



Associations of Musculoskeletal Pain with Sociodemographic, Health Related, Reproductive Related, Pain Related, Treatment Seeking Pattern and Outcome Among Postmenopausal Women From Dhaka City

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Abstract: Background: The associations (correlations) of Musculoskeletal pain (MSP) with the presenting characteristics in postmenopausal women from Dhaka City are not known; Objectives: To determine the statistical significance of the associations of MSP with the presenting characteristics in postmenopausal women from Dhaka City; Materials & Methods: Statistically further analyses were done for associations of MSP with the presenting features reported in our descriptive cross-sectional study. The SPSS version 22.0 was used for the Chi-squared (χ^2) test on the previous results published; Results: MSP in the respondents i.e. postmenopausal women was strongly associated with age ($p=0.005$) and sunlight exposure ($p=0.002$), while it was not associated significantly with BMI ($p=0.112$), education level ($p=0.707$), age at onset of menopause ($p=0.154$) and number of children ($p=0.778$). Neck pain among the respondents was not significantly associated with age ($p=0.515$), BMI ($p=0.574$) and parenthesis ($p=0.125$). Shoulder pain was also not significantly associated with age ($p=0.396$), but it was significantly associated with stiffness ($p=0.013$). None of the factors studied were associated with low back pain significantly ($p=0.173-0.759$). But the knee pain was significantly dependent on sunlight exposure ($p=0.019$) and association of swelling in knee pain was significant ($p=0.000$). MSP and other symptoms were significantly improved after taking treatments ($p=0.000$); Conclusions: The implications of these observations relating various factors for MSP, neck pain, shoulder pain and treatments outcome in postmenopausal women were discussed.

Keywords: Postmenopausal women, musculoskeletal pain, presenting features, Associations

INTRODUCTION

The background literature had been reviewed in our previously published article.¹ Briefly, menopause is the natural biological phenomenon in the women's reproductive age. Menopause is the stage when menstrual cycle stops permanently for more than 12 months and level of estrogen and progesterone drops which are

the most important hormones in female body.^{1,2} Musculoskeletal disorders (MSDs) are diverse group of conditions with regard to their pathophysiology but are linked anatomically by musculoskeletal pain (MSP) and physical function. MSP has a higher prevalence in postmenopausal women as compared to premenopausal women suggesting that the decline in the reproductive hormones is associated with increased pain perception.³ MSP is generally associated with reduction of the ovarian function, where there is decline in the production of mainly estrogen hormone.^{4,5} Estrogen deficiency leads to impairment in the muscle performance and functional capacity and these changes cause early degeneration in postmenopausal women.⁶ In developing countries, poverty, malnutrition, infectious diseases, and inadequate medical facilities may have a role in the occurrence of MSDs leading to MSP. MSP had no relationship with smoking, opium consumption, hypertension, level of education and dyslipidemia.^{7,8} The majority of MSP in MSDs found in neck, lumbar region, hip and knee and most of these conditions are left over to be developed as chronic pain or recurrent MSP even beyond the menopausal period imposing the great burden to individual, family and society as well.⁹ The prevalence of MSP among postmenopausal women was found to be 56% with mean age of onset of menopause as 46 years. Body's region wise analysis of MSP among postmenopausal women showed that back (57%) and knee (72%) pain to be most prevalent.⁶ The women in menopausal stage are even more prone to suffer from these complaints due to decreased level of estrogen, ageing factor and lifestyle change such as lack of physical activity, no exposure to sunlight and obesity.^{10,11} Some studies suggested increase in body mass index (BMI) or total fat mass with menopause. However, studies that directly investigated the association of overall and central obesity with MSP in postmenopausal women are scarce.^{10,11,12}

The most common complaints among postmenopausal women were reported to be low back pain (LBP) (39%), knee pain (22%), neck pain (16%) and shoulder pain (9%). Similarly, postmenopausal women also had same pattern of pain in low back, knee, neck and shoulder with prevalence of 37.7%, 24.6%, 14.8% and 11.5% respectively. The most common diagnosis was spondylosis for LBP and neck pain, osteoarthritis for neck pain, and frozen shoulder for shoulder pain. The musculoskeletal complaint at different sites of body was associated with osteoporosis risk, exercise status and sunlight exposure but was not associated with menopausal status. The obese women were more likely to have shoulder pain and knee pain. The severity of MSP was associated with co-morbid conditions, menopausal status and depressed mood due to pain. Several studies have shown that negative attitudes toward menopause have an increasing effect on the severity of specific menopausal symptoms that leads to more complaints.^{13,14}

