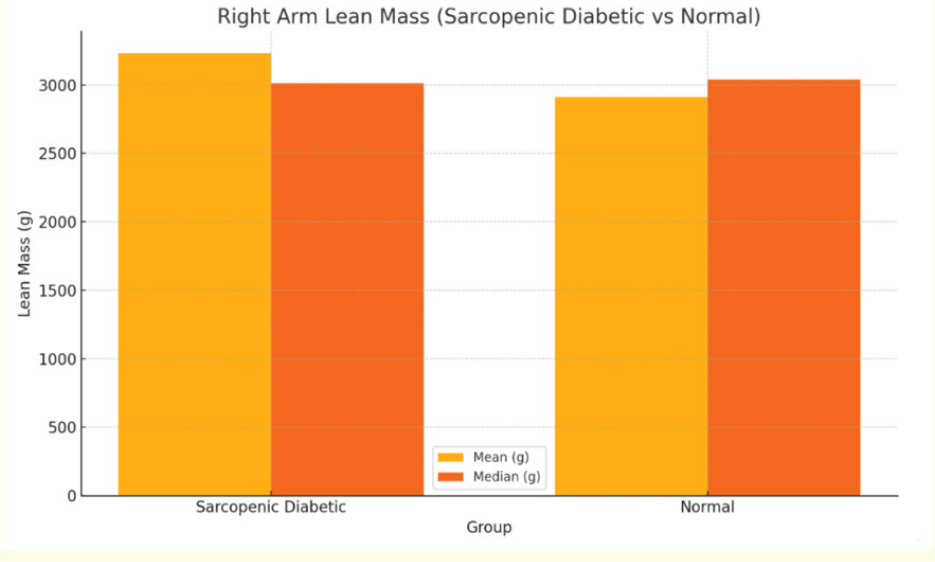

Figure b

Group	n	Mean (g)	Median (g)	SD (±)	Mann-Whitney U test
Sarcopenic Diabetic	22	8032.27	8061.0	1349.85	p-value: 0.131
Normal	22	9012.09	9261.5	1808.16	

Table 3: Comparison of Left Leg Lean.

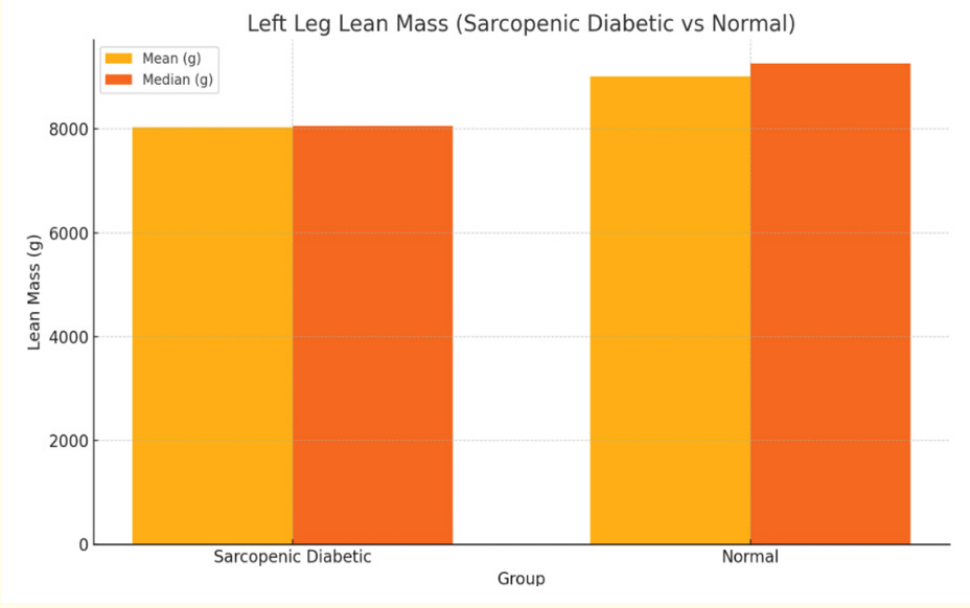

Figure c

The difference was not statistically significant when all ages were included, though a trend toward lower lean mass in Sarcopenic Diabetics remained.

There is a statistically significant reduction in Right Leg Lean Mass in the Sarcopenic Diabetic group compared to the Normal group ($p = 0.0116$). This finding supports the presence of lower limb sarcopenia in individuals with diabetes.

Group	N	Mean (g)	Median (g)	SD (±)	Mann-Whitney U test
Sarcopenic Diabetic	22	7777.36	7951.5	1830.31	p-value: 0.0116
Normal	22	9393.59	9394.0	1962.51	

Table 4: Comparison of Right Leg Lean.

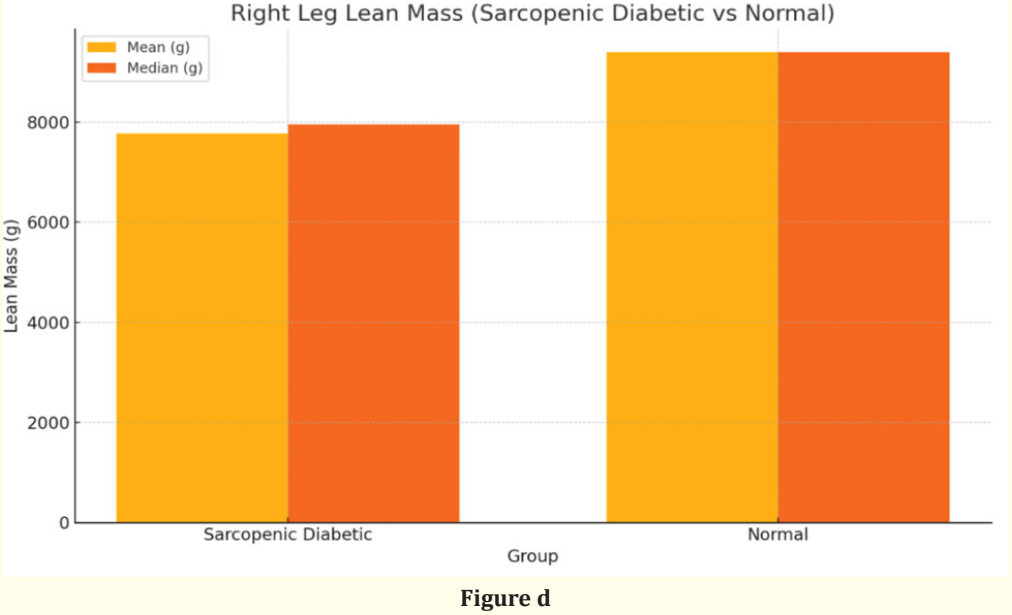

Figure d

Group	n	Mean (g)	Median (g)	SD (±)	Mann–Whitney U test
Sarcopenic Diabetic	22	10794.36	10715.0	1473.88	p-value: 0.460
Normal	22	11163.77	11053.0	1850.27	

Table 5: Comparison of Left Trunk Lean.

