Original Article

Obesity and Musculoskeletal Disorders among Public Sector Bank Employees of Mangaluru Region – A Cross-sectional Study

Sunila Dixit, Mackwin Kenwood D'mello*, Priyanka Dsouza Rent

ABSTRACT

Introduction: Certain professions predispose individuals to obesity and musculoskeletal disorders. Banking is one such sector where working involves sitting for prolonged times along with exposure to physical and psychosocial risk factors. Very few studies have been conducted in India in public sector bank settings, concerning these chronic conditions. This study intends to encourage further research in these areas. **Objectives:** This study aimed to determine the prevalence of obesity and MSDs. Its objectives were to determine the association of these conditions with socio-demographic characteristics and lifestyle factors. **Materials and Methods:** A cross-sectional study was conducted among 487 employees working in PSU banks of Mangaluru region. WHO STEPS and modified Nordic questionnaire were used for this study. The participants were measured for their height and weight, using a portable stature meter and a digital weighing scale respectively. **Results:** The aggregate prevalence of overweight and obesity was 65.5% (20.9% for overweight and 44.6% for obesity). The prevalence of musculoskeletal discomfort within the past 12 months was 57.3%. Most of the complaints were reported for the lower back (27.1%) and neck (26.9%). **Conclusion:** The aggregate prevalence of overweight/obesity and MSDs among the public sector bank employees of Mangaluru region was very high. Action needs to be taken at policy level. The cost of treating these chronic conditions can be very high. Risk factors need to be modified which will help to control the prevalence of obesity and MSDs.

Key words: Obesity, Overweight, Sedentary, BMI, Musculoskeletal disorders, Public sector bank.

INTRODUCTION

Sedentary lifestyle has emerged to be one of the significant risk factors, responsible for chronic/non-communicable diseases. Often neglected, obesity and musculoskeletal disorders are public health concerns of increasing measure. The worldwide prevalence of obesity nearly doubled, between the years 1980 and 2014.[1] The reason behind the increase in prevalence of obesity in developing countries has been attributed to a shift from rural to urban lifestyle, from physically active routine to sedentary routine and from nutritious foods to energy-dense foods.[1] As per the Global Status Report on NCDs, the age-standardised prevalence of obesity in India increased by 22% from 2010 to 2014.[2]

Work-related musculoskeletal disorders (WMSDs) occur due to improper postures and carrying out repetitive and forceful movements. They are characterized by inflammatory and degenerative conditions of muscles, tendons, joints, ligaments and peripheral blood vessels and nerves.[3] MSDs is the second largest contributor to disabilities worldwide, with lower back pain being the leading cause of disabilities. WMSDs have been found to be associated not only with physical risk factors but also with psychosocial risk factors. Factors such as work load, stress, lack of social support also contribute towards WMSDs. WMSDs account for significant expenditure due to their chronic nature. According to the International Labour Organisation estimates, occupational illnesses and accidents account for 4% of the world's GDP. Recent studies have shown evidence that WMSDs are the most expensive of occupational diseases.[4] This means WMSDs account for a major share of that 4% of the world's GDP.

Certain professions predispose individuals to develop obesity and musculoskeletal disorders. These professions are characterized by sitting for long times in one position. Long working hours combined with physical and psychosocial risk factors create an apt setting for these disorders. Banking is one such sector where working involves sitting for prolonged times. The levels of stress are also considerably high in the banking environment. Public Sector Undertaking (PSU) banks in India are not covered by any law or policy concerning work hours. Thus, PSU bank employees end up working for more than eight hours a day. This leaves them no time for any physical activity even if they want to. Moreover, it adds to the fatigue and stress. Very few studies have been conducted in India in bank settings, concerning

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chronic conditions such as obesity and MSDs. This study intends to encourage further research in these areas.

Hypothesis

There is a high prevalence of obesity and musculoskeletal disorders among public sector bank employees.

Aim

- To determine the prevalence of obesity and musculoskeletal disorders among public sector bank employees.

