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Article

Musculoskeletal and mental health problems of adult (25-64 years) smokers of Dhaka city: a cross-sectional study

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Abstract: Both musculoskeletal and mental health are important components of the quality of life of individuals as well as public health. This study aimed to determine the musculoskeletal and mental health problems of adult smokers in Dhaka city, Bangladesh. During July to October 2022, a cross-sectional survey was conducted among desk-based officials in Dhaka city who smoke. Musculoskeletal pain of officials was determined by the Visual Analogue Scale (VAS), and mental health status was determined by the Patient Health Questionnaire (PHQ-9) scale. The collected dataset was checked and analyzed by IBM SPSS 23 package software. During the study period, 289 complete interviews with smokers were conducted, of which only 13.1% were female. Our analysis has identified a high prevalence of musculoskeletal pain (66%), where 15% had severe pain and another 28% had moderate pain. Severe depression was seen among 2.8% of participants, and another 9% had moderately severe depression. Advanced aged individuals (>54 years) are at higher risk of having musculoskeletal pain (OR=1.99, 95% CI: 1.01-3.93). People who are overweight or obese have 71% more risk of developing musculoskeletal pain (OR=1.71, 95% CI: 1.02-2.86). Moreover, having a lift facility in the house and the depression level of the participants were also significantly associated with the presence of musculoskeletal pain (P<0.05). There is a high prevalence of moderate to severe musculoskeletal pain and mental health problems among sedentary workers who smoke. The findings of this study would be helpful for smoking cessation programs to control smoking and would guide policymakers to take effective steps to control tobacco. More research is required to determine the combined effect of depression and smoking on musculoskeletal pain.

Keywords: musculoskeletal health; night time smoking; desk-based officials; sleep quality; Dhaka

1. Introduction

Musculoskeletal (MS) health problems are common public health issues and they constitute one of the largest occupational health burdens for contemporary occupational groups (Mohammadipour *et al.*, 2018; Tuček and Vaněček, 2020). Previous studies have observed a high prevalence (>70%) of musculoskeletal (MS) problems among sedentary workers, though the prevalence of severe pain is much lower (Okezue *et al.*, 2020; AlOmar *et*

al., 2021; Iqbal *et al.,* 2023). The working population's primary reason for absenteeism and early retirement, as well as a significant risk factor for occupational impairment, is MS-related health difficulties (Weerasekara and Hiller, 2017). The direct medical expenditure related to MS pain is very high due to employee's sickness, disease treatment, medical compensation, and irregularities at workplace. In addition to the immediate costs, MS discomfort also lowers workers' productivity and capacity to work, which will have an impact on their quality of life (Bhattacharya, 2014; Ge *et al*., 2018).

According to estimates, various mental health issues, such as depression and anxiety disorders, cost around US$ 1 trillion each year (Vigo *et al*.,2016; WHO, 2017). The meantal health of sedentary workers is very important as it is associated with working environment, regularity, as well as economics. The investment on the mental health of sedentary workers is favorable and beneficial because, the amount of money invested in mental health (i.e. depression, anxiety) would lead to multiple-fold return for improved working ability and environment (Schultz and Edington, 2007; WHO, 2017). In the workplace, there are multiple factors recognized as determinants of workers' mental health. These include high job demand, low job control, low workplace social support, effort-reward imbalance, low organizational procedural justice, low organizational relational justice, organizational change, job insecurity, temporary employment status, atypical working hours, bullying, and role stress (Marchand *et al.*, 2015; Harvey *et al.*, 2017). Mental health promotion and prevention programs are expending globally, however, a small percentage (around 7%) of those activities are focused on workplace. As the mental health burden in workplace is increasing globally, the Global Happiness Policy Report (2018) urges for more research and expansion of the evidence based activities to improve mental health status and wellbeing (Helliwell, 2018; Sachs *et al.*, 2018).