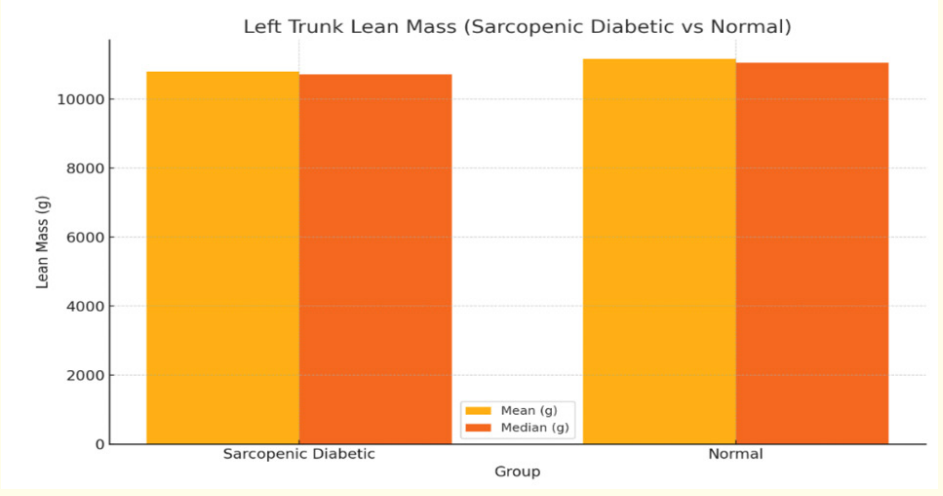

Figure e

There was no statistically significant difference in Left Trunk Lean Mass between Sarcopenic Diabetic and Normal groups (p = 0.460). The values were closely matched, indicating the trunk may be less affected by sarcopenia compared to the limbs.

There was no statistically significant difference in Right Trunk Lean Mass between Sarcopenic Diabetic and Normal groups (p = 0.163), although the Normal group showed a slightly higher mean.

Left vs. Right Side Comparisons (Within-Group).

Group	n	Mean (g)	Median (g)	SD (±)	Mann–Whitney U test
Sarcopenic Diabetic	22	10391.45	10353.0	1721.33	p-value: 0.163
Normal	22	11111.18	10750.5	1923.82	

Table 6: Comparison of Right Trunk Lean.

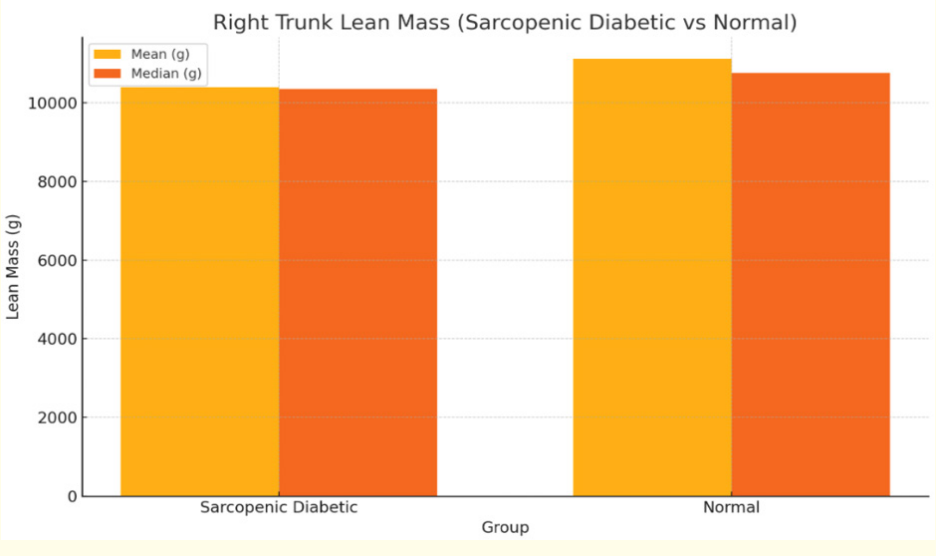

Figure f

In the Sarcopenic Diabetic Group (N = 22), the right arm lean mass (3230.73 g) was significantly higher than the left arm(3000.09 g), with a Wilcoxon p-value of 0.028. This suggests a statistically significant asymmetry in arm muscle mass among Sarcopenic Diabetic individuals, potentially indicating early muscle imbalance or lateralization that could be associated with Sarcopenic Diabetic neuropathy or differential physical activity.

In contrast, in the Normal Group (N = 22), the left arm (3038.50 g) and right arm (2911.55 g) lean mass did not differ significantly (p = 0.702), indicating symmetry in muscle distribution between limbs, as expected in healthy individuals.

Group	Side	Mean (g)	Wilcoxon test
Sarcopenic Diabetic (n = 22)	Left Arm	3000.09	p-value : 0.028
	Right Arm	3230.73	
Normal (n = 22)	Left Arm	3038.50	p-value : 0.702
	Right Arm	2911.55	

Table 7: Left vs. Right Arm Lean.

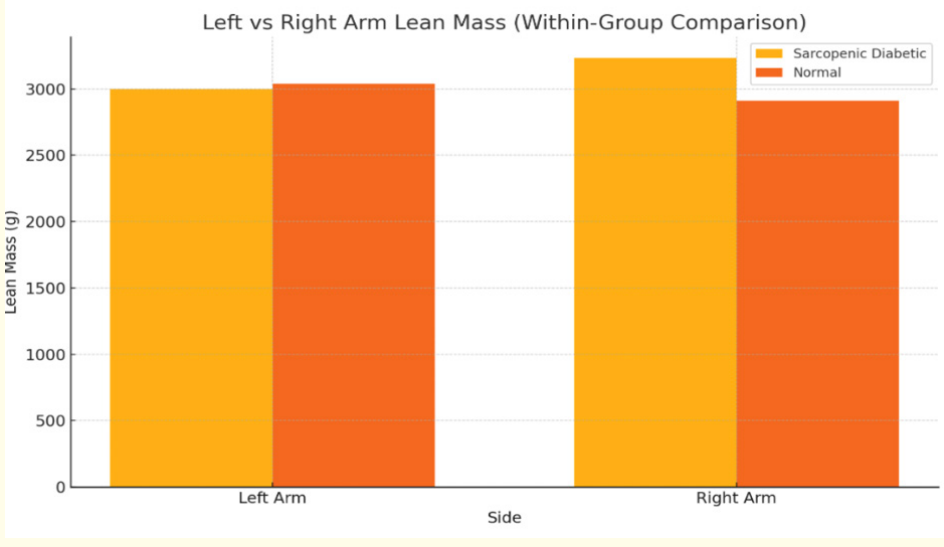

Figure g

In the Sarcopenic Diabetic Group (n = 22), the mean lean mass of the left leg was slightly higher (7960.95 g) than that of the right leg (7777.36 g), but this difference was not statistically significant (Wilcoxon p = 0.176). This indicates a relatively symmetrical distribution of leg muscle mass in Sarcopenic Diabetic individuals, with no consistent lateral dominance.

