Original Article

Burden of Musculoskeletal Disorders among Diabetics and Their Functional Capacity in Southwest, Nigeria

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Abstract

Introduction: The complications associated with diabetes manifest in a systemic fashion including the musculoskeletal (MSS) system where it leads to a reduction in the quality of life and impacts the mental health of the patient. A study to determine the extent of the musculoskeletal and emotional burden it imposes on the patient may help ascertain the extent of support needed in their care. We thus set out to determine the rate and the clinical factors that are predictive of MSS and emotional disorders in them. **Materials and Methods:** Self-administered questionnaires which consist of the short MSS functional assessment were given out to diabetic patients at the Endocrinology Clinic of the hospital. **Results:** The rate of presence of MSS disorder in our series was 66.4%, while the presence of increasing age, presence of MSS disorders, previous bones, and joints surgeries were significantly associated with poor physical, functional, mobility, emotional, and bother index. **Conclusion:** This study has further shown the huge burden diabetes places on the musculoskeletal system and by extension the mind of the patients. Routine assessment as a form of surveillance for the presence of musculoskeletal and emotional disorders should be incorporated into the clinical management protocol for diabetes.

Keywords: Diabetes, emotional, musculoskeletal

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease associated with high morbidity and mortality and has become a public health problem.[1] The world prevalence of DM was in the region of 30 million cases as of 1985, increasing to 177 million in 2000.[2] The current global prevalence is 463 million, and this is estimated to rise to 578 million by 2030.[3] Type 2 DM which accounts for most of the cases of DM (around 95%) is characterized by insulin resistance, excessive hepatic production of glucose, and abnormal metabolism of fat, leading to a relative deficiency of insulin.[2,4] The rise in the prevalence of type 2 DM is attributable to the increase in obesity coupled with a reduction in physical activities as nations become more industrialized.[2] Diabetes may be complicated by micro- and macrovascular complications.

Musculoskeletal (MSS) complications are also found, apart from the known vascular ones, although less valued than the vascular ones, they significantly compromise the patients' quality of life.[2,5] Various pathologies such as trigger finger, shoulder capsulitis among others have been described in diabetic patients.[4,6] These pathologies result in functional impairment of the patients and at the same time, negatively affect the mental health of these patients. This study aimed to look at the occurrence and effects of MSS disorders among patients with DM.

Materials and Methods

This was a hospital-based, cross-sectional study conducted at the Diabetes outpatient Clinic of a tertiary health facility, southwest of Nigeria. Ethical clearance was obtained from the Research and Ethics Committee of the hospital. The study

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was done in compliance with ethical standard laid down in 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. One hundred and thirteen consenting patients with types 1 and 2 DM receiving treatment at the diabetes clinic were sequentially recruited into this study. Patients with neurological disorders were excluded. All participants were required to fill the administered questionnaire which contained short MSS functional assessment (SMFA) developed by Swiontkowski *et al*.[7] This is one of the recommended outcome measures by the American academy of orthopedic surgeons to assess and compare all types of MSS diseases. It is a two-part, 46-item questionnaire, with 34 questions grouped into four categories that evaluate a patient's dysfunction related to daily activities, emotional status, upper extremity function, and mobility, contributing to an overall dysfunction Index. The remaining 12 items assess how much patients are bothered by problems across four categories such as recreation/leisure, sleep/rest, work, and family, all of which contribute to an overall bother index. It uses a 5-point Likert's system which is transformed into a score from 0 to 100, with higher scores indicative of poorer function. Weight and height were measured and the body mass index (BMI) was calculated. Participants were categorized based on the BMI of <18.5 kg/m^2, 18.5–24.9 kg/m^2, ≥30 kg/m^2 as underweight, normal, overweight and obese, respectively. Study data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 22 (IBM SPSS Incorporated, Chicago, Illinois, USA). The level of significance was set at $P < 0.05$.