Objectives

- To determine the association of obesity and musculoskeletal disorders with lifestyle factors.
- To find the association of obesity and musculoskeletal disorders with socio-demographic characteristics.

Methods

Study design

A cross-sectional study was conducted from January 2019 – April 2019. A semi-structured, self-administered questionnaire was used. It consisted of four parts –

- Demographic information – general information regarding age, gender, grade of employment along with Kuppuswamy scale (2018) was used for getting information on the socio-economic status
- WHO STEPS – this questionnaire was used to assess the lifestyle habits of the participants
- Modified Nordic questionnaire - this was used to find the prevalence of MSDs in different parts of body.
- A Likert scale ranging from 0-4 was used to assess the perceived physical and psychological risk for MSDs.

Since the questionnaire covered hypertension and diabetes history, health records were not looked into. Due to time and resources constraints, the study only focused on hypertension and diabetes, which are found to be the top two conditions related to obesity.

Ergonomics were not considered in this study, as the main intent was to understand if there is an association of physical (which includes workstation design as well) and psychosocial risk factors with the occurrence of MSDs and if the participants are taking any treatment for their musculoskeletal conditions. If ergonomics were to be considered, it would have been a study on its own as it would require going in to the details of workstation design. The purpose of the Nordic questionnaire is not to diagnose MSDs, but to understand how much the participants are aware of their musculoskeletal conditions.

Sample size and sampling

Based on the study conducted by Hirani *et al.* a prevalence of 30% was considered and a sample size of 323 was calculated, at 95% confidence interval and a 5% margin of error. Allowing for a design effect of 1.5, the effective sample size was arrived at 487 participants.

There is a total of 16 PSU banks in Mangaluru. Out of these, 20% (i.e. 3) were selected through random sampling. The three banks have a total of 1648 employees working in Mangaluru region. The number of employees to be included from each bank was calculated by multiplying the population of one bank with sample size and dividing the result by total population of all 3 banks. Due to the busy schedules of employees and leave of absence, the participants were selected through convenience sampling.

Selection criteria

- Inclusion criteria – employees who had completed six months or more of working in a bank
- Exclusion criteria – those who were unwilling to participate, pregnant women, attendant staff

For measuring weight

A digital weighing scale was used to measure weight in kilograms. Employees were instructed to stand on the weighing scale without shoes and any objects like wallets, coins in their pockets and hands. They were asked to look straight and not look down.

For measuring height

The participants' heights were measured using a portable stature meter. The stature meter was placed on the floor, against the wall. The tape was pulled up for the zero to coincide exactly with the red stripe in the measurement display area. A mark was made on the wall where the tape ended. At that mark, the top of the tape was stuck on the wall.

Participants were asked to stand upright without their shoes, with their backs against the vertical surface, heels together and eyes looking forward. The measuring tape was pulled down until it reached the top of the head of the participants. Height was measured to the nearest 0.1 cm.

Operational definitions

- BMI – weight (kg)/height (m²)
- According to WHO Asia Pacific Guidelines
  - ➢ Underweight – BMI < 18.5 kg/m²
  - ➢ Normal weight – BMI18.5 – 22.9 kg/m²
  - ➢ Overweight – BMI 23.0 – 24.9 kg/m²
  - ➢ Obese – BMI ≥ 25 kg/m²
- MSDs – presence of discomfort/inflammation/pain in or degenerative condition of muscles, tendons, ligaments, joints, peripheral nerves of any body part

Statistical analysis

Data was analysed using Statistical Package for Social Sciences (SPSS 23.0). Frequencies, mean, and standard deviation were used for univariate analysis. For bivariate analysis, chi-square test was used to find an association between independent and dependent categorical variables. For the sake of analysis, BMI categories were sub-categorised into two groups – non obese (under/normal) and overweight/obese.

Ethical considerations

Ethical clearance was obtained from Institutional Ethics Committee, K. S. Hegde Medical Academy, Nitte (Deemed to be University). Permission was taken from the concerned authority at the banks to conduct the study. Participants were explained about the objectives and the nature of the study. Each participant was asked for informed consent, prior to administering the questionnaire. All information collected was kept confidential and the identity of the participants and their organisations was not revealed.