However, in the Normal Group (n = 22), the right leg lean mass (9393.59 g) was significantly higher than the left leg (8863.91 g), and this difference was statistically significant (p < 0.001). This suggests a physiological right-side dominance in lower limb muscle mass among healthy individuals, which may reflect habitual motor use patterns in right-limb dominant populations.

Group	Side	Mean (g)	Wilcoxon test
Sarcopenic Diabetic (n = 22)	Left Leg	7960.95	p-value : 0.176
	Right Leg	7777.36	
Normal (n = 22)	Left Leg	8863.91	p-value : < 0.001
	Right Leg	9393.59	

Table 8: Left vs. Right Leg Lean.

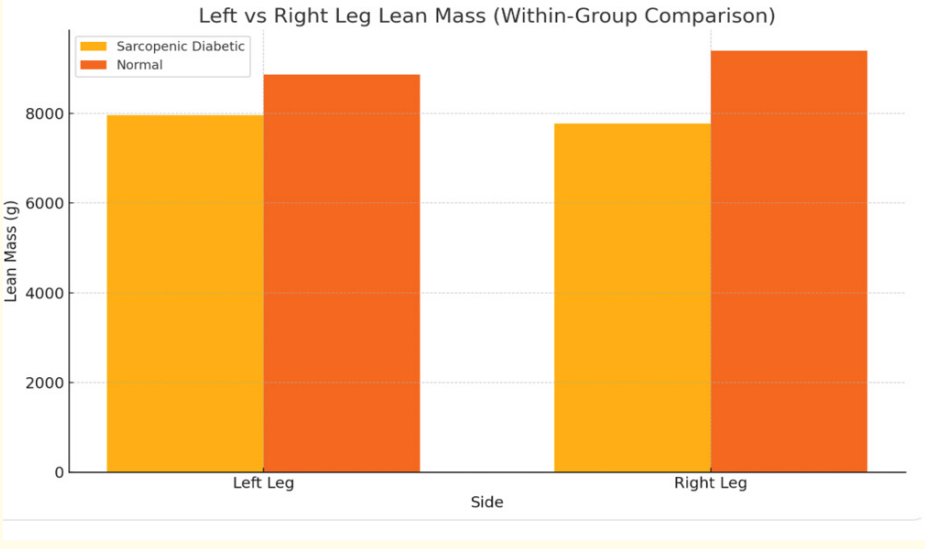

Figure h

In the Sarcopenic Diabetic Group (n = 22), the left trunk lean mass (10794.36 g) was slightly higher than the right (10391.45 g), and this difference was statistically significant (Wilcoxon p = 0.036). This finding may indicate asymmetrical trunk muscle loss, potentially due to altered postural or compensatory loading patterns in Sarcopenic Diabetic individuals.

In contrast, the Normal Group (n = 22) showed nearly identical trunk lean mass on both sides (11163.77 g vs. 11111.18 g), with no significant difference (p = 0.388), supporting the expected symmetry in healthy individuals.

Functional Outcome Comparisons (Sarcopenic Diabetic vs. Normal)

In the Sarcopenic Diabetic Group (n = 22), the mean grip strength was 21.45 kg, which was lower than that of the Normal Group (n = 3) with a mean of 28.63 kg. However, the difference was not statistically significant (p = 0.143), likely due to the very small sample size in the Normal group.

Although a trend toward weaker grip strength in Sarcopenic Diabetics was observed - consistent with muscle loss patterns - this result should be interpreted cautiously due to limited data in the control group. Increasing the number of healthy participants would help clarify this trend.

Group	Side	Mean (g)	Wilcoxon test
Sarcopenic Diabetic (n = 22)	Left Trunk	10794.36	p-value : 0.036
	Right Trunk	10391.45	
Normal (n = 22)	Left Trunk	11163.77	p-value : 0.388
	Right Trunk	11111.18	

Table 9: Left vs. Right Trunk Lean.

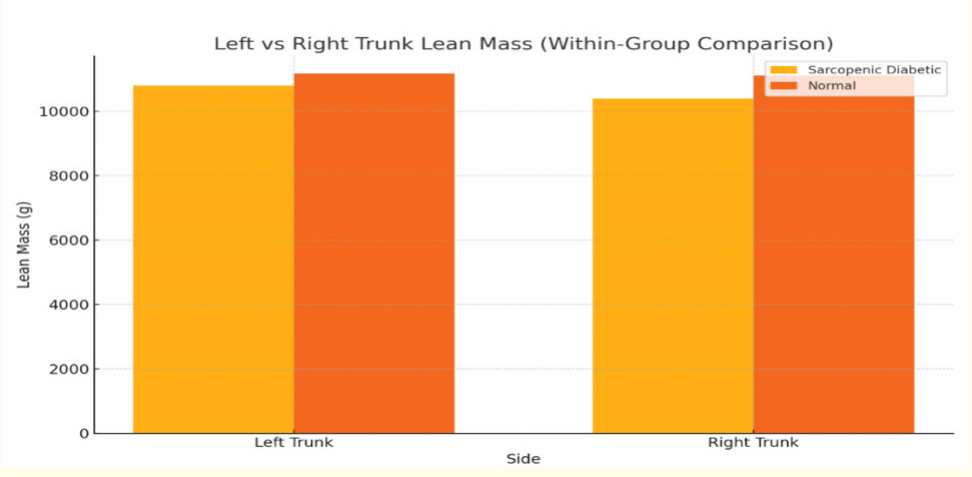

Figure i

In the Sarcopenic Diabetic Group (n = 22), the mean gait speed was 1.74 m/s, which was higher than that of the Normal Group (n = 3) at 1.16 m/s. This difference approached statistical significance (p = 0.072), but did not cross the conventional threshold (p < 0.05).

Correlation Analyses (Muscle vs. Function)

A significant positive correlation was observed between Left Arm Lean Mass and Grip Strength (r = 0.437, p = 0.029), suggesting that higher lean mass in the left arm is moderately associated with stronger grip strength across participants.

Group	Mean (kg)	Median (kg)	SD (±)	Mann–Whitney U test
Sarcopenic Diabetic (n = 22)	21.45	20.85	7.02	p-value : 0.143
Normal (n = 3)	28.63	27.00	5.63	

Table 10: Comparison of Grip Strength (ANALYSIS GRIP STRENGTH).