Tobacco is associated with a large number of deaths and kills around 50% of its users. The consumption of cigarettes is higher among males (36.7%) compared to females (7.8%) and overall, 22.3% of the world's population consumes cigarettes (WHO, 2022). Though the prevalence of smokers has decreased worldwide, however, population expansion has increased the number of smokers worldwide (Reitsma *et al*., 2021). Bangladesh has a high rate of tobacco use, and smoking is associated with the deaths of 25% of male and 7.6% of female each year (Detels, 2009; Ahmned and Naimul Wadood, 2020).

Although Bangladesh has a huge burden of tobacco-related health issues, research in this area is very limited. Musculoskeletal health issues are widely discussed in various forums; however, effective measures are rarely taken. There is no Bangladeshi study that focuses on the effect of smoking on sedentary workers' musculoskeletal health. The sound mental health of sedentary workers is also essential, which might be closely related to MS pain. Therefore, the aim of this study is to determine the musculoskeletal health status of sedentary workers in Dhaka who smoke. The study will also assess their mental health status and determine the possible predictors of poor mental health.

2. Materials and Methods

2.1. Ethical approval and informed consent

The researchers collected data in a process that was fully anonymized, and no sensitive data were collected. The participants were not subjected to any kind of risk, and all ethical principles were maintained. Each of the study participants provided informed consent before the interview. Participants received assurances that their information would be kept private and used exclusively for research purposes. Participants were also made aware that they could leave the interview at any moment without repercussions. The Helsinki Declaration was followed for each of the phases of this research (1964).

2.2. Study design and participants

The target population of our study was sedentary workers (desk-based job holders) those do smoke and living inside Dhaka city. Therefore, we have performed a population based cross-sectional study during July to October 2022, among the target population. We have selected study participants through convenient sampling technique to perform structured face to face interview from conveniently selected households of Dhaka, Bangladesh. The interview was conducted if there was any desk-based officer with minimum one-year of job experience in the household. All of the study participants were active smokers. The sample size was calculated based on the confidence interval of 95% and the prevalence of MS pain of 30% (Zahid-Al-Quadir *et al.*, 2020), the assumptions of an alpha of 0.05. Thus, the sample size was 323 according to the formula, however, the number of complete interviews was 289 due to various limitations such as manpower, funds, and time. During the interview, the participants were clarified and acknowledged about the study purpose and also informed that it was voluntary.

2.3. Measures

2.3.1. Independent variables

Independent variables included gender, lift facility in house, physical activity, extra sedentary time, smoking practice (night-time, regular), organization type, age group, BMI status, etc. Physical activity per day (no, <30 minutes and ≥ 30 minutes), sedentary hours (< 2 hours, 2-4 hours, and > 4 hours per day), and age of participants (<35 years, 35-54 years, >54 years) were categorized into three categories.

2.3.2. Outcome variable

The musculoskeletal health problems of sedentary workers were identified by pain in the shoulder, neck, hands, back, arms, lower back etc. The visual analog scale (VAS) was used to determine the level of MS pain. The VAS scale is a widely used pain rating tool where scores are calculated based on the self-reported status and symptoms that are recorded with a 10-cm line that represents a continuum of scoring between the two ends of the scale "no pain" on the left end (0 cm) and the "worst pain" on the right end (10 cm). The scoring or pain level was categorized as, no pain ('0'), mild pain ('1-3'), moderate pain ('4-6'), and severe pain ('7-10'). As the participants were highly educated, the English version of the questionnaire was used (Boonstra *et al.*, 2014; Delgado *et al.*, 2018).

The depression level was assessed by the Patient Health Questionnaire 9 (PHQ-9) scale. This is one of the most widely used depression modules to assess depressive symptoms in adults. The scoring of the PHQ-9 is also simple, range from 0 (no depressive symptoms) to 27 (severe depressive symptoms). Depression Severity was determined as following: 0-4 (none), 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe), and 20-27 (severe depression) (Manea *et al.*, 2012; Udedi *et al.*, 2019; Iqbal *et al.*, 2023).

2.4. Statistical analysis

The collected were entered at used Microsoft Excel (2013) and checked for consistency. IBM SPSS (version 25) software was used to conduct the statistical analysis. Mean, median, frequency and percentage were used to describe the continuous variables. Pearson's chi-square tests were used to investigate the associations between categorical variables. Multiple logistic regression analysis was performed on variables that showed statistically significant association in Pearson's chi-square tests.