Results

There was female preponderance with 66 females (58.4%) and 47 males (41.6%) with the age ranges of between 32 and 86 years. The mean age was 61.46 ± 11.25 years with the majority of the respondents (94%) older than 45 years of age. The commonly affected age group from our study was 55–64 years. A large proportion of the respondents was retirees (33.6%) and many others engaged in trading. Table 1 is the sociodemographic characteristics of the study participants. The BMI ranged between 18.9 and 45.7 kg/m^2, with a mean of 27.58 ± 5.15 kg/m^2. The duration of diagnosis of DM ranged between a month and 456 months, with a mean of 106.13 ± 85.40 months. Majority of the respondents 72 (64.9%) had been diagnosed as diabetics for over 1 year before the conduct of the study. Twenty-four patients (26.4%) presented only with polyuria while 21 (23.1%) patients had different combinations of the symptoms such as polyuria, polydipsia, polyphagia, and weight loss. Most of the patients (40, 44.0%) were diagnosed either incidentally or with symptoms outside the cardinal ones.

The two most common MSS symptoms in this study were neck and low back pain in 39.8% and knee osteoarthritis in 17.3%. Seventy-five patients (66.4%) reported the presence of one form or the other of MSS disorder. Eleven patients (9.7%) have had previous orthopedic surgery while 42 patients (37.2%) were aware of orthopedic complications of diabetes. There is a mild positive correlation, though insignificant relationship, between the number of MSS disorders and the age of the patient (rho = 0.182, $P = 0.054$). Majority (71.9%) of the respondents were either overweight (36.8%) or obese (35.1%).

About a quarter of them had experienced a major accident, with less than half of those who had experienced a major accident sustained a fracture from it. A fewer number of the respondents had also undergone a bone and joint surgery before the conduct of this study. Very few respondents (11.4%) were aware of the existence of MSS disorders. A higher proportion of the respondents (66.4%) had at least one MSS disorder, while 78.7% of the respondents had either 1 or 2 MSS disorders. The median duration of time respondents had experienced a neck or joint pain was about 36 weeks and at most less than a year [Table 2].

The most common MSS disorders experienced by the respondents were pain in the lower limb. However, this was not specific as many of them also were diagnosed with osteoarthritis and ischemic pain. Neck and back pain were the most common single entity followed by osteoarthritis of the lower limbs. Other MSS disorders recorded were Dupuytren contracture and the Carpal Tunnel Syndrome Figure 1.

The SMFA is made up of smaller components such as daily activities, emotion, and others. The mean indices for the major categories and subscales are as shown in Table 3.

Overall, the mean and median scores of the MSS indices assessed which have a skewed distribution are as presented in Table 3. The respondents had the highest scores in the mobility index, followed by the daily activities index. This shows that they had more difficulties with these functions compared to their arm and hand index with the least score. The composite score of the mobility, arm and hand, daily activities, and emotional status indices is the function index. Although the respondents experienced a higher score (meaning more difficulties) with their function index, they had a lower score (less difficulty) with their bothersome index.

Table 1: Sociodemographic characteristics of the respondents

Variable	Frequency (%)
Age (years)	
<45	6 (5.4)
45-64	59 (53.6)
≥65	45 (41.0)
Sex	
Male	47 (41.6)
Female	66 (58.4)
Occupation	
Retiree	38 (35.5)
Civil servant	16 (15.0)
Artisan	3 (2.7)
Farmer	3 (2.7)
Trader	31 (27.4)
Others	22 (14.2)

The respondents' sociodemographic characteristics and their medical history were compared with their MSS function and presented in Tables 4–9. In Table 4, the female respondents had higher mean and median scores (more difficulties) in their mobility index compared to the males. Furthermore, mobility index means and median scores increased progressively with increase in the age categories, and this was statistically significant, $P = 0.020$. Respondents with a history of major accident or fracture from the accidents had higher scores in their mobility index; it was not statistically significantly different from those who had not. However, respondents who had previous bone and joint surgery had much more higher scores, (difficulties) with mobility ($P = 0.002$). Duration of diagnosis of diabetes awareness of the existence of MSS disorders was not significantly associated with their mobility index scores. Respondents with MSS disorders had much higher mean and median mobility index scores than those who do not and this was statistically significant, $P < 0.001$.