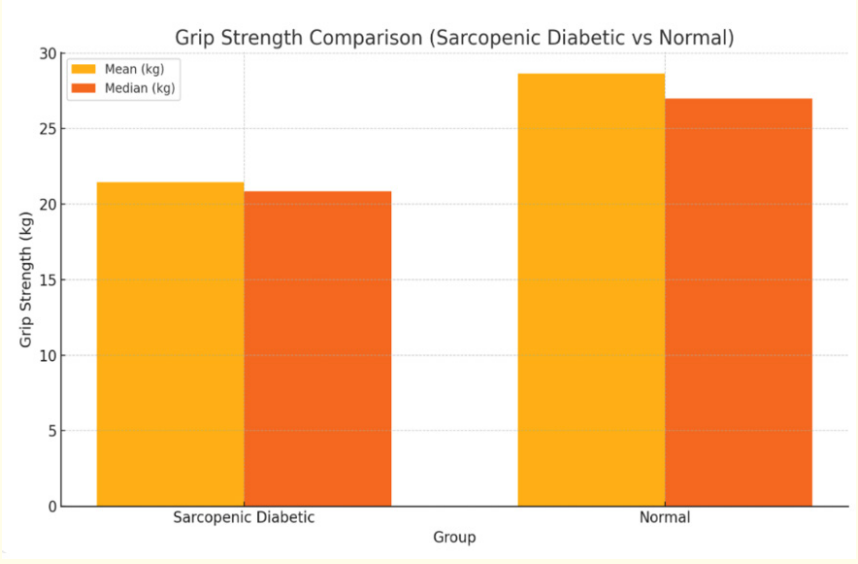

Figure j

Group	Mean (kg)	Median (kg)	SD (±)	Mann-Whitney U test
Sarcopenic Diabetic (n = 22)	1.74	1.565	0.81	p-value : 0.072
Normal (n = 3)	1.16	1.190	0.19	

Table 11: Comparison of Gait Speed (ANALYSIS GAIT SPEED).

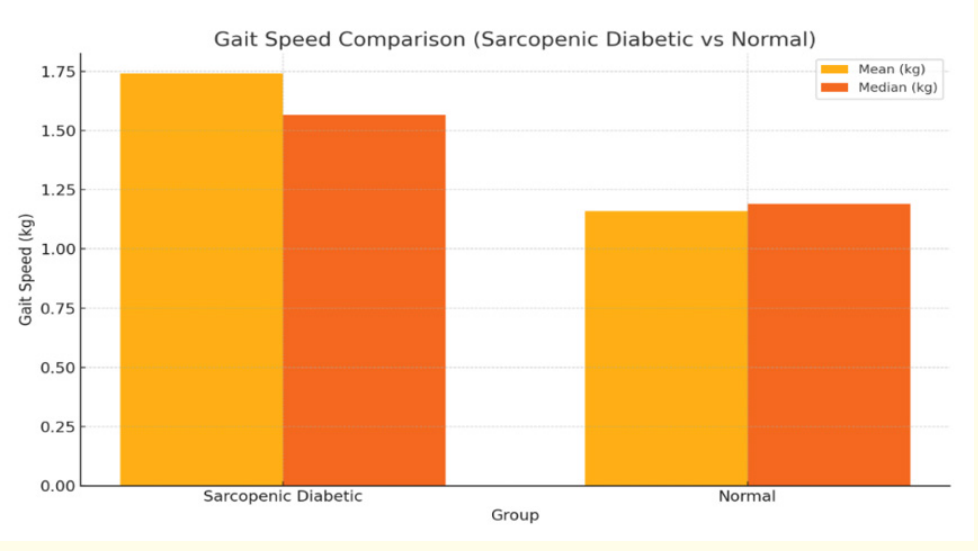

Figure k

Comparison	Spearman r	p-value
Left Arm Lean vs Grip Strength	0.437	0.029
Right Arm Lean vs Grip Strength	0.202	0.333

Table 12: Correlation: Arm Lean (L/R) vs. Grip Strength.

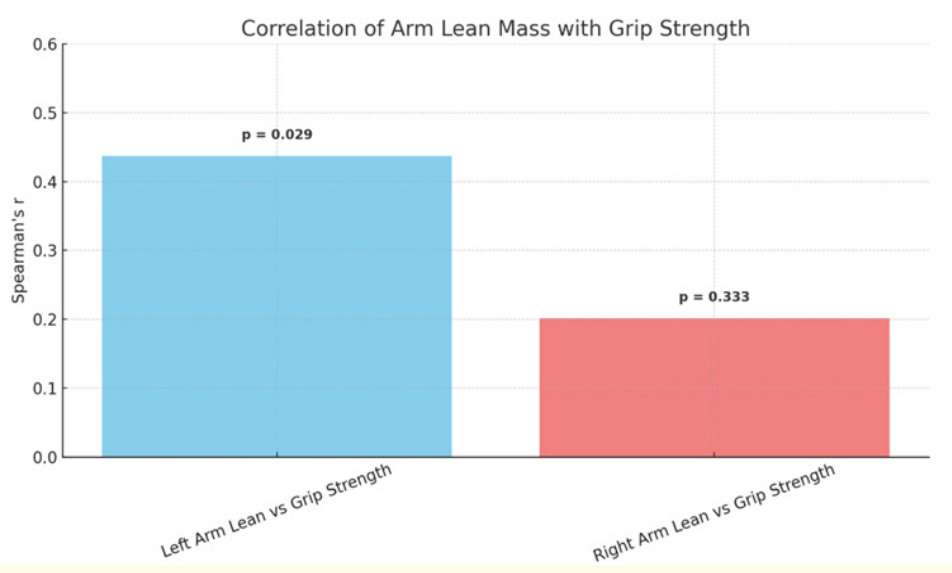

Figure l

However, the correlation between Right Arm Lean Mass and Grip Strength was not statistically significant (r = 0.202, p = 0.333), indicating weaker or inconsistent association on the right side.

This asymmetry may reflect variability in dominance, muscle recruitment patterns, or measurement sensitivity, and warrants further exploration in larger subgroups or dominance-specific analyses.

Comparison	Spearman r	p-value
Left Leg Lean vs Gait Speed	–0.196	0.348
Right Leg Lean vs Gait Speed	–0.313	0.127

Table 13: Correlation: Leg Lean (L/R) vs. Gait Speed.

There was no statistically significant correlation between Leg Lean Mass (left or right) and Gait Speed:

The correlation for Left Leg Lean was weak and inverse (r = -0.196, p = 0.348).

The correlation for Right Leg Lean was moderate but still non-significant (r = -0.313, p = 0.127).

These findings suggest that lower limb muscle bulk alone may not predict gait performance in this sample, possibly due to compensatory mechanisms, variability in neuromotor control, or functional adaptations beyond lean mass.

