Work-related musculoskeletal disorders and associated factors among bank workers in Addis Ababa, Ethiopia: a cross-sectional study

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Abstract

Background: Work-related musculoskeletal disorders (WMSDs) are dramatically increased in the world due to the advancement of technology and competitiveness of markets. There were limited studies carried out regarding WMSDs among bank workers in Africa particularly in Ethiopia. Therefore, the aim of this study was to assess the magnitude of work-related musculoskeletal disorders and associated factors among bank workers in Addis Ababa, Ethiopia.

Methods: Institution-based cross-sectional study design was employed in the study. Multi-stage sampling techniques were used to select 838 bank workers from 62 banks in Addis Ababa. Self-administered standard Nordic questionnaires were used as well. Multivariable binary logistic regression analyses were employed to identify factors associated with WMSDs. Moreover adjusted odds ratio (AOR), 95% confidence interval (CI) and \( p \) value < 0.05 was used to show the strength of association between explanatory variables and dependent variable.

Results: Out of 838 total numbers of participants, 755 bank workers returned their questionnaires responding with a rate of 90%. Of these, 77.6% (\( N = 586 \)) suffered WMSDs with a 95% CI [75–81%]. Based on the final multivariate logistic regression analysis being female [AOR = 2.98, 95% CI 1.91–4.65], sitting back in a twisted position [AOR = 3.59, 95% CI 2.13–6.08], sitting back bent [AOR = 4.06, 95% CI 2.48–6.66], work on fixed position [AOR = 1.78, 95% CI 1.17–2.71], no work time break [AOR = 3.33, 95% CI 1.44–7.71], type of chairs [AOR = 2.62, 95% CI 1.19–5.75] and job stress [AOR = 2.33, 95% CI 1.19–4.54] were factors significantly associated with WMSDs.

Conclusion: From the study’s findings, the magnitude of work-related musculoskeletal disorders among bank workers was high. Being female, awkward posture, no work time break, fixed position, type of chairs, and job stress are the factors significantly associated with WMSDs. So bank workers should use proper types of chairs, practice proper work posture, increase healthy working conditions, and create awareness programs on how to maintain beneficial health conditions which may lead to increased leisure time.

Keywords: Bank workers, Musculoskeletal disorder, Prevalence, Work related
Background
Musculoskeletal disorder is a serious problem that every human being will face at least once throughout their lifetime. Work-related musculoskeletal disorder (WMSDs) is a soft-tissue disorder of non-traumatic origin that is caused or exacerbated by interaction with the work environment [1–4].

Every year over 2.34 million women and men die at work from an occupational injury or disease; of these, over 350,000 deaths are due to fatal accidents and almost 2 million deaths are due to fatal work-related diseases [5, 6]. The distribution of work-related fatalities by United Nation (UN) geographical regions accounted Europe for 11.7%, Oceania for 0.6%, Africa for 11.8%, America for 10.9%, and Asia 65.0% [7]. A study conducted in Kuwait and India which focused on 12-month prevalence of WMSDs accounted for 80.0% and 83.5% respectively [8, 9]. In addition, a study conducted in Nigeria and Ghana revealed that a 12-month prevalence of WMSDs among the bank workers accounted for 71.7% and 83.5% respectively [10, 11].

Moreover, the global compensation cost of WMSDs accounted for 40% in 2015. This shows that WMSDs is one of the leading causes of socio-economic burden of workers due to direct and in direct costs [7]. The major factors that may influence the problem includes people sitting with their backs bent, back twisted, having no work time break, psychosocial factors, repetitive work and awkward posture [1].

The studies conducted in different countries showed that office workers including bank workers are vulnerable groups for different WMSDs [8–11]. However, there are limited studies carried out regarding WMSDs among bank workers in Africa particularly in this study setting. Hence, the focus of this study was to assess the magnitude of WMSDs and associated factors among bank workers.

Methods
Study design and study population
Institution-based cross-sectional study design was employed. This study was conducted in Addis Ababa the capital city of Ethiopia. The city is administered by a city council and organized in 10 sub-cities and 117 districts. There are about 1303 banks found in Addis Ababa in 2016/2017 and an estimated number of more than 10,000 employees who worked in those banks [12].

The source of the study’s population was all bank workers engaged in bank activity in Addis Ababa, Ethiopia. The study population was all bank workers engaged in bank activity in the selected three sub-cities of Addis Ababa. For this study, bank workers who worked at least 1 year were included.

Sample size and sampling procedures
The sample size for the magnitude of WMSDs was computed based on single proportion formula by using proportion of WMSDs from a previous study conducted in Rwanda among bank workers who accounted for 45.8% [13] and a 95% confidence interval (CI) and margin of error of 5% and 10% non-response rate. Since the sampling method was multi-stage, this study used design effect of 2 making a total sample size of 838.