3. Results

In this study, a total of 289 sedentary workers (officials) those do smoke were included for the analysis, where most of them (86.9%) were male and only 13.1% were female. The mean age of sedentary workers was 41.9±11.7 years. Majority of the participants (41.2%) were aged between 35-54 years. The monthly family income is relative good, where majority have a monthly family income of sixty thousand or more in Bangladeshi taka. The mean BMI of the participants is high (25.2±2.49), with maximum 34.65kg/m^2 and minimum 18.73kg/m^2. The prevalence of overweight and obesity is very high (61.6%), only 18% sedentary workers perform a good amount of physical activity every day (at least 30 minutes). Excluding the sedentary work hour at office, 48.1% of them pass more than four extra sedentary time every day. Both night time smoking (54%) and smoking practice after meal (45.3%) were also highly prevalent. According to the chi-square analysis, age of the sedentary workers *(P=0.01)*, BMI *(P<0.01)*, lift facility in house *(P<0.01)* and depression status *(P=0.014)* have a statistically significant association with musculoskeletal pain (Table 1).

Table 1. Descriptive statistic and chi-square analysis.

Variable	Category	Frequency (%)	Musculoskeletal pain		*P* value
			No/mild (%)	Mod/severe (%)	
Gender	Female	38 (13.1)	17 (44.7)	21 (55.3)	0.11
	Male	251 (86.9)	147 (58.6)	104 (41.4)	
Age	<35 years	102 (35.3)	70 (68.6)	32 (31.4)	0.01*
	35-54 years	119 (41.2)	62 (52.1)	57 (47.9)	
	>54 years	68 (23.5)	32 (47.1)	36 (52.9)	
BMI	Normal	111 (38.4)	75 (67.6)	36 (32.4)	0.003*
	Overweight	178 (61.6)	89 (50.0)	89 (50.0)	
Lift facility in house	No	128 (44.3)	87 (68.0)	41 (32.0)	0.001*
	Yes	161 (55.7)	77 (47.8)	84 (52.2)	

Table 1. Contd.

Variable	Category	Frequency (%)	Musculoskeletal pain		*P* value
			No/mild (%)	Mod/severe (%)	
Physical activity	No	116 (40.1)	58 (50.0)	58 (50.0)	0.16
	<30 mins	121 (41.9)	75 (62.0)	46 (38.0)	
	=>30 mins	52 (18.0)	31 (59.6)	21 (40.4)	
Sedentary hour	<2 hours	82 (28.4)	43 (52.4)	39 (47.6)	0.19
	2-4 hours	68 (23.5)	45 (66.2)	23 (33.8)	
	>4 hours	139 (48.1)	76 (54.7)	63 (45.3)	
Night smoking	No	133 (46.0)	81 (60.9)	52 (39.1)	0.18
	Yes	156 (54.0)	83 (53.2)	73 (46.8)	
After meal smoking	No	158 (54.7)	94 (59.5)	64 (40.5)	0.31
	Yes	131 (45.3)	70 (53.4)	61 (46.6)	
Organization type	Government	137 (47.4)	84 (61.3)	53 (38.7)	0.13
	Private	152 (52.6)	80 (52.6)	72 (47.4)	
Depression	No	75 (26.0)	38 (50.7)	37 (49.3)	0.014*
	Mild/ moderate	180 (62.3)	113 (62.8)	67 (37.2)	
	Severe	34 (11.8)	13 (38.2)	21 (61.8)	

According to the VAS scale, there is a high prevalence of musculoskeletal pain among sedentary workers those do smoke (66%). Severe pain was present among 15% participant and another 28% participants had moderate pain. The remaining 23% has mild pain in shoulder/ neck/ arms/ hand/ back/ lower back etc. (Figure 1).