RESULTS

In this study, 58.3% of the participants were males and 41.7% were females. The mean age was 39.96±11.76 years. The minimum age of the participants was 23 whereas maximum age was 60. The number of females and males was the highest in the age group 20-30. Majority of the participants (41%) were officers, 30% were managers and 29% were clerks. About three-quarters of the participants were married. Most of

the participants (71.5%) had completed their graduation. The mean number of years spent working with the bank was 15.96 ±12.41 years. Out of the total participants, 5.8% currently use tobacco products daily (both smoking and chewing), while 8.5% used tobacco products in the past. About 80% of the participants had consumed alcohol within the past 12 months. Out of those 80%, 96 participants had consumed alcohol within the past 30 days. Around 21% of the participants were overweight and 44.6% were obese. Gender, monthly income and weekly working hours were not found to be significantly associated with BMI categories. In the case of lifestyle factors, consumption of fruits/vegetables, physical activity and alcohol consumption were not found to be significantly associated with BMI categories. On an average, the participants spent 7.5+-1.36 hours sitting, daily at work, with a majority (55.4%) of them spending between 6-8 hours (Table 1). If we assume the standard 8 hr of sleeping and one hour each for travelling to and from work, it means people are home for 6 hours which is lesser than the time they spend at work. Characteristics like age, grade of employment, marital status, number of years at work were found to be significantly associated with being obese/overweight (Table 2). Occupational sitting time and lifestyle diseases like hypertension and diabetes were also found to be significantly associated (Table 3).

More than half (57.3%) of the participants complained of musculo-skeletal discomfort in at least one body part. Many participants reported multiple musculoskeletal complaints. In spite of being prevented from doing their work, not all of the participants had taken treatment for it (Table 4). The highest number of complaints regarding musculoskeletal discomfort was for lower back (27.1%), followed by neck (26.9%) and shoulders (20.7%) (Figure 1). Musculoskeletal discomfort in hips/thighs (6.4%) and elbows (7.5%) was found to be lower than in other body parts.

The participants were asked if they perceived any physical risk for MSDs based on four factors - force exertion, awkward posture, static posture and repetitive movements. A Likert scale ranging from 0-4 was used for scoring. Majority of the females (59.6%) and males (58.5%) faced moderate risk for MSDs. Similarly, in the case of psychosocial risk, the participants were asked if they perceived any risk based on five factors
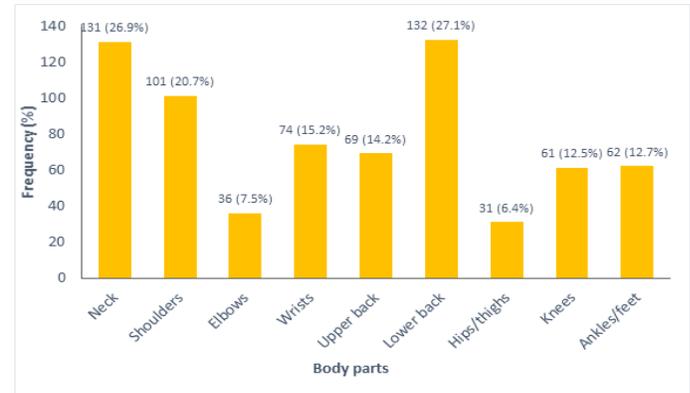

Figure 1: Distribution of participants based on musculoskeletal discomfort in the last 12 months.

Table 1: Distribution of participants based on lifestyle factors.

