Article

Night time smoking among Bangladeshi adults: effect on sleep quality and musculoskeletal health

A.H.M. Khairul Imam Suman[1], Khadija Begum[1], Kaniz Rahman[2], Saiful Bahar Khan[3], AQM Mobin[4], Fatema Tuj Johora[2] and Morshad Alam[5*]

[1]Department of Medicine, Ad-din Women's Medical College Hospital, Moghbazar, Dhaka-1217, Bangladesh
[2]Department of Dermatology and Venereology, Ad-din Women's Medical College Hospital, Moghbazar, Dhaka-1217, Bangladesh
[3]Department of Nephrology, Ad-din Women's Medical College Hospital, Moghbazar, Dhaka-1217, Bangladesh
[4]Colonel Malek Medical College, Manikganj Sadar, Manikganj-1800, Bangladesh
[5]Independent Researcher, Dhaka-1209, Bangladesh

*Corresponding author: Morshad Alam, Independent Researcher, Dhanmondi, Dhaka-1209, Bangladesh. E-mail: evan.morshad1@gmail.com

Abstract: Quality of sleep is linked to a number of illnesses, including cardiovascular problems, diabetes, mental and behavioral issues. The study determined the impact of night time smoking on sleep quality and musculoskeletal health. A cross -sectional study was conducted among desk-based officials of Dhaka city between June to September 2022 using convenient sampling technique. Sleep quality was measured by Pittsburgh Sleep Quality Index (PSQI). Data were collected through structured interview and analyzed by IBM SPSS 25 statistical package software. A total of 261 desk-based officials who do smoke were included in this study and among them, 132 (50.6%) were night time smokers. More than half of the study participants had poor sleep quality (58.6%). Night time smoking habit (OR= 2.59, 95% CI: 1.55 - 4.32) and doing a job in a private organization (OR=1.71, 95% CI: 1.02 - 2.85) were a significant predictor of poor sleep quality. On the other hand, various musculoskeletal health issues such as pain in the shoulder/ neck, pain in the back/ lower back, and pain in arms etc. were also scientifically associated with night time smoking habit (*P*<0.05). Night smoking poses a significant health risk as it is associated with sleep disturbance and musculoskeletal health problems. Lifestyle modification of desk-based officials is urgent to reduce the health risk.

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

1. Introduction

More than 80% of the world's 1.3 billion tobacco smokers come from low- and middle-income nations like Bangladesh. Tobacco kills up to half of its users and each year the number is more than 8 million people. In 2020, globally 36.7% males and 7.8% females consumed cigarettes which represents 22.3% of the world's population (WHO, 2022). In 2019, tobacco users have consumed 7·41 trillion cigarette-equivalents of tobacco. Despite a large decline in smoking prevalence among both genders since 1990, population expansion has created significantly more smokers worldwide than there were in 1990 (0.99 billion). In 2019, smoking was the

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biggest risk factor for mortality among men, contributing to 769 million deaths and 200 million disability-adjusted life years globally (He *et al*., 2022).

Bangladesh has a significant number of tobacco-related diseases and fatalities, which calls for national attention to this serious issue. This is one of the 10 nations with the highest rates of tobacco usage, where smoking kills 25% of men and 7.6% of women each year (Detels and Tan, 2009). The overall monetary loss caused by tobacco-related illness and mortality in Bangladesh in 2018 was BDT 305.6 billion (USD 3.6 billion), or 1.4% of the country's GDP (Nargis *et al*., 2020).

According to recent research, smoking at night may be a sign of nicotine dependency. When night smokers get up to smoke, their sleep cycle is likely to be disturbed. Numerous detrimental medical and psychological effects of sleep disruption include impairment, a decline in quality of life, and psychological anguish. Smokers frequently experience sleep problems, and sleep problems by quitting smoking indicate a less than favorable response to therapy (Simon and Vonkorff, 1997 1997; Peters *et al*., 2011; Phillips and Danner, 1995).

An abnormally low or high level of sleep is linked to a number of illnesses, including cardiovascular problems, diabetes, mental and behavioral issues, all-cause mortality, and a decline in wellbeing. Additionally, there is proof that those who have trouble sleeping are less productive and take more time off from work. In the caring professions, the potential harm from a decrease in sleep duration or quality might be more severe since it can impact both the person receiving assistance and the person providing the aid (Daley *et al*., 2009; Garbarino *et al*., 2016; Magnavita and Garbarino, 2017).