In Bangladeshi population, wide cultural diversity, inequality in socioeconomic status and gender are some of the sensitive multifactorial determinants that influence the menopausal health.¹⁵ Postmenopausal symptoms are generally ignored in rural, suburban as well as urban Bangladesh, even if they suffer from symptoms silently.¹⁶ There is under-reporting of symptoms due to sociocultural factors as well due to lack of awareness and knowledge about these conditions. Therefore, the previous study titled "Sociodemographic, health related, reproductive, musculoskeletal pain related parameters and treatment seeking

patterns among postmenopausal women from selected areas of Dhaka City, Bangladesh” was undertaken and the results were published recently.¹ However, associations of MSP with the presenting characteristics in postmenopausal women from Dhaka City were not much studied and reported. Therefore, the present study was undertaken to determine the significance of the associations of MSP with the presenting characteristics in postmenopausal women from Dhaka City and the results are reported in the present article.

MATERIALS AND METHODS

The methodologies for the study were those as described in our previous publication as the following¹:

- **Study Design:** A descriptive cross-sectional study;
- **Study Area:** Selected areas of Dhaka City;
- **Study Population:** Women in postmenopausal phase within age range 42 years or above;
- **Study Period:** Six months from November 2021 to April 2022;
- **Inclusion Criteria:** Medically stable women who have started their menopause aged 42 years and above;
- **Exclusion Criteria:** Women not willing to participate due to personal reasons, women diagnosed with any medical condition of neurological, severely mental disorder, malignancy and bedridden women;
- **Sampling Technique:** Samples were selected conveniently and purposively to interview the study population following inclusion and exclusion criteria;
- **Data collection Procedure:** The semi-structured questionnaire was developed and pretested among postmenopausal women from the study area of Dhaka City. The data were collected through face-to-face interview using the questionnaire; written informed consent was obtained using the consent form at the time of enrolling the participants;
- **Data Analysis and Presentation:** Microsoft Excel was used for data entry, while SPSS 22.0 software was used for analyzing the data by Chi-squared (χ^2) test. The data were presented in the form of tables for the present article;
- **Ethical Consideration:** International ethical guidelines for biomedical research involving human subjects were followed throughout the study.¹⁷

RESULTS

The associations (correlations) of MSP with different presenting characteristics in our respondents i.e. postmenopausal women evaluated by Chi-squared (χ^2) tests are presented in Table-1, Table-2, Table-3, Table-4, Table-5, Table-6, Table-7, Table-8 and Table-9 respectively.

Table 1: Associations (correlations) of MSP with age and BMI among of the respondents, i.e. postmenopausal women from Dhaka City

	Musculoskeletal Pain (MSP)		Total	χ^2	df	p-Value
Age	Yes	No	101	12.883	3	0.005*
42-51	29	11				
52-61	41	2				
62-71	10	0				
72-81	8	0				
Total	88	13				
BMI	Yes	No	101	5.99	3	0.112
<18.5	3	0				
18.5-24.9	36	2				
25-29.9	43	11				
≥ 30	6	0				
Total	88	13				

* $p > 0.05$: significant; $p > 0.05$: Not significant

Data analysis indicated that age of the respondent was significantly ($p=0.006$) and BMI was not significantly ($p=0.112$) associated with MSP.

Table 2: Associations of MSP with education level and monthly income of the respondents i.e. postmenopausal women from Dhaka City

	Musculoskeletal Pain (MSP)		Total	χ^2	df	p-Value
Education Level	Yes	No	101	2.952	5	0.707
Illiterate	22	2				
Primary	20	5				
Secondary	22	4				
Higher Secondary	16	2				
Graduation	7	0				
Post-graduation and above	1	0				
Total	88	13				
Monthly income	Yes	No	101	4.152	4	0.386
9000-28000	37	5				
29000-48000	26	7				
49000-68000	16	1				
69000-88000	6	0				
89000-108000	3	0				
Total	88	13				

* $p \leq 0.05$: significant; $p > 0.05$: Not significant

Data analysis showed that education level was not statistically significant ($p=0.707$); Monthly income was also not significantly ($p=0.346$) associated with MSP.