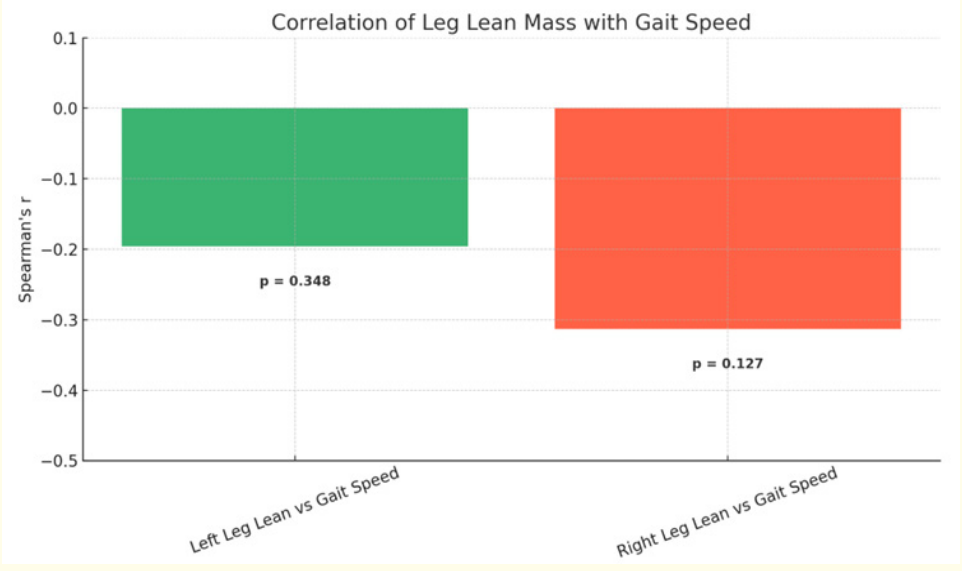

Figure m

Comparison	Spearman r	p-value
Left Trunk Lean vs Gait Speed	–0.447	0.025
Right Trunk Lean vs Gait Speed	–0.394	0.051

Table 14: Correlation: Trunk Lean (L/R) vs. Gait Speed.

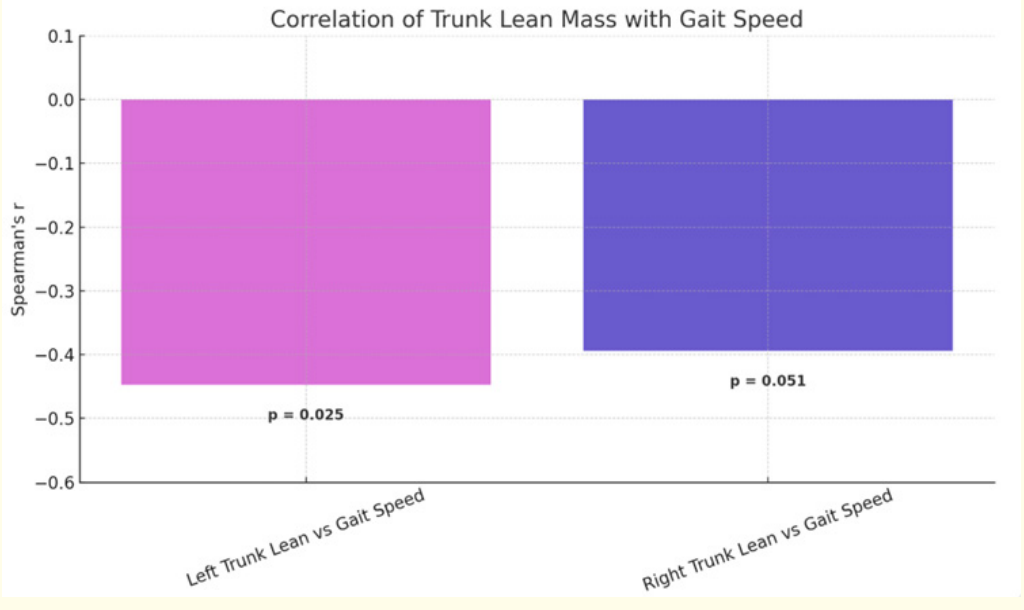

Figure n

A moderate and statistically significant negative correlation was found between Left Trunk Lean Mass and Gait Speed (r = -0.447, p = 0.025). This suggests that individuals with greater left trunk muscle mass tended to have slower gait speeds in this sample.

For the Right Trunk Lean, a similar negative trend was observed (r = -0.394), and missed statistical significance(p = 0.051).

These inverse correlations may reflect

Increased trunk lean mass in less mobile individuals, Compensatory overdevelopment due to postural imbalance, or statistical artifacts due to small sample size and inter-subject variability.

In this multivariate correlation analysis, grip strength showed the strongest positive association with left trunk lean mass (r =

Spearman Correlation Coefficients		
Lean Region	**Grip Strength ®**	**Gait Speed ®**
Left Arm Lean	+0.437	–0.310
Right Arm Lean	+0.202	–0.115
Left Leg Lean	+0.457	–0.196
Right Leg Lean	+0.408	–0.313
Left Trunk Lean	+0.558	–0.447
Right Trunk Lean	+0.375	–0.394

Table 15: Multivariate Correlation: All Lean Areas vs. Functional Outcomes.

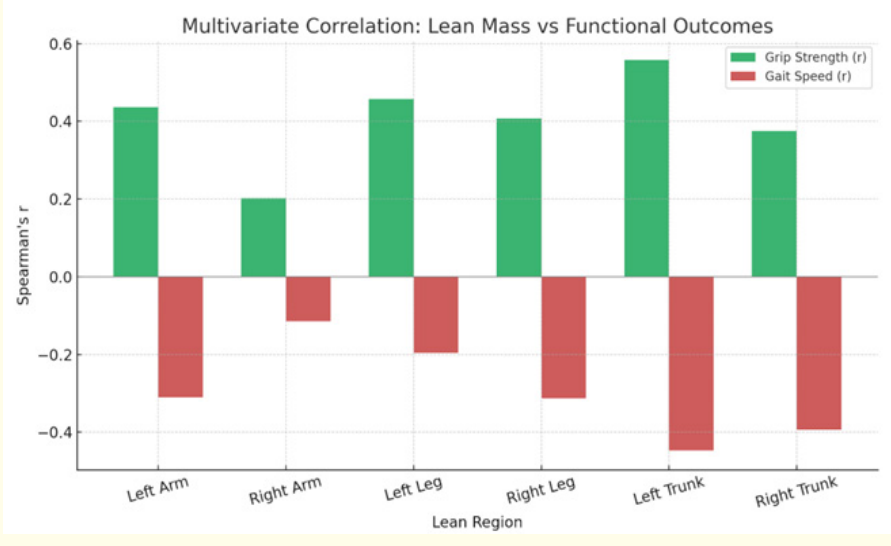

Figure o

0.558), followed by left leg (r = 0.457), left arm (r = 0.437), and right leg lean (r = 0.408), indicating that increased muscle mass in these regions contributes to stronger grip performance. Interestingly, the correlations were consistently stronger on the left side, which may reflect individual dominance patterns or compensatory muscle use in weaker limbs.