Dhaka, the capital of Bangladesh, is the eleventh largest megacity city in the world. Students are staying here for studies, businessman for business, service holders for services and so on. People are coming to this metropolis because it is heavily inhabited and congested and because the remote and outlying regions have not been developed to the same extent (Swapan *et al*., 2017). As a result, Dhaka city is home to a wide range of professionals who support the national economy. Although there is no data on the prevalence of night time smoking among desk-based employees and their sleep quality (World Data ATLAS, 2022). Therefore, the study determined the impact of night time smoking on sleep quality and musculoskeletal health.

2. Materials and Methods
2.1. Study design and participants
The target population of the study was desk-based officials those do smoke. Therefore, a population based cross sectional study was conducted between June to September, 2022 among target population of Dhaka city. The data were collected following convenient sampling technique through structured interview from selected households of two City Corporation of Dhaka, Bangladesh. The sample size was calculated based on the assumptions of an alpha of 0.05, confidence interval of 95% and prevalence of smoking of 17% in Bangladesh (Rahman *et al*., 2021). Thus, the sample size was 217. After adding a 20% non-response rate the final sample size was 261. Before the participants filled out the questionnaires, data collectors explained the study purpose and also clarified that it was voluntary.

2.2. Measures
2.2.1. Independent variables
Independent variables included physical activity, sedentary activities, age group (<35 years, 35-54 years and >54 years), gender (male and female), BMI (normal, overweight and obese), monthly income (≤35000 BDT, 35000-60000 BDT and >60000 BDT), organization (government and private) were among the sociodemographic characteristics. Physical activity per day has 3 categories which were (no, <30 minutes and ≥ 30 minutes) and sedentary activities (< 2 hours, 2-4 hours and > 4 hours per day) also have 3 categories subsequently. The important variable of our study 'night time smoker' were those who consume cigarette at least once between dinner and morning wake up.

2.2.2. Outcome variable
To assess the sleep quality of desk-based officials, the English version of Pittsburgh Sleep Quality Index (PSQI) tool was used which is a widely validated and effective instrument to measure the sleep quality in adult populations (Backhaus et al. 2002). The musculoskeletal health problems were also determined by several information such as pain in the shoulder/ neck, arms, hands, back/ lower back, etc.

2.3. Statistical analysis
The collected data were entered in Microsoft excel-2013 and checked for consistency. Based on the Pittsburgh Sleep Quality Index (PSQI) tool, the sleep quality was categorized into good and poor. Statistical analysis was

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performed by IBM SPSS (version-25) statistical package software. The descriptive analysis of categorical variables was performed by frequency, percentage and continuous variables were reported as means with standard deviation. Association among categorical variables were analyzed Pearson's chi-square test, Fisher's exact test when appropriate. Statistically significant variables were subjected to multiple logistic regression analysis.

2.4. Ethical considerations
The informed consent was obtained from each of the participant. Participants were assured that their personal information would remain confidential and be used only for research purposes. In addition, participants were informed that they could withdraw at any time without negative consequences.

3. Results
A total of 261 desk-based officials with smoking habit were included in the analysis. The mean age of the study participants was 39.54 ± 10.58 years, ranged between 24 to 65 years. Majority of the participants (43.3%) were aged between 35-54 years. Almost all of the participants (93.5%) were male and only 6.5% were female. Around 54% of our participants were from government organizations, where largest proportion (47.5%) has monthly income of more than sixty thousand Bangladeshi taka. More than 50% of the participants were overweight/ obese which is a warning sign for the officials and only 35.6% participants perform recommended amount of physical activity per day ($\geq$ 30 minutes, 5 days in a week). Other than sedentary job hours a large proportion of the participants (44.1%) pass more than four sedentary hours regularly. Both night time smoking (50.6%) and smoking practice after meal (57.9%) were highly prevalent (Table 1).

The Chi-square statistic were used to determine the association of sleep quality with socio-demographic characteristics and activity related characteristics. The type of organization (government/ private) where the participants were involved (P=0.04), habit of night time smoking (P<0.01), and habit of smoking after each meal (P<0.01), were significantly associated with the poor sleep quality of the desk-based officials (Table 1).

Table 1. Association of socio-demographic characteristics and activity related characteristics with sleep quality.