Characteristics	Frequency	Percent
Consumption of fruit servings in a day (*n* = 479)		
1 – 2	419	87.5
> 2	60	12.5
Consumption of vegetable servings in a day (*n* = 486)		
1 – 2	407	83.8
2 – 3	76	15.6
> 3	3	0.6
Consumption of outside meals (*n* = 487)		
Yes	102	21.0
No	385	79.0
Types of physical activity†		
Walking	274	56.3
Vigorous-intensity activity	100	20.7
Moderate-intensity activity	147	30
Occupational sitting time in a day (in hours)		
< 6	113	23.2
6 – 8	270	55.4
8 – 10	104	21.4
Diagnosed with hypertension	96	23.4
Diagnosed with diabetes	60	17.1

†Multiple responses

Table 2: Association of BMI categories with gender, age, grade of employment, marital status, level of education and work experience

Characteristics	Overweight/ obese	Non-obese	*p* value
Age			
20 – 30	80 (25.1%)	68 (41.5%)	
30 – 40	79 (24.8%)	37 (22.6%)	
40 – 50	59 (18.5%)	31 (18.9%)	0.00**
50 – 60	101 (31.7%)	28 (17.1%)	
Grade of employment			
Managers	112 (35.1%)	34 (20.7%)	
Officers	113 (35.4%)	87 (51.8%)	0.00**
Clerks	94 (29.5%)	47 (28.0%)	
Marital status			
Single	59 (18.5%)	55 (32.7%)	
Married	257 (80.6%)	113 (67.3%)	0.001*
Divorced/separated	3 (0.9%)	0	
Level of education			
Profession or honours	77 (24.1%)	28 (17.1%)	
Graduate	225 (70.5%)	123 (73.2%)	
Intermediate or diploma	9 (2.8%)	13 (7.7%)	0.033*
High school certificate	7 (2.2%)	4 (2.4%)	
Middle school certificate	1 (0.3%)	0	
Work experience (in years)			
< 10	134 (42.0%)	91 (54.2%)	
10 – 20	39 (12.2%)	22 (13.1%)	
20 – 30	74 (23.2%)	30 (17.9%)	0.04*
30 – 40	72 (22.6%)	25 (15.3%)	

*$p < 0.05$

**$p < 0.001$

Table 3: Association of BMI categories with tobacco usage, occupational sitting time, hypertension and diabetes.

Characteristics	Overweight/ Obese	Non-obese	*p* value
Ever used tobacco products in the past			
Yes	33 (11.0%)	6 (3.8%)	0.006*
No	267 (89.0%)	155 (96.3%)	
Occupational sitting time (in hours)			
< 6	85 (26.6%)	28 (16.7%)	
6 – 8	163 (51.1%)	107 (63.7%)	0.016*
8 – 10	71 (22.3%)	33 (31.7%)	
Diagnosed with hypertension			
Yes	74 (27.8%)	22 (15.3%)	0.004*
No	192 (72.2%)	122 (84.7%)	
Diagnosed with diabetes			
Yes	47 (20.8%)	13 (10.5%)	0.014*
No	179 (79.2%)	111 (89.5%)	

*p< 0.05

Table 4: Distribution of participants based on them being prevented from doing work due to the presence of musculoskeletal discomfort in different body parts.

Body part	In the last 12 months		In the last 7 days	
	Prevented from doing work	Treatment taken	Prevented from doing work	Treatment taken
Neck	47 (35.9%)	30 (22.9%)	9 (6.9%)	5 (3.8%)
Shoulders	31 (30.7%)	17 (16.8%)	10 (9.9%)	3 (3%)
Elbows	15 (41.7%)	9 (25%)	6 (16.7%)	3 (8.3%)
Wrists	20 (27%)	9 (12.3%)	6 (8.1%)	1 (1.4%)
Upper back	14 (20.3%)	4 (5.9%)	8 (11.6%)	0
Lower back	44 (33.3%)	26 (20%)	8 (6.1%)	3 (2.3%)
Hips/thighs	5 (16.1%)	5 (16.1%)	2 (6.5%)	3 (9.7%)
Knees	20 (33.3%)	11 (18.3%)	7 (11.5%)	4 (6.7%)
Ankles/feet	16 (25.8%)	11 (18%)	7 (11.3%)	4 (6.6%)

– job dissatisfaction, lack of job control, job monotony, job demand and lack of social support. Majority of females (42.3%) and males (56%) faced moderate psychosocial risk for MSDs.