None of the respondents' sex, age, their medical history, BMI, duration of diabetes, or awareness of the existence of diabetic MSS disorders or not was significantly associated with having a higher or lower mean or median scores in the arm and hand index of the short MSS function assessment. However, having MSS disorder was significantly associated with having higher arm and hand index scores, $P = 0.011$ [Table 5].

There were increasing mean and median scores in the daily activity index with increase in the respondent's age categories ($P = 0.005$), as well as with having had a previous bone and joint surgery ($P = 0.001$), and having MSS disorders ($P < 0.001$), and these were all statistically significant [Table 6].

Females have a higher but not significant mean and median emotional index scores compared with male counterpart. There was a statistically significant higher mean and median emotional index scores with increase in the respondents' age categories ($P = 0.025$) and with having at least one MSS disorder ($P < 0.001$) Table 7.

There was a significantly higher mean and median scores in the composite function index with increase in the respondents' age categories ($P = 0.009$), having had a previous bone and joint surgery ($P = 0.007$), and having MSS disorders ($P < 0.001$) Table 8.

The bothersome index means and median scores were higher for the female respondents, those with previous bone and joint surgery, those diagnosed <1 year before the conduct of the study and the obese patients. All these were not statistically significant. However, the bothersome index means and median scores were statistically significantly higher with increasing age categories ($P = 0.029$) and for respondents with MSS disorders ($P < 0.001$) Table 9.

There was a statistically significant high positive correlation (rho = 0.782, $P < 0.001$) between the function and bothersome index. (i.e., as the function index increases in score and thus difficulties, the bothersome index also increases). There was a statistically significant moderate positive correlation between the number of MSS disorders a respondent has and their function index (rho = 0.517, $P < 0.001$), as well as with their bothersome index (rho = 0.473, $P < 0.001$).

Table 2: Description of respondents' medical history (n=113)

Variables	Frequency (%)
Duration of diagnosis as a diabetic (year)	
≤1 year	39 (35.1)
>1 year	72 (64.9)
Ever had a major accident	
Yes	28 (25.0)
No	84 (75.0)
Had fracture from major accident (n=28)	
Yes	13 (46.4)
No	15 (53.6)
Ever had previous bone and joint surgery	
Yes	11 (10.2)
No	97 (89.8)
Awareness of MSS disorders	
Yes	12 (11.4)
No	93 (88.6)
Has MSS disorders	
Yes	75 (66.4)
No	38 (33.6)
Number of MSS disorders	
One	32 (42.7)
Two	27 (36.0)
Three	9 (12.0)
Four	7 (9.3)
Median number of MSS disorders	2±1 IQR
Median duration of neck pain (weeks)	36±48 IQR
Median duration of joint pains (weeks)	36±50 IQR

MSS: Musculoskeletal, IQR: Interquartile range

Table 3: Mean short musculoskeletal functional assessment indices

Measure	Daily activities index	Emotion index	Arm/hand index	Mobility index	Function index	Bother index
n	111	111	112	112	111	96
Mean±SD	15.9±21.9	15.3±15.7	6.4±13.8	18.8±19.8	14.3±16.6	9.3±14.9
Median	5.0	10.7	0.0	13.9	3.7	4.2
IQR	22.5	17.8	6.3	22.2	16.2	12.5

SD: Standard deviation, IQR: Interquartile range

Table 4: Association between respondents' characteristics and their mobility index