Variables	Category	Frequency (%)	Sleep quality		P value
			Good (%)	Poor (%)	
Age	< 35 years	106 (40.6)	39 (36.8)	67 (63.2)	0.13
	35-54 years	113 (43.3)	46 (40.7)	67 (59.3)	
	> 54 years	42 (16.1)	23 (54.8)	19 (45.2)	
Gender	Male	244 (93.5)	102 (41.8)	142 (58.2)	0.59
	Female	17 (6.5)	6 (35.3)	11 (64.7)	
Income	≤35000 BDT	72 (27.6)	22 (30.6)	50 (69.4)	0.08
	35000-60000 BDT	65 (24.9)	28 (43.1)	37 (56.9)	
	> 60000 BDT	124 (47.5)	58 (46.8)	66 (53.2)	
BMI	Normal	129 (49.4)	56 (43.4)	73 (56.6)	0.51
	Overweight	132 (50.6)	52 (39.4)	80 (60.6)	
Organization	Government	140 (53.6)	66 (47.1)	74 (52.9)	0.04*
	Private	121 (46.4)	42 (34.7)	79 (65.3)	
Physical activity/day	No	49 (18.8)	22 (44.9)	27 (55.1)	0.28
	< 30 minutes	119 (45.6)	43 (36.1)	76 (63.9)	
	≥ 30 minutes	93 (35.6)	43 (46.2)	50 (53.8)	
Sedentary activities	< 2 hours	82 (31.4)	33 (40.2)	49 (59.8)	0.94
	2-4 hours	64 (24.5)	26 (40.6)	38 (59.4)	
	> 4 hours	115 (44.1)	49 (42.6)	66 (57.4)	
Night time smoking	No	129 (49.4)	68 (52.7)	61 (47.3)	<0.01*
	Yes	132 (50.6)	40 (30.3)	92 (69.7)	
Smoking after meal	No	151 (57.9)	73 (48.3)	78 (51.7)	<0.01*
	Yes	110 (42.1)	35 (31.8)	75 (68.2)	

This study has observed a high prevalence of various musculoskeletal health problems among desk-based officials. More than 32% were very bothered about their pain in shoulder/ neck, 26.5% were very bothered regarding pain in arms/ hands, and 25% had bothering severe pain in back/ lower back. Headache (22.7% were very bothered) and fatigue (17.4% were very bothered) were also highly prevalent among them. The chi-square

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analysis was also used to determine the association between night time smoking and musculoskeletal health problems of desk-based officials. Pain in shoulder/ neck (P=0.01), pain in the arms/ hands (P<0.01), and pain in back/ lower back (P=0.006), all has statistically significant association with night time smoking habit of the participants (Table 2).

Table 2. Association of nighttime smoking with musculoskeletal health problems.

Variable	Category	Night time smoking		P value
		Yes, n (%)	No, n (%)	
Pain in shoulder/ neck	Very bothered	43 (32.6)	19 (14.7)	0.01*
	Slightly bothered	46 (34.8)	62 (48.1)	
	Fine	43 (32.6)	48 (37.2)	
Pain in the arms, hands, etc.	Very bothered	35 (26.5)	13 (10.1)	0.001*
	Slightly bothered	61 (46.2)	64 (49.6)	
	Fine	36 (27.3)	52 (40.3)	
Pain in the back/ lower back	Very bothered	33 (25.0)	19 (14.7)	0.006*
	Slightly bothered	59 (44.7)	47 (36.4)	
	Fine	40 (30.3)	63 (48.8)	
Fatigue	Very bothered	23 (17.4)	16 (12.4)	0.12
	Slightly bothered	72 (54.5)	62 (48.1)	
	No	37 (28.0)	51 (39.5)	
Headache	Very bothered	30 (22.7)	22 (17.1)	0.44
	Slightly bothered	63 (47.7)	70 (54.3)	
	No	39 (29.5)	37 (28.7)	

A multiple logistic regression analysis was performed to determine the predictor of poor sleep quality. Night time smoking habit (OR= 2.59, 95% CI: 1.55 - 4.32) and doing job in a private organization (OR= 1.71, 95% CI: 1.02-2.85) were identified as the significant predictors of poor sleep quality (Table 3).

Table 3. Logistic regression analysis of nighttime smoking and significant socio-demographic factors with sleep quality.