Table 3: Associations of MSP with sunlight exposure and exercise status of the respondents i.e. postmenopausal women from Dhaka City

Sunlight Exposure	Musculoskeletal Pain (MSP)		Total	χ^2	df	p-Value
	Yes	No				
Yes	34	11	101	9.693	1	0.002*
No	54	2				
Total	88	13				
Exercise Status	Yes	No	101	2.65	1	0.607
Yes	19	2				
No	77	3				
Total	96	5				

* $p \leq 0.05$: significant; $p > 0.05$: Not significant

In this study, sunlight exposure was significantly ($p=0.002$) associated but exercise status was not significantly ($p=0.607$) associated with MSP.

Table 9: Associations of type of treatments taken and outcome after taking treatments among with respondents i.e. postmenopausal women for Dhaka City

	Outcome after taking treatment			Total	χ^2	df	p-Value
	Improve	Worsened	Unchanged				
Treatment type				81	22.994	2	0.000*
Medication	4	6	10				
Physiotherapy	17	2	6				
Both	30	2	4				
Total	51	10	20				

* $p \leq 0.05$: significant; $p > 0.05$: Not significant

Data analysis showed that associations of treatment type and overtime after taking treatments were highly significant ($p=0.000$).

Table 4: Associations of MSP with onset of menopause and number of children of the respondents i.e. postmenopausal women from Dhaka City

Age at Onset of Menopause (year)	Musculoskeletal Pain (MSP)		Total	χ^2	df	p-Value
	Yes	No				
39-43	15	5	101	3.742	2	0.154
44-48	55	7				
49-53	18	1				
Total	88	13				
Number of Children	Yes	No	101	1.947	2	0.378
1-3	13	2				
4-6	45	9				
7-9	30	2				
Total	96	13				

* $p > 0.05$: significant; $p > 0.05$: Not significant

Data analysis showed that age at onset of menopause ($p=0.154$) and number of children ($p=0.378$) were not significantly associated with MSP.

Table 5: Factors associated with neck pain among the respondents i.e. postmenopausal women for Dhaka City

	Neck Pain		Total	χ^2	df	p-Value
Age	Yes	No	88	2.288	3	0.515
42-51	8	21				
52-61	11	30				
62-71	5	5				
72-81	2	6				
Total	26	62				
BMI	Yes	No	88	1.994	3	0.574
<18.5	0	3				
18.5-24.9	12	24				
25-29.9	13	30				
30 and above	1	5				
Total	26	62				
Paresthesia	Yes	No	88	2.348	1	0.125
Yes	9	12				
No.	17	50				
Total	26	62				

* $p < 0.05$: significant; $p > 0.05$: Not significant

Data analysis showed that there were no significant associations for age ($p=0.515$), BMI ($n=0.574$) and paresthesia ($p=0.125$) with neck pain.

Table 6: Factors associated with shoulder pain among the respondents i.e. postmenopausal women from Dhaka City

	Shoulder Pain		Total	χ^2	df	p-Value
Age	Yes	No	88	6.226	3	0.101
42-51	6	23				
52-61	10	31				
62-71	6	4				
72-81	2	6				
Total	24	64				
BMI	Yes	No	88	1.249	3	0.741
<18.5	0	3				
18.5-24.9	10	26				
25-29.9	12	31				
≥ 30	2	4				
Total	24	64				
Sunlight Exposure	Yes	No	88	0.721	1	0.396
Yes	11	23				
No	13	41				
Total	24	64				

Stiffness	Yes	No	88	6.191	1	0.013*
Yes	8	7				
No	16	57				
Total	24	64				

* $p \leq 0.05$: significant; $p > 0.05$: Not significant

Data analysis showed that there were no statistically significant associations for age ($p=0.101$) BMI ($n=0.741$) and sunlight exposure ($p=0.396$), but significant associations for stiffness ($p=0.013$) with shoulder pain.