For associated factors for the occurrence of WMSDs, the sample size was computed using double population proportion formula using Epi Info software considering the different variables like sitting while back is bent, sitting while back is twisted, and work time break. But the sample sizes were low compared to the sample size for the prevalence of WMSDs. Finally, the larger sample size was taken for this study.

Study participants were selected using multi-stage sampling techniques. From 10 sub-cities, three sub-cities (Arada, Nifas silk lafto, and Kirkos) was selected randomly using lottery method. Then, the number of banks was determined in each sub-city proportionally. By using probability proportional to size (PPS) study subjects were allocated to each bank and selected by a simple random sampling technique.

Data collection tools
The standard Nordic Musculoskeletal Questionnaire (NMQ) was used to assess the magnitude of neck, shoulder, upper back, lower back, hip/thigh, knee/leg, ankle/foot, wrist/hand, and elbow musculoskeletal disorders [14]. The reliability of the Amharic version questionnaire was tested using Cronbach’s alpha (Cronbach’s alpha = 0.72). Detailed information regarding socio-demographic factors, behavioral factors, ergonomic factors, organizational, and psychosocial factors was also included in the structured questionnaire.

Data quality control
The data collection tool was first designed in English and then translated in to the local language, Amharic and then back to English. Afterward, training was provided for four data collectors and two supervisors for 2 days, which made them familiar with the data collection procedures. Finally, a pre-test was done on 5% (N = 42) of the total sample size. This was done so that those who did not participate in the main study would be addressed. Based on the pre-test analysis, unclear questions were modified. Supervisors and investigators evaluated the collected data completeness, accuracy, and clarity on a daily basis.

Data processing and analysis
The data entry and code was done by Epi Info version 7 and exported to SPSS version 20 for analysis. The
outcome variable (WMSDs) coded as No = 0 and Yes = 1. Descriptive analysis was done for both dependent and independent variables and binary logistic regression model was used to see the statistical association between different predictors and outcome variables. In this study, 18 variables with \( p \) value < 0.2 in bivariate analysis were included in multivariable logistic regression analysis model to control the effect of confounders. Model fitting was checked by using Hosmer and Lemeshow goodness of fit test, which showed \( p \) value = 0.88. Finally, adjusted odds ratio (AOR) with 95% CI and \( p \) value < 0.05 was used to establish the significance of association between explanatory variables and dependent variable.

**Operational definitions**

- **Bank workers.** Employees that perform financial activities that includes supervisor, customer service, public relation, accounting clerks, loan officers, and managers
- **Work-related musculoskeletal disorders.** Bank workers having perceived pain, ache, or discomfort for at least 2–3 workdays in the last week or the last 12 months in any part of their bodies segments was considered [9]
- **Body mass index (BMI).** < 18.5 = underweight, 18.5–24.9 = normal, 25.0–29.9 = overweight, and \( \geq \) 30.0 = obese [15]
- **Perform physical activity.** Exercising or doing any kind of sport activity including walking at least 150 min/week [16, 17].
- **Awkward posture.** Bank workers perform activities with the neck bent more than 30 degrees without support, working with a bent wrist, working with the back bent without support, and squatting and kneeling for 2 or more hours continuously [18].
- **Repetitive work.** Perform work by repeating the same activity with less than 30 s or no variation every few seconds for 2 or more hours [18]
- **Fixed postures.** Bank workers perform activities by prolonged sitting in a limited space for 2 or more hours without changing positions [18].
- **Job satisfaction.** A score measured using the generic job satisfaction scale as yes (32–50) and no (10–31) [19]
- **Job stress.** A score measured using the workplace stress scales moderate to severe job stress as yes (16–40) and no (\( \leq \) 15) [20]

**Results**

**Socio-demographic characteristics of the study participants**

A total of 755 bank workers returned and fully answered questionnaires making a response rate of 90%. Of the total study participants, 50.7% (\( N = 383 \)) were females. The mean age of the study participants with standard deviation (SD) were 29.4 (SD = 5.91) years. Majority of the study participants, 78.5% (\( N = 593 \)) religion was orthodox and more than three fourths of them had a Bachelor’s degree, 75.4% (\( N = 569 \)). More than half, 51.2% (\( N = 386 \), of the study participants were single in their marital status. About 64.6% (\( N = 488 \)) of the