Variables	Category	OR (95%CI)	P value
Organization	Private	1.71 (1.02-2.85)	0.04
	Government	Reference	
Night time smoking	Yes	2.59 (1.55-4.32)	<0.01
	No	Reference	

4. Discussion

The current study revealed the night time smoking status of desk-based officials and their sleep quality, musculoskeletal health status and identified the factors associated with poor sleep condition in Dhaka city. More than half of the participants were nighttime smokers and the smoking habit after meal was more prevalent. According to a previously study in USA, the prevalence of at least one episode during night is around 41% (Scharf, Dunbar, and Shiffman 2008). There is limited study in this regard and more study is required using wide range of population for better understanding. All of the desk-based officials are highly educated and have enough knowledge on bad impact of nighttime smoking. Counseling services for smokers needed to be arranged by responsible authority to reduce the health burden better work efficiency.

Majority of the participants are overweight or obese. A high BMI (overweight and obesity) is a well-known predictor of musculoskeletal health problems (Seaman, 2013; Viester *et al.,* 2013). We also observed a low amount of physical activity and high number of sedentary activities among study participants. Desk-based officials should lower the sedentary hours and develop the habit of regular physical activity for better health status.

It is well established that smokers have poorer sleep quality than nonsmokers (Liao *et al*., 2019; Oh *et al*., 2022). Current findings strengthened that night time smoking habit significantly increases the risk of poor sleep quality of desk-based officials compared to individuals those does not have night time smoking habit. Previously reported a significant poor sleep quality of night smokers than non-night smokers (Peters *et al*., 2011; da Silva e Silva *et al*., 2022). Another study revealed that, night time smoking is significantly associated

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with a higher intensity of insomnia as well as short sleep (PhD et al. 2021). Employees experiencing high work burden have more risk to develop sleep problems (Burgard and Ailshire, 2009; Fietze *et al*., 2022). This study revealed a higher prevalence of poor sleep quality among employees from private organizations. This might be due to high work burden in their organizations.

Previous studies have observed the negative effects of smoking on the musculoskeletal system (Al-Bashaireh *et al*., 2018). There is also a statistically significant association between sleep quality and the presence of musculoskeletal pain (Chun *et al*., 2018). The present study revealed a significant association between musculoskeletal pain and night time smoking, which has not yet focused by previous studies.

There were several limitations in terms sampling technique, sample size, tools and representativeness. Here, only self-reported information was used for the analysis and no follow up was performed. For more precise findings monthly smoking data would be collected. The present study did not use any recognized validated scale to determine the musculoskeletal health status of participants, which was important to determine the actual health status. A countrywide study focusing various groups of people is recommended to represent the scenario of Bangladesh.

5. Conclusions

Poor sleep quality is highly prevalent among desk-based officials of Dhaka city. There was a high prevalence of some negative practices among desk-based officials such as low physical activity, high sedentary hours, nighttime smoking, and habit of smoking after meal. More than half of the officers were overweight or obese which is a concerning issue. Presence of musculoskeletal health issue among officials negatively impact work performance. The findings of this study would be valuable for Bangladesh and international perspective. It will help the policy makers in making decision to improve the work performance.

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' contribution

A.H.M. Khairul Imam Suman, AQM Mobin, Fatema Tuj Johora and Morshad Alam equally contributed in research design, data analysis, and manuscript writing; A.H.M. Khairul Imam Suman, Khadija Begum, Kaniz Rahman, and Saiful Bahar Khan involved in data collection and data entry. All authors have read and approved the final manuscript.

References

Al-Bashaireh AM, LG Haddad, M Weaver, DL Kelly, X Chengguo and S Yoon, 2018. The effect of tobacco smoking on musculoskeletal health: A systematic review. J. Env. Pub. Heal., 2018: 4184190.

Backhaus J, K Junghanns, A Broocks, D Riemann and F Hohagen, 2002. Test-retest reliability and validity of the Pittsburgh Sleep Quality Index in primary insomnia. J. Psych. Res., 53:737–40.

Burgard, SA and JA Ailshire, 2009. Putting work to bed: Stressful experiences on the job and sleep quality. J. Heal. Soc. Behav., 50: 476–92.

Chun, MY, BJ Cho, SH Yoo, B Oh, JS Kang and C Yeon, 2018. Association between sleep duration and musculoskeletal pain: The korea national health and nutrition examination survey 2010-2015. Medicine, 97: e13656.

Daley M, CM Morin, M LeBlanc, JP Grégoire, J Savard and L Baillargeon, 2009. Insomnia and its relationship to health-care utilization, work absenteeism, productivity and accidents. Sleep Medicine, 10: 427–38.