Conversely, gait speed exhibited a moderate negative correlation with trunk and leg lean mass, especially with left trunk (r = -0.447) and right leg (r = -0.313), suggesting that individuals with higher mass in these areas tended to have slower walking speeds. This inverse relationship may represent a biomechanical imbalance or a redistribution of mass in those with declining mobility. These findings highlight that while greater lean mass generally supports strength, its association with mobility is more nuanced and possibly affected by posture, balance, and functional adaptation.

Additional Comparisons

Left Total Lean Mass (L-TOTAL LEAN)					
Group	**N**	**Mean (kg)**	**Median (kg)**	**SD (±)**	**p-value**
Sarcopenic Diabetic	22	25026.09	23484.0	7386.58	0.255
Normal	22	25235.55	25095.0	4644.73	
Right Total Lean Mass (R-TOTAL LEAN)					
Sarcopenic Diabetic	22	23760.45	22881.5	3853.40	0.156
Normal	22	25580.73	25433.0	4345.71	
Total Body Lean Mass (TOTAL LEAN)					
Sarcopenic Diabetic	22	47423.05	46373.5	7263.04	0.124
Normal	22	50907.27	50642.0	8996.48	

Table 16: Comparison of Total Lean Mass (L-TOTAL LEAN, R-TOTAL LEAN, TOTAL LEAN).

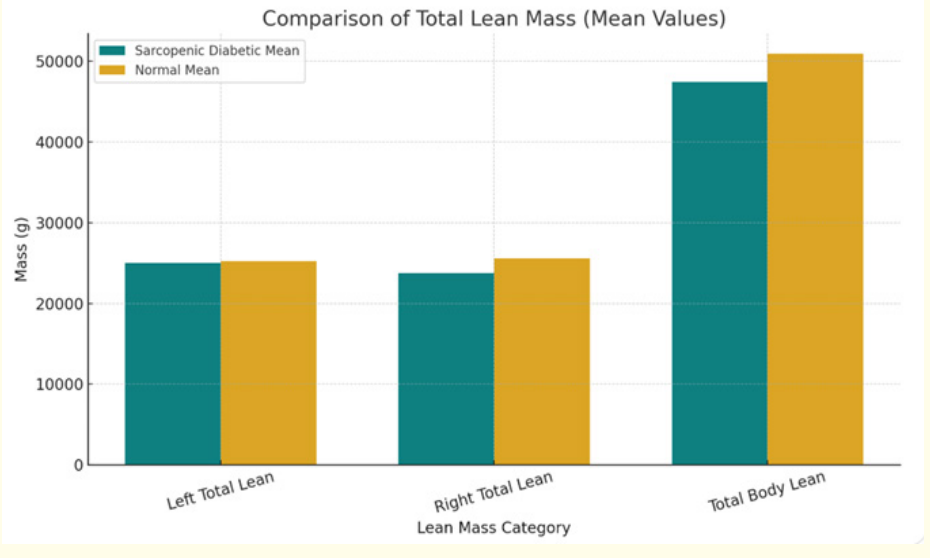

Figure p

Across all three measurements-left, right, and total body lean mass-the Normal group consistently exhibited higher mean and median values compared to the Sarcopenic Diabetic group. However, none of these differences reached statistical significance (all p-values > 0.05). This suggests that while there is a trend toward reduced overall muscle mass in Sarcopenic Diabetics, the difference is not strong enough to be considered statistically definitive in this sample. The large variability within groups, particularly in total lean mass, may also obscure more subtle distinctions.

Group	Region	Mean Lean Mass (g)	Wilcoxon test
Sarcopenic Diabetic Group (N = 22)	Android Region	2982.32	p-value: < 0.000001
	Gynoid Region	6172.18	
Normal Group (N = 22)	Android Region	3015.86	p-value: < 0.000001
	Gynoid Region	6737.50	

Table 17: Comparison of Android vs. Gynoid Lean Distribution (ANDROID LEAN vs. GYNOID LEAN).

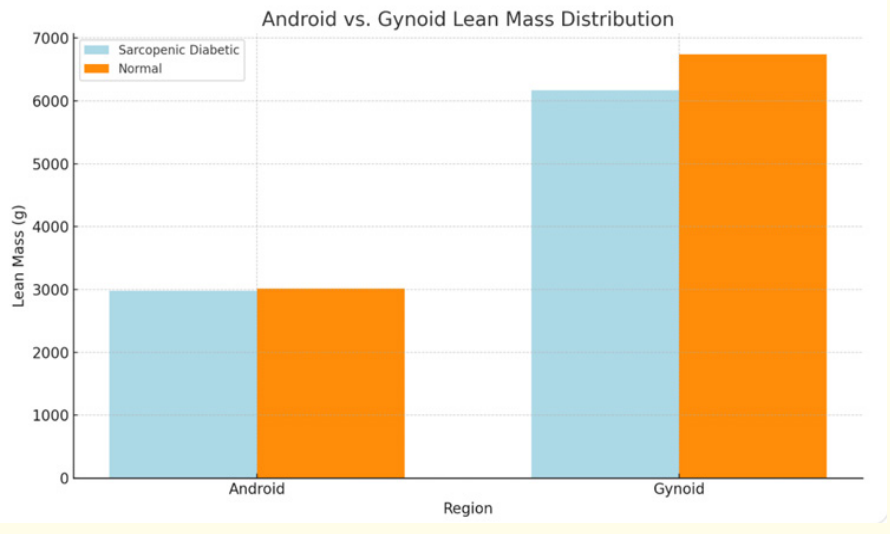

Figure q

In both the Sarcopenic Diabetic and Normal groups, the Gynoid region (hip and thigh area) exhibited significantly higher lean mass compared to the Android region (abdominal area). This difference was highly significant in both groups ($p < 0.000001$), reflecting a common physiological pattern where muscle mass is more concentrated in the lower body.

Despite the Sarcopenic Diabetic group having overall lower lean mass, the android-to-gynoid distribution trend was preserved, suggesting that diabetes may not significantly alter this regional lean mass pattern. However, the absolute gynoid lean mass was lower in Sarcopenic Diabetics than in ormal, reinforcing the broader trend of lean tissue loss in diabetes.

Spearman Correlation Analysis		
Comparison	**Spearman r**	**p-value**
ASM vs Grip Strength	+0.492	0.013
ASM vs Gait Speed	–0.256	0.217

Table 18: Correlation of ASM with Grip Strength and Gait Speed.