| Variables/characteristics | Numbers | Percent (%) |
|---------------------------|---------|-------------|
| **Sex**                   |         |             |
| Female                    | 383     | 50.7        |
| Male                      | 372     | 49.3        |
| **Age**                   |         |             |
| 20–29                     | 477     | 63.2        |
| 30–39                     | 235     | 31.1        |
| \( \geq \) 40             | 43      | 5.7         |
| **Religion**              |         |             |
| Orthodox                  | 593     | 78.5        |
| Muslim                    | 54      | 7.2         |
| Protestant                | 88      | 11.7        |
| Catholic                  | 20      | 2.6         |
| **Educational status**    |         |             |
| Certificate               | 8       | 1.1         |
| Diploma                   | 60      | 8.0         |
| Bachelor’s degree         | 569     | 75.4        |
| Master                    | 118     | 15.6        |
| **Marital status**        |         |             |
| Single                    | 386     | 51.2        |
| Married                   | 367     | 48.6        |
| Separated                 | 1       | 0.1         |
| Divorced                  | 1       | 0.1         |
| **Job category**          |         |             |
| Accounting clerks         | 34      | 4.5         |
| Customer service          | 488     | 64.6        |
| Managers                  | 108     | 14.3        |
| Others                    | 125     | 16.6        |
| **Salary**                |         |             |
| \( \leq \) 5240           | 196     | 26.0        |
| 5241–8500                 | 212     | 28.1        |
| 8501–11,200               | 177     | 23.5        |
| \( > \) 11,200            | 169     | 22.4        |
| **Work experience**       |         |             |
| 1–5                       | 162     | 21.5        |
| 6–9                       | 287     | 38.1        |
| \( \geq \) 10             | 305     | 40.5        |
participants’ job was customer service. The mean monthly income of the participants was 8794.4 (SD = 5544.0) Ethiopian Birr. About 40.5% \( (N = 305) \) of the respondents worked at the bank for over 10 years (Table 1).

Magnitude of self-reported work-related musculoskeletal disorders among bank workers
The result of the study revealed that from the total amount of bank workers 77.6% \([95\% \text{ CI 75–81\%}]\) suffered work-related musculoskeletal disorders at least at one region of the body in the last 1 year. The four most affected body regions that the respondents reported pain or discomfort in or around were the lower back 54.3% \((N = 410)\), shoulder 40.9% \((N = 309)\), neck 38.0% \((N = 287)\), and upper back 35.4% \((N = 267)\), while the lowest affected body parts that the respondents reported were hip/thigh 18.9% \((N = 143)\), wrist/hand 16.6% \((N = 125)\), and ankle/foot 15.1% \((N = 114)\) (Fig. 1).

Behavioral characteristics of bank workers
The result indicated that the majority of bank workers 96.6% \((N = 729)\) were non-smokers. Regarding alcohol use 19.7% \((N = 149)\) of the respondents drank alcohol below the threshold of two times per week. The result also indicated that 45.8% \((N = 346)\) of respondents did not practice physical activities. More than half of the participants, 69.0% \((N = 521)\) had BMI in the normal range. A majority of respondents 97% \((N = 732)\), of bank workers performed

Working environment, ergonomic characteristics, and psychosocial factor of bank workers
The study result showed that 92.8% \((N = 701)\) of bank workers performed activities at least 6 days per week. Majority, 97% \((N = 732)\), of bank workers performed

\[
\begin{array}{|c|c|c|}
\hline
\text{Variables/characteristics} & \text{Numbers} & \text{Percent (\%)} \\
\hline
\text{Smoker} & & \\
\text{No} & 729 & 96.6 \\
\text{Yes} & 26 & 3.4 \\
\hline
\text{Alcohol consumption} & & \\
\text{≥ Two times per week} & 47 & 6.2 \\
\text{< Two times per week} & 149 & 19.8 \\
\text{Never} & 559 & 74.0 \\
\hline
\text{Physical activities} & & \\
\text{No} & 346 & 45.8 \\
\text{Yes} & 409 & 54.2 \\
\hline
\text{BMI} & & \\
\text{Normal} & 521 & 69.0 \\
\text{Underweight} & 108 & 14.3 \\
\text{Overweight} & 103 & 13.7 \\
\text{Obese} & 23 & 3.1 \\
\hline
\text{Dominant hand} & & \\
\text{Right hand} & 712 & 94.3 \\
\text{Left hand} & 43 & 5.7 \\
\hline
\text{History of MSDs} & & \\
\text{No} & 725 & 96.0 \\
\text{Yes} & 30 & 4.0 \\
\hline
\end{array}
\]
their work habits by sitting more than or equal to 2 h/day. In addition, majority 40.8% (N = 308) of bank workers were sitting with their back(s) bent. The result also indicated that 94.7% (N = 715) of bank workers performed work by using a computer. More than half (52.1%) (N = 393) of the workers performed activities with a fixed position. Moreover, most bank workers, 87.3% (N = 659), used movable chairs and 77.9% (N = 588) of bank workers used arm rest chair. The finding also indicates that most bank workers, 95.1% (N = 718) did not take work break in minutes. More than half, 59.7% (N = 451), did repetitive activities less than 30 s and only 10.7% (N = 81) of the bank workers took ergonomic training. About 87.0% (N = 657) of the bank workers had a good relationship with their customers. Furthermore, 71.3% (N = 538) of respondents had a good relationship with their boss (Table 3).