Table 7: Factor associated with low back pain (LBP) among the respondents i.e. in postmenopausal women from Dhaka City

	Low back Pain (LBP)		Total	χ^2	df	p-Value
Age	Yes	No	88	2.074	5	0.557
42-51	19	10				
52-61	25	16				
62-71	4	6				
72-81	5	3				
Total	53	35				
BMI	Yes	No	88	2.446	3	0.485
<18.5	3	0				
18.5-24.9	22	14				
25-29.9	14	19				
≥ 30	4	2				
Total	53	35				
Sunlight Exposure	Yes	No	88	0.437	1	0.509
Yes	19	15				
No	34	20				
Total	53	35				
Exercise Status	Yes	No	88	0.584	1	0.445
Yes	10	9				
No	43	26				
Total	53	35				
Maximum pain time	Yes	No	88	4.990	3	0.173
Morning	17	19				
Day	9	4				
Evening	2	2				
Night	25	10				
Total	53	35				
Tingling	Yes	No	88	0.94	1	0.759
Yes	26	16				
No	27	19				
Total	53	35				
Paresthesia	Yes	No	88	1.445	1	0.229
Yes	15	6				
No	38	29				
Total	53	35				

Data analysis revealed no statistically significant associations between LBP with age ($p=0.557$), BMI ($n=0.485$), sunlight exposure ($p=0.509$), exercise status ($p=0.445$), maximum pain time ($p=0.173$), tingling ($p=0.759$) and paresthesia ($p=0.229$).

Table 8: Factors associated with knee pain among the respondents i.e. in postmenopausal women from Dhaka City

	Knee Pain		Total	χ^2	df	p-Value
Age	Yes	No	88	7.126	3	0.68
42-51	13	16				
52-61	22	19				
62-71	8	2				
72-81	7	1				
Total	50	38				
BMI	Yes	No	88	4.710	3	0.194
<18.5	2	1				
18.5-24.9	16	20				
25-29.9	27	16				
≥ 30	5	1				
Total	50	38				
Religion	Yes	No	88	0.013	1	0.909
Muslim	43	33				
Hindu	7	5				
Total	50	38				
Sunlight exposure	Yes	No	88	0.525	1	0.019*
Yes	14	20				
No	36	18				
Total	50	38				
Swelling	Yes	No	88	18.312	1	0.000*
Yes	29	5				
No	21	33				
Total	50	38				
Stiffness	Yes	No	88	0.94	1	0.398
Yes	10	5				
No	40	33				
Total	50	38				

* $p \leq 0.05$: significant; $p > 0.05$: Not significant

Data analysis showed no statistically significant associations between knee pain with age ($p=0.681$), BMI ($n=0.194$), religion ($p=0.909$), stiffness ($p=0.398$) but significantly associated with sunlight exposure ($p=0.019$) and swelling ($p=0.000$).

DISCUSSION

MSDs are diverse group of diseases with regard to their pathophysiology, but are linked anatomically by MSP among postmenopausal women affecting functional capacity and socioeconomic status negatively.

Table-1 shows the associations of MSP with age and BMI in our respondents i.e. postmenopausal women from Dhaka City, Bangladesh. interestingly, MSP was, found to be associated significantly with age ($\chi^2=12.88$, $df=3$, $p<0.005$), but not significantly with BMI ($\chi^2=5.99$, $df=3$, $p=0.112$). **Table-2** shows the associations of MSP with education level ($p=0.707$) and monthly income ($p=0.346$) of our respondents. Although statistically not significant, the illiterate group had the highest incidence of MSP (22/24=91.6%). The association of MSP with sunlight exposure was highly significant ($\chi^2=9.693$, $df=1$, $p=0.002$), while MSP with exercise status was not associated significantly ($\chi^2=2.65$, $df=1$, $p=0.607$) (**Table-3**). Therefore, exposure to sunlight is important relevant to MSP and exercise status is also important, although we did not find it associated significantly. The age at onset of menopause ($\chi^2=3.742$, $df=2$, $p=0.54$) and number of children ($\chi^2=1.947$, $df=2$, $p=0.378$) of our respondents were not significantly associated with MSP as indicated by data analysis (**Table-4**). Although large proportion of our respondents (26/88=30%) had neck pain, it was found to be not significantly associated with age ($\chi^2=2.288$, $df=3$, $p=0.515$), BMI ($\chi^2=1.994$, $df=3$, $p=0.574$) and paresthesia ($\chi^2=2.148$, $df=1$, $p=0.125$) (**Table-5**). Similarly, shoulder pain (24/88=27.8%) was not significantly associated with age ($\chi^2=6.226$, $df=3$, $p=0.101$), BMI ($\chi^2=1.249$, $df=3$, $p=0.741$) and sunlight exposure ($\chi^2=0.721$, $df=1$, $p=0.396$), but its association with stiffness was highly significant ($\chi^2=6.191$, $df=1$, $p=0.013$) (**Table-6**).