DISCUSSION

The aggregate prevalence of overweight and obesity among the public sector bank employees of Mangaluru region was 65.5% (overweight 20.9% and obese 44.6%). In Accra, Greece, Addo *et al.* found the overall prevalence of overweight and obesity to be 55.6% among the financial institution workers.[5] In a study conducted on bank employees of Aurangabad, Maharashtra, a higher overall prevalence (77.5%) of overweight and obesity was reported.[6] Many studies have found the prevalence of overweight and obesity to be more than 50%, which is a cause of concern. This could be attributed to the sedentary lifestyle of office employees.

In the present study, the study population comprised of 58.3% males and 41.7% females. The percentage of females who were overweight/ obese was close to that of males. In this study, gender was not found to be significantly associated with BMI categories. This is in contrast with the study conducted by Addo *et al.* where gender was found to be significantly associated (*p*< 0.001). Females were twice at more risk than males.[5] In general, females are more at risk of developing obesity because of factors like menarche, menopause, cultural restraints and a relatively lower metabolism rate than that of males.[7]

In this study, the mean age of the population was 39.96 ± 11.76 years. In the linear regression model, age was found to be significantly associated with BMI categories (*p* < 0.001). For every unit increase in age, the risk of obesity increased by 0.055 times. This finding is in line with the study conducted by Mummery *et al.* where age was reported to be significantly associated with being overweight/obese.[8] Studies conducted by Siddiqui and Donato, Pradeepa *et al.* and Nagendra *et al.* also showed similar results.[1,9,10] Age is one of the most common and significant risk factors of obesity. As age increases, the level of physical activity decreases which predisposes individuals to obesity.

A significant association was found, in bivariate analysis, between the level of education and overweight/obesity (*p*< 0.05) in this study. An exploratory multi-level analysis of national data carried out by Siddiqui and Donato showed that initial years of education increased the probability of obesity and it decreased the probability after 7-8 years of education.[1]

Findings from this study show that marital status is significantly associated with BMI categories. A study that sought to find a relation between obesity and marital status found that singles who started dating and then living together with their partners became more susceptible to obesity. Married people were observed to have strong obesity-related behaviours which could be attributed to the shared household environment.[11] The current study found a significant association of BMI categories with the number of years spent working in the bank. A Greek cross-sectional study found that the risk of obesity was directly proportional to the number of years spent working at the bank.[5]

Among lifestyle factors, tobacco consumption in the past was found to be significantly associated with being overweight/obese (Table 3). Siddiqui and Donato, in their study, found that people who consumed tobacco had a higher likelihood of overweight/obesity than those who did not.[1] Studies are showing evidence that tobacco consumption affects body fat distribution and increases the risk of central obesity.[12] In this study, there was a significant association between occupational sitting time and BMI categories (*p*< 0.05). A study that investigated the association between occupational sitting time and overweight/obesity, reported the odds of being overweight/obese almost twice for males who sat for ≥ 6 hr/day than those who sat for < 45 min/day.[8]

This study found the presence of hypertension and diabetes to be significantly associated with BMI categories. Pradeepa *et al.* also found similar associations in their study.[9] A study conducted in four low middle-income countries reported that "every standard deviation higher of BMI was associated with 1.65 and 1.6 times higher probability of diabetes and 1.42 and 1.28 times higher probability of hypertension, for men and women respectively".[13] Since this is a cross-sectional study, it is difficult to establish temporality between obesity and the mentioned metabolic conditions. However, there is much evidence pointing to how obesity contributes to the development of hypertension and diabetes.