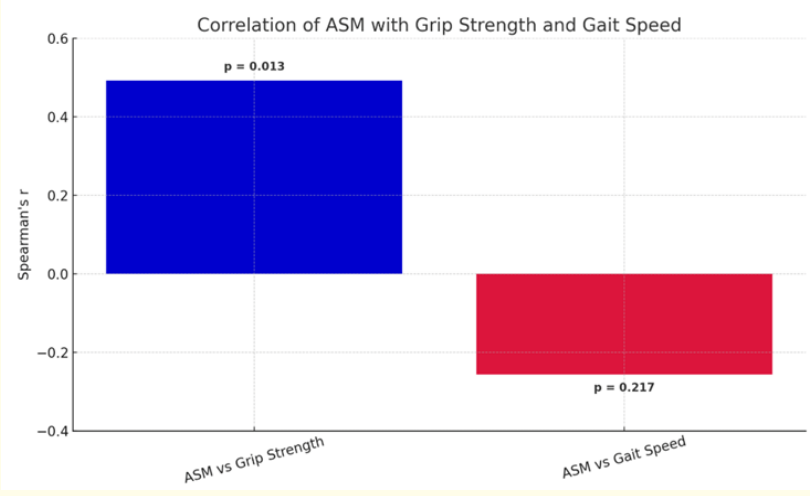

Figure r

There was a moderate and statistically significant positive correlation between ASM (Appendicular Skeletal Muscle mass) and Grip Strength (r = +0.492, p = 0.013), suggesting that individuals with higher ASM values tend to have better upper limb strength.

In contrast, ASM showed a weak and non-significant inverse correlation with Gait Speed (r = -0.256, p = 0.217). This indicates that while ASM contributes to upper limb strength, its relationship with lower limb functional performance such as walking speed may be more complex and influenced by additional neuromuscular or balance-related factors.

To address the primary objective - "to see which area is more sarcopenic in Sarcopenic Diabetics than in Normal people" - we synthesized the results from Tables 1 to 6 which compared lean muscle mass in specific regions between the two groups.

Among all regions analyzed

The Right Leg demonstrated the greatest and statistically significant lean mass reduction in Sarcopenic Diabetics compared to normal individuals (p = 0.012).

Region	Sarcopenic Diabetic Mean (g)	Normal Mean (g)	Mean Difference	p-value	Significant?
Left Arm	3000.09	3038.50	–38.41	0.336	No
Right Arm	3230.73	2911.55	+319.18	0.916	No
Left Leg	7960.95	8863.91	–902.96	0.131	No
Right Leg	7777.36	9393.59	–1616.23	0.012	Yes
Left Trunk	10794.36	11163.77	–369.41	0.460	No
Right Trunk	10391.45	11111.18	–719.73	0.163	No

Table 19

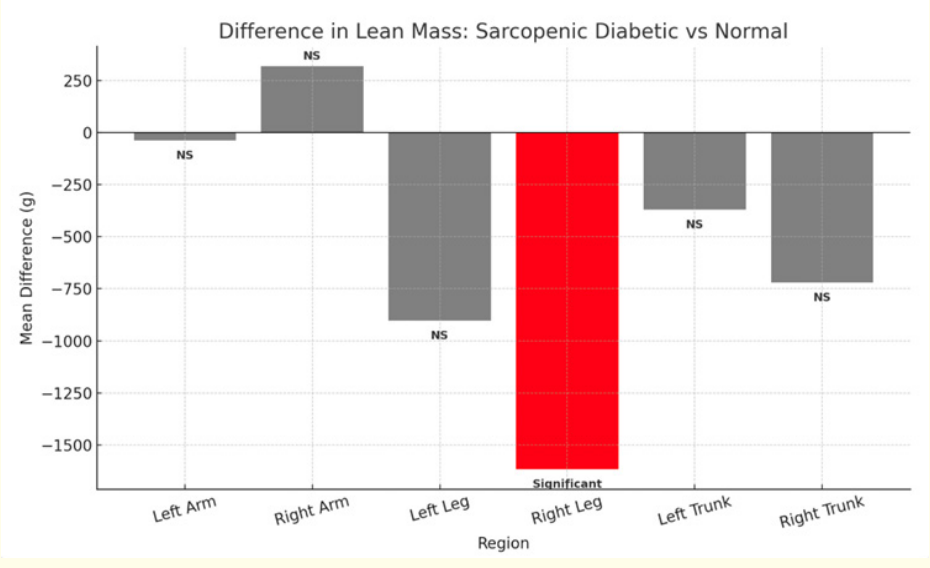

Figure s

The Left Leg also showed a substantial numerical deficit, though not statistically significant.

Other regions (arms, trunk) did not show significant differences.

Therefore, Right Lower Limb (Right Leg) appears to be the most sarcopenic region in Sarcopenic Diabetics in this study.

This aligns with established knowledge that lower limb muscle loss occurs earlier and more severely in conditions involving insulin resistance, inactivity, and age-related mobility decline - all common in Sarcopenic Diabetic populations.

Discussion

When including all ages, the difference in Left Arm Lean Mass between Sarcopenic Diabetic and Normal groups is not statistically significant (p = 0.336). Both groups show comparable means, but Sarcopenic Diabetics exhibit greater variability.

There is no statistically significant difference in Right Arm Lean Mass between Sarcopenic Diabetic and Normal groups (p = 0.916). Although the Sarcopenic Diabetic group had a slightly higher mean, the distributions were similar.

The difference was not statistically significant when all ages were included, though a trend toward lower lean mass in Sarcopenic Diabetics remained.

There is a statistically significant reduction in Right Leg Lean Mass in the Sarcopenic Diabetic group compared to the Normal group ($p = 0.0116$). This finding supports the presence of lower limb sarcopenia in individuals with diabetes.

There was no statistically significant difference in Left Trunk Lean Mass between Sarcopenic Diabetic and Normal groups ($p = 0.460$). The values were closely matched, indicating the trunk may be less affected by sarcopenia compared to the limbs.

There was no statistically significant difference in Right Trunk Lean Mass between Sarcopenic Diabetic and Normal groups ($p = 0.163$), although the Normal group showed a slightly higher mean.

In the Sarcopenic Diabetic Group ($N = 22$), the right arm lean mass (3230.73 g) was significantly higher than the left arm(3000.09 g), with a Wilcoxon p-value of 0.028. This suggests a statistically significant asymmetry in arm muscle mass among Sarcopenic Diabetic individuals, potentially indicating early muscle imbalance or lateralization that could be associated with Sarcopenic Diabetic neuropathy or differential physical activity.

In contrast, in the Normal Group ($N = 22$), the left arm (3038.50 g) and right arm (2911.55 g) lean mass did not differ significantly ($p = 0.702$), indicating symmetry in muscle distribution between limbs, as expected in healthy individuals.

In the Sarcopenic Diabetic Group ($n = 22$), the mean lean mass of the left leg was slightly higher (7960.95 g) than that of the right leg (7777.36 g), but this difference was not statistically significant (Wilcoxon $p = 0.176$). This indicates a relatively symmetrical distribution of leg muscle mass in Sarcopenic Diabetic individuals, with no consistent lateral dominance.