Detels R and CC Tan, 2009. 1.1 The Scope and concerns of public health. Oxford Textbook of Global Public Health (6 edn), pp. 3-18.

Fietze I, L Rosenblum, M Salanitro, AD Ibatov, MV Eliseeva, T Penzel, D Brand and G Westermayer, 2022. The interplay between poor sleep and work-related health. Front. Pub. Heal., 10: 866750.

Simon GE and M Vonkorff, 1997. Prevalence, burden, and treatment of insomnia in primary care. American J. Psych., 154: 1417–23.

Garbarino S, P Lanteri, P Durando, N Magnavita and WG Sannita, 2016. Co-morbidity, mortality, quality of life and the healthcare/welfare/social costs of disordered sleep: a rapid review. Int. J. Env. Res. Pub. Heal., 13:

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831.

He H, Z Pan, J Wu, C Hu, L Bai and J Lyu. 2022. Health effects of tobacco at the global, regional, and national levels: results from the 2019 global burden of disease study. Nicot. Tob. Res., 24: 864–70.

Liao, Y, L Xie, X Chen, BC Kelly, C Qi, C Pan, M Yang, W Hao, T Liu and J Tang, 2019. Sleep quality in cigarette smokers and nonsmokers: findings from the general population in central China. BMC Pub. Heal., 19: 808.

Magnavita N and S Garbarino, 2017. Sleep, health and wellness at work: a scoping review. Int. J. Env. Res. Pub. Heal., 14: 1347.

Nargis N, GM Faruque, M Ahmed, I Huq, R Parven, SN Wadood, AKMG Hussain and J Drope, 2020. A comprehensive economic assessment of the health effects of tobacco use and implications for tobacco control in Bangladesh. Tob. Cont., 31: 723-729.

Oh S, S Kim, E Sung, CH Kim, JH Kang, H Shin and IY Cho, 2022. The association between cotinine-measured smoking intensity and sleep quality. Tob. Ind. Dis., 20: 77.

Peters EN, LM Fucito, C Novosad, BA Toll and SS O'Malley, 2011. Effect of night smoking, sleep disturbance, and their co-occurrence on smoking outcomes. Psych. Addic. Behav., 25: 312–19.

PhD AN, JU Rhee, P Haynes, S Chakravorty, F Patterson, WDS Killgore, RA Gallagher, L Hale, C Branas, N Carrazco, P Alfonso-Miller, JA Gehrels and MA Grandner, 2021. Smoke at night and sleep worse? the associations between cigarette smoking with insomnia severity and sleep duration. Sleep Heal., 7: 177–82.

Phillips, Barbara A., and Frederick J. Danner. 1995. Cigarette Smoking and Sleep Disturbance." Arch. Intern. Med., 155:734–37.

Rahman MA, S Kundu, BO Ahinkorah, J Okyere, HR Halder, MM Rahman, UN Yadav, SK Mistry and MA Rahman, 2021. Was there any change in tobacco smoking among adults in Bangladesh during 2009-2017? insights from two nationally representative cross-sectional surveys. BMJ Open, 11: e057896.

Scharf D, M Dunbar and S Shiffman, 2008. Smoking during the night: Prevalence and smoker characteristics. Nico. Tob. Res. 10: 167–78.

Seaman DR, 2013. Body mass index and musculoskeletal pain: Is there a connection? Chiropr. Man. Therap., 21:15.

da Silva e Silva, WC, NL Costa, DS Rodrigues, ML da Silva and KC Cunha, 2022. Sleep quality of adult tobacco users: a systematic review of literature and meta-analysis. Sleep Epidemiol., 2: 100028.

Swapan, M, A Zaman, T Ahsan and F Ahmed, 2017. Transforming urban dichotomies and challenges of south Asian Megacities: rethinking sustainable growth of Dhaka, Bangladesh. Urban Sci., 1: 31.

Viester L, EA Verhagen, KMO. Hengel, LL Koppes, AJVD Beek and PM Bongers, 2013. The relation between body mass index and musculoskeletal symptoms in the working population. BMC Muscul. Dis., 14: 238.

World Data ATLAS. 2022. Bangladesh - smoking prevalence adult men. Retrieved (https://knoema.com/atlas/Bangladesh/topics/Health/Risk-factors/Smoking-prevalence-adult-men).

World Health Organization (WHO). 2022. Tobacco *2022*. Retrieved (https://www.who.int/news-room/fact-sheets/detail/tobacco).