Independent variable	*n*	Mean±SD	Median±IQR	Mean rank	Statistical significance and *P*
Gender of respondents					
Male	47	17.5±20.0	11.1±25.0	53.8	*U*-test=1400.5*, *P*=0.451
Female	65	19.7±19.8	13.9±25.0	58.5	
Respondents' age (years)					
<45	6	6.9±9.9	2.7±14.6	34.4	*H*=7.852**, df=2, *P*=0.020
45-64	59	14.6±15.1	11.1±19.4	51.1	
≥65	46	24.4±22.7	16.7±39.5	65.1	
Ever had major accident					
Yes	28	19.3±13.9	16.7±16.0	63.7	*U*-test=947.0, *P*=0.142
No	83	18.0±21.6	11.1±25.0	53.4	
Fracture from major accident					
Yes	13	20.7±14.9	16.7±20.8	15.12	*U*-test=89.5, *P*=0.717
No	15	18.1±13.4	16.7±19.4	13.97	
Previous bone and joint surgery					
Yes	11	33.6±16.2	36.1±27.8	81.00	*U*-test=231.0, *P*=0.002
No	96	16.7±19.1	11.1±19.4	50.91	
BMI					
Normal weight	32	21.3±20.6	16.7±19.4	62.53	*H*=1.762, df=2, *P*=0.414
Overweight	42	17.5±19.6	0.0±27.1	52.56	
Obese	38	18.1±19.8	11.1±20.1	55.78	
Duration of diagnosis as diabetic (year)					
≤1	39	13.4±15.4	8.3±19.4	47.94	*U*-test=1089.5, *P*=0.064
>1	71	21.2±21.4	13.9±25.0	59.65	
Awareness of MSS disorder					
Yes	12	19.2±19.4	15.3±26.4	56.08	*U*-test=509.0, *P*=0.659
No	92	17.5±19.1	12.5±22.2	52.03	
Has MSS disorder					
Yes	75	24.5±21.0	19.4±30.6	67.33	*U*-test=575.5, *P*<0.001
No	37	7.13±9.8	2.8±11.1	34.55	

*MannWhitney *U*-test, **Kruskal-Wallis test. BMI: Body mass index, SD: Standard deviation, IQR: Interquartile range, MSS: Musculoskeletal

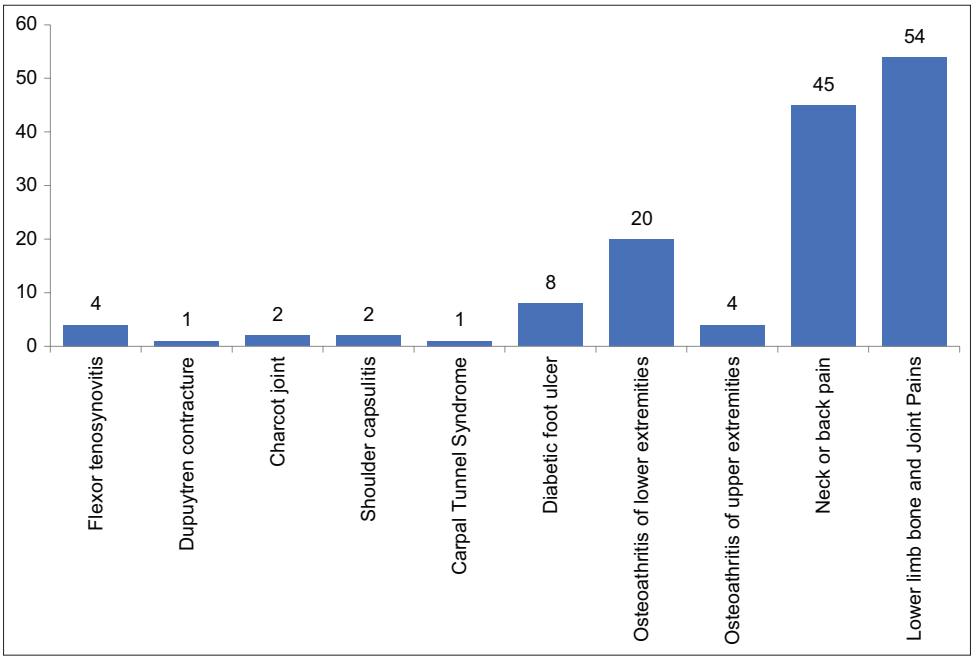

Figure 1: Distribution of musculoskeletal disorders

Table 5: Association between respondents' characteristics and their arm and hand index