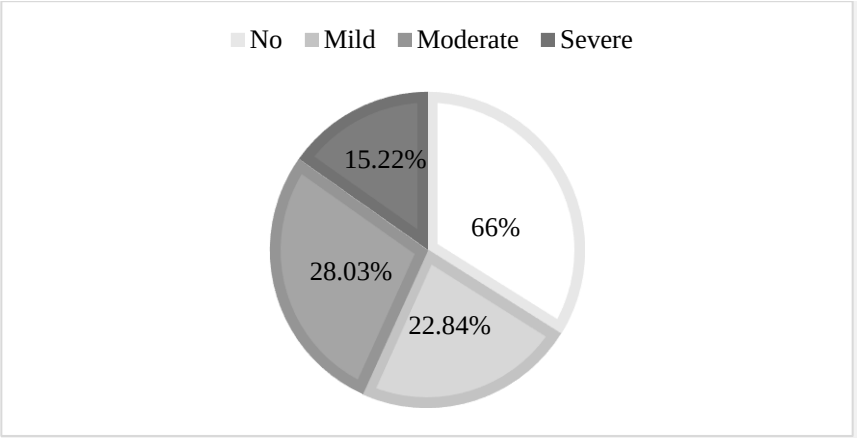

Figure 1. Musculoskeletal pain among sedentary workers those do smoke (n=289).

According to the PHQ-9 scale, 2.8% participants have severe depression, 9% have moderately severe depression, 17.3% have moderate depression, 45% have mild depression and the remaining 26% participants does not have any depressive symptoms (Figure 2).

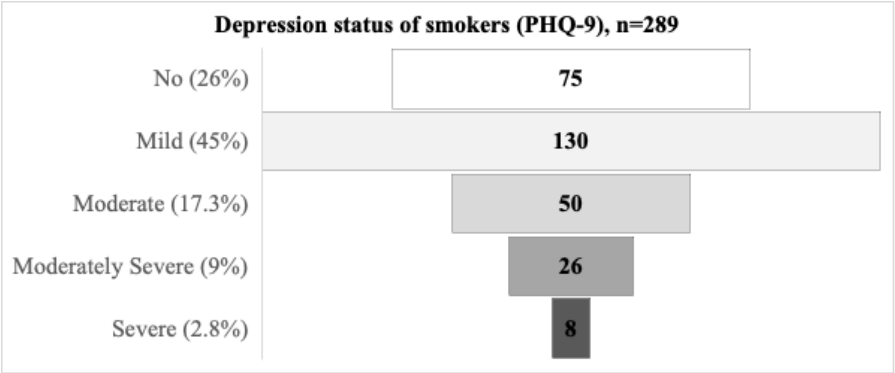

Figure 2. Depression status of sedentary workers those do smoke.

Participants were more than 54 years old had a higher risk of develop musculoskeletal pain (OR=1.99, 95% CI: 1.01-3.93). A high BMI (Overweight/ obesity) is associated with a 71% increase risk of musculoskeletal pain (OR=1.71, 95% CI: 1.02-2.86), which was a significant predictor of moderate to severe pain (Table 2).

Table 2. Multiple logistic regression analysis of possible predictors of musculoskeletal pain.

Variable	Category	Odds ratio (95% CI)	*P* value
Age	>54 years	1.99 (1.01-3.93)	0.047*
	35-54 years	1.61 (0.89-2.92)	0.112
	<35 years	Ref	
BMI	Overweight	1.71 (1.02-2.86)	0.043*
	Normal	Ref	
Lift facility	Yes	1.63 (0.96-2.79)	0.07
	No	Ref	
Depression	Severe	1.65 (0.68-4.01)	0.26
	Mild/ moderate	0.78 (0.43-1.38)	0.39
	No	Ref	

4. Discussion

This study has successfully revealed the status of musculoskeletal pain and depression among sedentary workers who smoke. The socio-demographic status, important habits, and activities were also discussed. Moreover, we also successfully identified the factors that are associated with poor musculoskeletal health in sedentary workers.

We have observed a high prevalence of musculoskeletal pain among the study participants, though a lower prevalence of severe pain was observed. The high prevalence of musculoskeletal pain is associated with reduced productivity and has a major impact on performance at the workplace (Buck *et al.*, 2009; Iqbal *et al.*, 2023). The previous studies conducted in Bangladesh also observed a high prevalence of musculoskeletal pain among various groups of working people (up to 82%) (Jamil *et al.*, 2022). In the long term, it may cause social exclusion, poor mental and physical well-being, and poverty (Waddell and Burton, 2006). Therefore, it is necessary for sedentary workers to place importance on their musculoskeletal health to reduce the impact of pain on work. This is not only important from a clinical point of view but also to face the social and economic challenges.