Factors related with LBP among our respondents i.e. postmenopausal women are stated in Table-7. LBP in our respondents was not significantly associated with age ($\chi^2=2074$, $df=5$, $p=0.557$), BMI ($\chi^2=2.446$, $df=3$, $p=0.485$), sunlight exposure ($\chi^2=0.437$, $df=1$, $p=0.509$), exercise status ($\chi^2=0.584$, $df=1$, $p=0.445$), maximum pain time ($\chi^2=4.991$, $df=3$, $p=0.173$), tingling ($\chi^2=0.941$, $df=1$, $p=0.759$) and paresthesia ($\chi^2=1.445$, $df=1$, $p=0.229$) (**Table-7**). Knee pain in our respondents was associated significantly with sunlight exposure ($\chi^2=0.525$, $df=1$, $p=0.019$) and swelling ($\chi^2=18.372$, $df=1$, $p=0.000$), but was not significantly associated with age ($\chi^2=7.126$, $df=3$, $p=0.681$), BMI ($\chi^2=4.710$, $df=3$, $p=0.19$) and religion ($\chi^2=0.013$, $df=1$, $p=0.909$) (**Table-8**). Finally, association of the types of treatment taken (medication, physiotherapy, both) and outcome (improved, worsened, unchanged) after taking treatments were highly significant ($\chi^2=22.994$, $df=2$, $p=0.000$) (**Table-9**).

Our findings, as stated above (**Tables: 1-9**), supported the report by Islam et al that MSDs linked anatomically by MSP are significantly influenced by the socioeconomic status of the postmenopausal women in Bangladesh (18). Among their respondents, the majority (33.2%) had LBP and according to VAS (The Visual Analogue Scale), the pain was 6.11 ± 1.32 (Mean $\pm$ SD). They also reported a significant correlation between sociodemographic variables (living place, education, age, religion, occupation, family structure and socioeconomic status and pain intensity ($p=0.001$) (18). The types of treatment taken by our respondents and their outcomes clearly suggested that both physiotherapy and medication combined be taken which would be very much helpful for better outcome for MSP in postmenopausal women. However, the rapid increase in the prevalence and disease burden of elevated BMI highlights the need for continued focus on surveillance of BMI and identification, implementation and evaluation of evidence-based interventions to address this

problem in different respondents including postmenopausal women in Bangladesh (19).

Vitamin D is a fat-soluble essential vitamin that regulates calcium homeostasis and is crucial for human health across all ages including menopausal women (20,21). In a randomized control trial, Zaravar et al found that vitamin D3 alone did not have a significant impact on most physical fitness measures in water-based training, but water-based training with vitamin D3 supplementation significantly improved physical fitness indices in postmenopausal women who were overweight or obese and had deficient levels of serum vitamin D (22,23). Mesinovic et al, in a pilot placebo-controlled trial study, observed that exercise combined with vitamin D supplementation was much usefully for improving physical function, body composition and metabolic health in overweight or obese older adults with vitamin D deficiency (24). Interestingly these observations clearly supported our findings that treatment with combination of physiotherapy and medication of MSDs linked by MSP was much better and improved the condition significantly (Improved: 30/81=37%; $\chi^2=22.994$, df=2, p=0.000) (Table-9). From a quasi-experimental clinical trial, Ali et al reported that combined intervention with physiotherapy and Vitamin D produced significantly better results than only physiotherapy intervention in the reduction of the pain related outcomes among adult patients with MSDs (25).

In conclusion, we would like to recommend that combination of physiotherapy and medication including vitamin D supplementation for MSDs linked by MSP in postmenopausal women should be the treatment of choice. However, improvements in sociodemographic and socioeconomic status of the patients be kept in mind and given due consideration in these patients. Further studies including vitamin D status and vitamin D supplementation together with physiotherapy are warranted in these types of postmenopausal women patients from Bangladesh.

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