Independent variable	*n*	Mean±SD	Median±IQR	Mean rank	Statistical significance and *P*
Gender of respondents					
Male	47	6.9±14.5	0.0±6.3	57.2	*U*=1497.0*, *P*=0.841
Female	65	6.1±13.4	0.0±6.3	56.0	
Respondents' age (years)					
<45	6	0.0±0.0	0.0±0.0	33.0	H=5.029**, df=2, *P*=0.081
45-64	59	3.8±7.1	0.0±6.3	54.9	
≥65	46	9.6±12.5	0.0±12.5	60.4	
Ever had major accident					
Yes	28	4.0±8.5	1.6±6.9	56.3	*U*=1152.5, *P*=0.942
No	83	7.3±15.2	0.0±6.3	55.9	
Fracture from major accident					
Yes	13	6.5±11.9	3.1±6.3	15.65	*U*-test=82.5, *P*=0.496
No	15	1.9±2.6	0.0±3.1	13.50	
Previous bone and joint surgery					
Yes	11	7.7±12.8	3.1±9.4	60.77	*U*=453.5, *P*=0.394
No	96	6.0±13.2	0.0±6.25	53.22	
BMI					
Normal	32	6.6±15.5	0.0±5.5	56.55	H=0.230, df=2, *P*=0.891
Overweight	42	5.7±10.3	0.0±6.3	57.96	
Obese	38	7.1±15.8	0.0±6.3	54.84	
Duration of diagnosis as diabetic (year)					
≤1	71	3.0±7.2	0.0±3.1	49.64	*U*-test=1156.0, *P*=0.108
>1	110	8.3±16.2	0.0±6.3	58.72	
Awareness of MSS disorder					
Yes	12	2.3±2.7	1.5±5.5	50.58	*U*-test=541.5, *P*=0.903
No	92	5.9±12.4	0.0±6.3	52.19	
Has MSS disorder					
Yes	75	8.2±15.7	3.1±9.4	61.43	*U*=1018.0, *P*=0.011
No	37	3.0±7.9	0.0±1.6	46.51	

*Mann-Whitney *U*-test, **Kruskal-Wallis test. BMI: Body mass index, SD: Standard deviation, IQR: Interquartile range, MSS: Musculoskeletal

Discussion

This study assessed the prevalence of MSS disorders among patients with diabetes and how this has impacted on their ability to move around, move their upper extremities for their daily needs, conduct their daily activities, and the general functioning of their MSS system. Furthermore, it assessed how much the inability to do any of these have impacted on their emotional status and could have bothered them. Other health statuses of the respondents were compared and also related to this general functioning of their MSS system.

The proportion of patients with DM who had MSS disorders in this study was high (66.4%). This calls for a high index of suspicion for MSS disorders by the physicians managing patients with DM. A study in India corroborated a higher frequency of occurrence of such disorders in diabetics (42.58%) compared with nondiabetics (31.61%).[8] The mean age of patients in our series is higher than what was found in the study, and the age range of our patients falls within the age range of general population found to be consistent with the occurrence of MSS disorders such as osteoarthritis. These may be the reasons why we found a higher rate in our series. This leads to a triple burden of disease for these patients as they experience the challenge of aging alongside the challenges of the DM itself worsened by the presence of a MSS disorder among many of them. All these could have worsened their emotional status and bother with the consequent health effects on their cardiovascular system and mental health. We also found female preponderance in our study (58%) and this may not be unconnected with the fact that life expectancy is generally higher in females compared with males in this part of the world, and hence, more females are bound to present with diabetes and its complications compared with male.