However, in the Normal Group ($n = 22$), the right leg lean mass (9393.59 g) was significantly higher than the left leg (8863.91 g), and this difference was statistically significant ($p < 0.001$). This suggests a physiological right-side dominance in lower limb muscle mass among healthy individuals, which may reflect habitual motor use patterns in right-limb dominant populations.

In the Sarcopenic Diabetic Group ($n = 22$), the left trunk lean mass (10794.36 g) was slightly higher than the right (10391.45 g), and this difference was statistically significant (Wilcoxon $p = 0.036$). This finding may indicate asymmetrical trunk muscle loss, potentially due to altered postural or compensatory loading patterns in Sarcopenic Diabetic individuals.

In contrast, the Normal Group ($n = 22$) showed nearly identical trunk lean mass on both sides (11163.77 g vs. 11111.18 g), with no significant difference ($p = 0.388$), supporting the expected symmetry in healthy individuals.

In the Sarcopenic Diabetic Group ($n = 22$), the mean grip strength was 21.45 kg, which was lower than that of the Normal Group ($n = 3$) with a mean of 28.63 kg. However, the difference was not statistically significant ($p = 0.143$), likely due to the very small sample size in the Normal group.

Although a trend toward weaker grip strength in Sarcopenic Diabetics was observed - consistent with muscle loss patterns - this result should be interpreted cautiously due to limited data in the control group. Increasing the number of healthy participants would help clarify this trend.

In the Sarcopenic Diabetic Group ($n = 22$), the mean gait speed was 1.74 m/s, which was higher than that of the Normal Group ($n = 3$) at 1.16 m/s. This difference approached statistical significance ($p = 0.072$), but did not cross the conventional threshold ($p < 0.05$).

A significant positive correlation was observed between Left Arm Lean Mass and Grip Strength ($r = 0.437$, $p = 0.029$), suggesting that higher lean mass in the left arm is moderately associated with stronger grip strength across participants.

However, the correlation between Right Arm Lean Mass and Grip Strength was not statistically significant (r = 0.202, p = 0.333), indicating weaker or inconsistent association on the right side.

This asymmetry may reflect variability in dominance, muscle recruitment patterns, or measurement sensitivity, and warrants further exploration in larger subgroups or dominance-specific analyses.

There was no statistically significant correlation between Leg Lean Mass (left or right) and Gait Speed

The correlation for Left Leg Lean was weak and inverse (r = -0.196, p = 0.348).

The correlation for Right Leg Lean was moderate but still non-significant (r = -0.313, p = 0.127).

These findings suggest that lower limb muscle bulk alone may not predict gait performance in this sample, possibly due to compensatory mechanisms, variability in neuromotor control, or functional adaptations beyond lean mass.

A moderate and statistically significant negative correlation was found between Left Trunk Lean Mass and Gait Speed (r = -0.447, p = 0.025). This suggests that individuals with greater left trunk muscle mass tended to have slower gait speeds in this sample.

For the Right Trunk Lean, a similar negative trend was observed (r = -0.394), and missed statistical significance (p = 0.051).

These inverse correlations may reflect

- Increased trunk lean mass in less mobile individuals,
- Compensatory overdevelopment due to postural imbalance,
- Or statistical artifacts due to small sample size and inter-subject variability.

In this multivariate correlation analysis, grip strength showed the strongest positive association with left trunk lean mass (r = 0.558), followed by left leg (r = 0.457), left arm (r = 0.437), and right leg lean (r = 0.408), indicating that increased muscle mass in these regions contributes to stronger grip performance. Interestingly, the correlations were consistently stronger on the left side, which may reflect individual dominance patterns or compensatory muscle use in weaker limbs.

Conversely, gait speed exhibited a moderate negative correlation with trunk and leg lean mass, especially with left trunk (r = -0.447) and right leg (r = -0.313), suggesting that individuals with higher mass in these areas tended to have slower walking speeds. This inverse relationship may represent a biomechanical imbalance or a redistribution of mass in those with declining mobility. These findings highlight that while greater lean mass generally supports strength, its association with mobility is more nuanced and possibly affected by posture, balance, and functional adaptation.

Across all three measurements-left, right, and total body lean mass-the Normal group consistently exhibited higher mean and median values compared to the Sarcopenic Diabetic group. However, none of these differences reached statistical significance (all p-values > 0.05). This suggests that while there is a trend toward reduced overall muscle mass in Sarcopenic Diabetics, the difference is not strong enough to be considered statistically definitive in this sample. The large variability within groups, particularly in total lean mass, may also obscure more subtle distinctions.

In both the Sarcopenic Diabetic and Normal groups, the Gynoid region (hip and thigh area) exhibited significantly higher lean mass compared to the Android region (abdominal area). This difference was highly significant in both groups ($p < 0.000001$), reflecting a common physiological pattern where muscle mass is more concentrated in the lower body.

Despite the Sarcopenic Diabetic group having overall lower lean mass, the android-to-gynoid distribution trend was preserved, suggesting that diabetes may not significantly alter this regional lean mass pattern. However, the absolute gynoid lean mass was lower in Sarcopenic Diabetics than in ormal, reinforcing the broader trend of lean tissue loss in diabetes.

There was a moderate and statistically significant positive correlation between ASM (Appendicular Skeletal Muscle mass) and Grip Strength ($r = +0.492$, $p = 0.013$), suggesting that individuals with higher ASM values tend to have better upper limb strength.

In contrast, ASM showed a weak and non-significant inverse correlation with Gait Speed ($r = -0.256$, $p = 0.217$). This indicates that while ASM contributes to upper limb strength, its relationship with lower limb functional performance such as walking speed may be more complex and influenced by additional neuromuscular or balance-related factors.

Among all regions analysed

- The Right Leg demonstrated the greatest and statistically significant lean mass reduction in Sarcopenic Diabetics compared to normal individuals ($p = 0.012$).
- The Left Leg also showed a substantial numerical deficit, though not statistically significant.
- Other regions (arms, trunk) did not show significant differences.

Therefore, Right Lower Limb (Right Leg) appears to be the most sarcopenic region in Sarcopenic Diabetics in this study.

This aligns with established knowledge that lower limb muscle loss occurs earlier and more severely in conditions involving insulin resistance, inactivity, and age-related mobility decline - all common in Sarcopenic Diabetic populations.

Overall

The left cerebral lateralisation (dominance) clearly signifies the right appendicular strongness (as compared to left half of body). But in T2DM cases we found right lower limb as the most sarcopenic region as compared to normal subjects. So, the T2DM effects the left dominance cerebral control way before the T2DM affects the frank sarcopenia. This study gives a way to predict T2DM if we go for screening in a large population even if T2DM is in budding stage by just walk test and confirm by DEXA and getting disturbed right lower limb sarcopenia.

Conclusion

In T2DM Loss of right appendicular lateralisation as indicated by DEXA and walk test can predict left cerebral dysfunction in near future but fMRI may give a better prospective and objectivity with excellent corelation between these tests.

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