In this study, the overall prevalence of musculoskeletal discomfort in the past 12 months was found to be 57.3%. A lower prevalence of 33.8% was reported among bank employees of Kancheepuram, Tamil Nadu.[3] Saleem *et al.* observed a prevalence of 69% among software professionals.[14]

This study did not find any significant associations between MSDs and socio-demographic characteristics. However, many studies have reported a significant association between MSDs and age, gender, work experience and working hours. This study found significant associations between physical and psychosocial risk factors and MSDs. Physical factors such as force exertion, static position and repetition of movements were significantly associated. This is in line with the findings of Ekpenyong and Inyang. Physical factors contributed to the highest risk (41.6%) for MSDs.[4] In the present study, psychosocial factors such as job dissatisfaction, monotony and workload were found to be significantly associated with MSDs. Ranasinghe *et al.* reported work overload and lack of social support to be significantly associated with MSDs of arms and neck.[15] While the role of physical factors in the development of MSDs is apparent, many are not aware of the role psychosocial factors play. High psychological job demands can result in increased exposure to physical factors.[16]

In this study, BMI was observed to be significantly associated with MSDs ($p<0.05$). This supports the findings of Saleem *et al.* where they speculate that "the contributing factor could be the increase in physiological and mechanical load on tissues due to overweight/obesity".[14]

Strengths of the study

The study was carried out by a single investigator, hence inter-investigator biases were eliminated. The WHO STEPS questionnaire and Nordic questionnaire were used for the study, which have been already been tested and used in other studies, nationally and internationally.

Limitations of the study

Most of the participants were uncomfortable for getting their hip and waist circumferences measured. Hence, the waist to hip ratio had to be excluded from the study. The results of the study would have been better-rounded, had WHR been used along with BMI as measures of obesity. There is a possibility of self-reporting bias in case of physical activities and occupational sitting times. Confounders may have had an effect on the results. For e.g., conditions like hypothyroidism which can lead to weight gain, were not considered in the study.

CONCLUSION

The aggregate prevalence of overweight/obesity and MSDs among the public sector bank employees of Mangaluru region was very high. Such high prevalence rates ring alarm bells which call for effective interventions. Since more than 50% of the participants were overweight/obese, a spurious association was found between tobacco consumption, presence of hypertension/diabetes and overweight/obesity. This means that the number of people who were diagnosed with hypertension and had obesity were lesser than those who did not have hypertension and were obese. This could be attributed to coincidence or confounding factors. Lack of policy vis-à-vis regulation of working hours in public sector banks is a significant obstacle in the way of good health of bank employees.

Many are not aware that just being physically active is not enough, but one also needs to reduce their sitting times by regularly taking breaks. To add to that, many people do not realise the role psychosocial factors play in increasing the risk for MSDs. Work environment needs to be improved to prevent the risk of obesity and MSDs. Simple steps such as increasing awareness, reducing sitting time and doing light stretching exercises can go a long way.

Obesity and MSDs are chronic conditions and hence, special attention needs to be given. Obesity can lead to many other metabolic conditions such as hypertension, diabetes and disorders of kidneys. The financial costs of treating these conditions can be very high. MSDs contribute to work absenteeism which can eventually contribute to the loss of GDP.

Considering the high levels of stress and long working hours, the motivation to be physically active and health conscious is very low. This needs to be changed, starting from modifying the risk factors which will help to control the prevalence of obesity and MSDs.

Recommendations

More researchers need to carry out studies on public sector bank employees to highlight their health issues. Policy-makers need to formulate policy regarding working hours in public sector banks. Working hours need to be regulated and over-time needs to be compensated accordingly. Policies should encourage the construction of office spaces with ergonomic considerations.

Banks need to ensure healthy food is being served in its canteens. In this study, it was observed that many of the participants were transferred from their hometowns and they did not cook for themselves. Many of them ate breakfast and lunch in the office canteens. Posters listing the dos and don'ts to prevent obesity and MSDs should be displayed in the offices to increase the awareness. Weekly/monthly recreational activities should be conducted to reduce stress and encourage physical activity.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST

There was no conflict of interest involved in this study.

ABBREVIATIONS

BMI: Body Mass Index; **GDP:** Gross Domestic Product; **MSD:** Musculoskeletal Disorders; **NCD:** Non Communicable Diseases; **PSU:** Public Sector Undertaking; **WHO STEPS:** World Health Organization STEP wise approach to Surveillance; **WHR:** Waist Hip Ratio; **WMSD:** Work-related Musculoskeletal Disorders.

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