Most of the disorders were recorded in the lower limb and closely followed by the neck and back pain. Low back and neck pain were the most common MSS disorder (39.8%) in our series while knee osteoarthritis (17.7%) followed closely. The outcome of studies done by other workers with varying degree of prevalence (28.4% to 31%) in osteoarthritis and low back pain (46.2%) are in agreement with our result.[9,10] Another set of workers obtained a worldwide prevalence of 9.6% for males and 18% for females with osteoarthritis.[11]

This finding seems to support the theory that diabetics may have a higher risk for the development of osteoarthritis and that it also accelerates the rate of progression of osteoarthritis.[12]

Table 6: Association between respondents' characteristics and their daily activities index

Independent variable	*n*	Mean±SD	Median±IQR	Mean rank	Statistical significance and *P*
Gender of respondents					
Male	47	16.3±19.4	7.5±22.5	59.8	*U*=1325.0*, *P*=0.279
Female	64	15.5±23.7	5.0±20.0	53.2	
Respondents' age (years)					
<45	6	4.2±9.0	0.0±7.5	31.6	*H*=10.452**, df=2, *P*=0.005
45-64	58	9.8±14.6	5.0±15.6	49.7	
≥65	46	23.8±26.4	15.0±37.5	65.9	
Ever had major accident					
Yes	28	16.3±21.7	7.5±22.5	57.7	*U*=1085.5, *P*=0.663
No	82	15.6±22.3	5.0±23.1	54.7	
Fracture from major accident					
Yes	13	15.8±20.2	7.5±23.8	15.15	*U*=89.0, *P*=0.717
No	15	16.8±23.6	5.0±25.0	13.93	
Previous bone and joint surgery					
Yes	11	28.4±18.9	30.0±32.5	80.91	*U*-test=221.0, *P*=0.001
No	95	13.9±21.6	2.5±20.0	50.33	
BMI					
Normal weight	32	16.6±21.0	7.5±21.9	60.42	*H*=1.866, df=2, *P*=0.393
Overweight	42	14.6±21.3	2.5±25.6	50.87	
Obese	37	16.7±23.9	7.5±21.25	58.00	
Duration of diagnosis as diabetic (year)					
≤1	38	11.4±16.9	3.7±17.5	51.58	*U*=1219.0, *P*=0.401
>1	71	16.8±22.6	5.0±25.0	56.83	
Awareness of MSS disorder					
Yes	12	12.3±15.3	5.0±26.9	50.58	*U*=529.0, *P*=0.859
No	91	15.2±21.1	5.0±22.5	52.19	
Has MSS disorder					
Yes	75	20.2±24.5	10.0±25.0	62.76	*U*=843.0, *P*<0.001
No	36	6.9±10.7	2.5±7.5	41.92	

*Mann-Whitney *U*-test, **Kruskal-Wallis test. BMI: Body mass index, SD: Standard deviation, IQR: Interquartile range, MSS: Musculoskeletal

Table 7: Association between respondents' characteristics and their emotional status index