Our analysis also determined the prevalence of depressive symptoms among sedentary workers those who do smoke. The number of cases with severe and moderately-severe depression is not that high, however, the overall prevalence of depressive symptoms is very high (74%). According to previous studies, desk-based officials had higher levels of mental health problems than others (Kang *et al.*, 2016). Moreover, workplace related stress is also more common among sedentary officials and workers with a high education level (da Cruz Fernandes *et al.*, 2019). The available evidence also suggest a significant association between poor mental health and smoking, which would create more burden for sedentary officials (Kouvonen *et al.*, 2005; Ahmed *et al.*, 2021).

There was a statistically significant association between depression level and musculoskeletal pain in our analysis. A recent study has also revealed a statistically significant impact of anxiety and insomnia severity on musculoskeletal pain (Zarean *et al.*, 2021). Another study conducted in Saudi Arabia revealed that, the coexistence musculoskeletal pain and depression has significant negative impact on work ability and reduces efficiency (Alajmi *et al.*, 2022). Another previous study also observed a high prevalence of depressive symptoms among inactive individuals and also concludes that, they are more likely to have musculoskeletal pain (Christofaro *et al.*, 2022). In our population, there is low proportion of people those do recommended amount of physical activity. However, there was high proportion of participants those pass more than four hours extra sedentary hours beside regular activity. These factors increase the risk of depressive symptoms and pain as physically active individuals face less musculoskeletal problems and depressive symptoms (Christofaro *et al.*, 2022).

More than 60% of our study participants are overweight or obese. A high proportion of overweight and obesity is a significant predictor of musculoskeletal pain (Seaman, 2013; Viester *et al.*, 2013). Our analysis also revealed similar findings, where a high BMI is associated with a 71% increased risk of pain. The lift facility in the house was also identified as a significant predictor of musculoskeletal pain. Therefore, sedentary workers would be more concerned about their life-style, and risky habits and should develop the habit of physical exercise. Compared to young individuals, MS pian is very common among advanced age people which might

cause disability among senior officials (Welsh *et al.*, 2020). A multimodal, multidisciplinary management modality needed to be emphasized to reduce the existing burden of mental health and MS pain.

Besides a number of important findings, this study was completed with several limitations in terms of research design, data collection, sample size, and representativeness. We did not collect any follow-up data for this study, and the analysis was limited to self-reported data. Data on MS health would be collected on multiple scales for more precise results. There was a limitation regarding manpower, resources and time, which led to a low number of samples and the use of non-probability sampling methodology. A nationwide study focusing on various groups of the population is recommended to know the overall scenario in Bangladesh.

5. Conclusions

Both depressive symptoms and MS pain are highly prevalent among sedentary officials in Dhaka city who do smoke. There was also a statistically significant association between MS pain and depression. Advance age and a high BMI are also statistically significant predictors of MS pain. The high prevalence of overweight and obesity is a concerning issue and should be immediately addressed by concerned authorities. Low levels of physical activity, habit of smoking, and high sedentary hours are some common negative practices widely seen among sedentary workers. The findings of this study would be useful for Bangladesh and the rest of the world for smoking cessation programs. The findings will also widen the field of future research in this area, particularly among Bangladeshi people.

Data availability

The datasets arose and used in the current study is available from the corresponding author on reasonable request.

Conflict of interest

None to declare.

Authors' contributions

A.H.M. Khairul Imam Suman, Khadija Begum, and Morshad Alam contributed in research design; A.H.M. Khairul Imam Suman, Khadija Begum, and Narayan Krishna Bhowmik involved in data collection and data entry; A.H.M. Khairul Imam Suman and Morshad Alam contributed in data analysis; A.H.M. Khairul Imam Suman, Kaniz Rahman and MMA involved in manuscript writing. All authors have read and approved the final manuscript.

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