Independent variable	*n*	Mean±SD	Median±IQR	Mean rank	Statistical significance and *P*
Gender of respondents					
Male	47	14.5±14.3	10.7±17.8	56.0	*U*=1503.5*, *P*=0.998
Female	64	15.8±16.7	10.7±17.8	56.0	
Respondents' age (years)					
<45	6	7.1±7.5	5.4±15.2	38.3	*H*=7.403**, df=2, *P*=0.025
45-64	58	11.8±12.4	7.1±14.3	49.9	
≥65	46	19.6±17.2	14.3±25.9	64.7	
Ever had major accident					
Yes	28	11.1±9.6	7.1±14.2	50.29	*U*=1002.0, *P*=0.313
No	82	16.7±17.1	12.5±21.4	57.28	
Fracture from major accident					
Yes	13	9.9±10.3	7.1±10.7	13.08	*U*=79.0, *P*=0.413
No	15	12.1±9.2	7.1±17.8	15.73	
Previous bone and joint surgery					
Yes	11	15.3±12.1	14.3±17.8	58.23	*U*=470.5, *P*=0.487
No	95	14.9±15.5	10.7±17.8	52.95	
BMI					
Normal weight	32	14.8±15.1	14.3±20.5	55.50	*H*=2.113, df=2, *P*=0.348
Overweight	42	13.6±15.5	7.1±17.8	51.31	
Obese	37	17.6±16.5	14.3±16.1	61.76	
Duration of diagnosis as diabetic (year)					
≤1	38	11.7±14.0	7.1±15.2	47.59	*U*=1067.5, *P*=0.071
>1	71	17.0±16.4	14.3±21.4	58.96	
Awareness of MSS disorder					
Yes	12	11.9±10.9	7.1±16.9	48.71	*U*=506.5, *P*=0.682
No	91	15.0±15.2	10.7±17.8	52.43	
Has MSS disorder					
Yes	75	19.9±16.8	17.9±17.9	66.51	*U*=561.5, *P*<0.001
No	36	5.8±6.2	3.6±9.8	34.10	

*Mann-Whitney *U*-test, **Kruskal-Wallis test. BMI: Body mass index, SD: Standard deviation, IQR: Interquartile range, MSS: Musculoskeletal

Table 8: Association between respondents' characteristics and their function index

Independent variable	*n*	Mean±SD	Median±IQR	Mean rank	Statistical significance and *P*
Gender of respondents					
Male	47	14.0±15.7	9.6±19.1	56.8	*U*=1468.0*, *P*=0.830
Female	64	14.6±17.4	7.7±12.8	55.4	
Respondents' age (years)					
<45	6	4.5±4.9	4.0±8.8	32.3	*H*=9.447**, df=2, *P*=0.009
45-64	58	10.1±10.6	6.6±10.2	50.0	
≥65	46	19.7±19.9	11.0±28.2	65.5	
Ever had major accident					
Yes	28	13.2±12.1	8.1±12.1	58.71	*U*=1058.0, *P*=0.537
No	82	14.7±18.1	8.1±17.8	54.40	
Fracture from major accident					
Yes	13	13.7±13.0	8.1±12.1	15.0	*U*=91.0, *P*=0.786
No	15	12.7±11.6	7.3±15.4	14.1	
Previous bone and joint surgery					
Yes	11	22.2±12.7	23.5±22.0	77.18	*U*=262.0, *P*=0.007
No	95	13.0±16.2	7.4±12.5	50.76	
BMI					
Normal weight	32	15.1±16.6	10.3±16.8	59.80	H=1.738, df=2, *P*=0.419
Overweight	42	13.1±15.8	7.4±19.3	50.88	
Obese	38	15.1±17.9	9.6±12.1	58.53	
Duration of diagnosis as diabetic (year)					
≤1	38	10.1±11.9	7.4±9.9	49.21	*U*=1129.0, *P*=0.161
>1	71	16.0±18.2	9.6±16.9	58.10	
Awareness of MSS disorder					
Yes	12	11.7±11.3	7.4±15.3	51.92	*U*=545.0, *P*=0.992
No	91	13.7±15.7	8.1±14.0	52.01	
Has MSS disorder					
Yes	75	18.4±18.2	11.8±19.1	66.32	*U*=576.0, *P*<0.001
No	36	5.8±7.5	2.9±7.2	34.50	

*Mann-Whitney *U*-test, **Kruskal-Wallis test. BMI: Body mass index, SD: Standard deviation, IQR: Interquartile range, MSS: Musculoskeletal

This finding reflected in the mobility index of our patients as it turned out to have the highest mean value (18.8 ± 19.8) among the components of SFMA. The presence of osteoarthritis in these patients will no doubt weigh-in on the functional activities of the patients, thereby causing limitation with its attendant increased overall health cost.

We found that increasing age of the respondent was significantly associated with mobility index, activity, functional, emotional, and bothersome indices while other parameters such as duration of diagnosis, BMI, and gender among others have no significant relationship with the patient's mobility. These findings are not unexpected as the natural strength, MSS coordination, and ability to achieve balance are expected to wane as one age, whether this is now accelerated in the presence of diabetes remains to be ascertained. Patients' daily activities are gradually restricted and this no doubt will impact on their functionality.[13] Gregg *et al*. reported similar findings and concluded that diabetics report greater mobility problems and functional impairment associated with reduced health status compared with patients without diabetes.[14] Most of the patients in this series did not report MSS disorder in the upper limb unlike what others found. A study from Greece found that the presence of osteoarthritis of the small joints of the hand is prevalent in diabetics and this is said to give credence to the belief that diabetes is responsible for causing and accelerating osteoarthritis.[8]

The presence of MSS disorders in these patients also impacted negatively on all the indices measured in this study significantly. Limitation of activities and function is expected in the presence of painful bones and joints. The presence of difficulties with activities might have led to increased emotion and bother indices and this eventually may translate into the arm and hand index which were only affected significantly by the presence of upper limb MSS disorder.

Previous bone and joint surgeries were found to negatively impact on the daily activities and functional index in this study. This might not be unconnected with residual pain and discomfort in some instances after surgery. Some other workers found no decline in activities after fractures and this was predicated on loss of sensation and reduced pain resulting from DM neuropathy.[15]

This study has further shown the huge burden diabetes places on the MSS system and by extension the mind of the patients. Routine assessment as a form of surveillance for the presence of MSS and emotional disorders should be incorporated into the clinical management protocol for diabetes.

Table 9: Association between respondents' characteristics and their bothersome index

Independent variable	*n*	Mean±SD	Median±IQR	Mean rank	Statistical significance and *P*
Gender of respondents					
Male	41	8.7±12.2	4.2±12.5	48.8	*U*=1117.0*, *P*=0. 937
Female	55	9.8±16.7	4.2±10.4	48.3	
Respondents' age (years)					
<45	6	3.5±4.9	2.1±6.3	36.3	*H*=7.053**, df=2, *P*=0.029
45-64	51	6.0±11.0	4.2±8.3	42.8	
≥65	38	13.3±17.2	6.3±16.1	56.8	
Ever had major accident					
Yes	22	7.3±7.0	6.3±7.8	51.84	*U*=718.5, *P*=0.447
No	73	10.0±16.6	4.2±12.5	46.84	
Fracture from major accident					
Yes	10	6.5±6.5	5.2±5.2	10.75	*U*=52.5, *P*=0.628
No	12	8.0±7.6	7.3±13.6	12.13	
Previous bone and joint surgery					
Yes	7	9.2±7.9	6.3±10.4	57.43	*U*=221.0, *P*=0.249
No	85	8.7±14.6	4.2±10.4	45.60	
BMI					
Normal weight	29	8.4±12.2	4.2±12.5	49.41	*H*=1.446, df=2, *P*=0.485
Overweight	36	8.5±14.7	4.2±8.3	44.44	
Obese	31	11.2±17.5	4.2±10.5	52.35	
Duration of diagnosis as diabetic (year)					
≤1	34	7.0±13.2	10.3±15.8	42.51	*U*=850.5, *P*=0.173
>1	60	3.1±10.4	4.2±12.5	50.33	
Awareness of MSS disorder					
Yes	7	8.0±10.2	4.2±12.5	47.93	*U*=266.5, *P*=0.749
No	82	8.2±13.2	4.2±10.9	44.75	
Has MSS disorder					
Yes	63	12.5±17.1	6.3±12.8	56.60	*U*=529.0, *P*<0.001
No	33	3.3±5.9	1.0±4.2	33.03	

*Mann-Whitney *U*-test, **Kruskal-Wallis test. BMI: Body mass index, SD: Standard deviation, IQR: Interquartile range, MSS: Musculoskeletal, df: Degree of freedom

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Conflicts of interest
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