Factors associated with self-reported work-related musculoskeletal disorders
A binary logistic regression analysis was employed to assess the effect of explanatory variables to dependent variables and 18 variables that had p value less than 0.2 were included in the multivariate analysis.

Study participants who were female were 3 times more likely to develop WMSDs than male participants [AOR = 2.98, 95% CI 1.91–4.65]. Respondents sitting with their back twisted were 3.6 times more likely to develop WMSDs [AOR = 3.59, 95% CI 2.13–6.08], and respondents sitting with their back bent were 4 times more likely to develop WMSDs [AOR = 4.06, 95% CI 2.48–6.66] when compared to sitting back straight. Moreover, respondents who worked with fixed position were 1.8 times more likely to develop WMSDs [AOR = 1.78, 95% CI, 1.17–2.71] than those who worked without fixed position. Participants sitting in fixed chairs were 2.6 times more likely to develop WMSDs [AOR = 2.62, 95% CI 1.19–5.75] than those who sat in movable chairs. And respondents who had no work time breaks were 3 times more likely to develop WMSDs [AOR = 3.33, 95%

| Table 3 Working environment, ergonomic characteristics, and psychosocial factors of bank workers in Addis Ababa, April 2018 (n = 755) | Variables/characteristics | Number | Percent (%) |
|---|---|---|---|
| Working days | ≤ 6 days | 701 | 92.8 |
| | 7 days | 54 | 7.2 |
| Time spent sitting position | < 2 h | 23 | 3 |
| | ≥ 2 h | 732 | 97 |
| Type of sitting posture | Back twisted | 205 | 27.2 |
| | Back bent | 308 | 40.8 |
| | Back straight | 242 | 32 |
| Utilization of computer | No | 40 | 5.3 |
| | Yes | 715 | 94.7 |
| Fixed position | No | 362 | 47.9 |
| | Yes | 39 | 5.2 |
| Type of chair | Fixed chair | 96 | 12.7 |
| | Movable chair | 659 | 87.3 |
| Arm rest chair | No | 167 | 22.1 |
| | Yes | 588 | 77.9 |
| Work break in min | No | 718 | 95.1 |
| | Yes | 37 | 4.9 |
| Repetitive activities less than 30 s | No | 304 | 40.3 |
| | Yes | 451 | 59.7 |
| Ergonomic training | Yes | 81 | 10.7 |
| | No | 674 | 89.3 |
| Customer relationship | Good | 657 | 87.0 |
| | Poor | 98 | 13 |
| Boss relationship | Good | 538 | 71.3 |
| | Fair | 165 | 21.9 |
| | Poor | 24 | 3.2 |
| | None | 28 | 3.7 |
| Colleague relationship | Good | 629 | 83.3 |
| | Fair | 114 | 15.1 |

| Table 3 Working environment, ergonomic characteristics, and psychosocial factors of bank workers in Addis Ababa, April 2018 (n = 755) (Continued) |
| Variables/characteristics | Number | Percent (%) |
| Poor | 12 | 1.6 |
| Job stress | No | 72 | 9.5 |
| | Yes | 683 | 90.5 |
| Job satisfaction | No | 326 | 43.2 |
| | Yes | 429 | 56.8 |

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Table 4 Multi variable analysis of factors associated with work-related musculoskeletal disorders among bank workers, Addis Ababa, Ethiopia, 2018 (N = 755)

| Variable                  | Frequency | COR (95% CI) | AOR (95% CI) |
|---------------------------|-----------|--------------|---------------|
| **Sex**                   |           |              |               |
| Female                    | 51        | 3.02 [2.09–4.36] | 2.98 [1.91–4.65]** |
| Male                      | 118       | 1.00         | 1.00          |
| **Age**                   |           |              |               |
| 20–29                     | 115       | 1.00         | 1.00          |
| 30–39                     | 49        | 1.21 [0.83–1.76] | 1.09 [0.66–1.83] |
| ≥ 40                      | 5         | 2.414 [0.92–6.27] | 3.05 [0.86–10.73] |
| **Educational status**    |           |              |               |
| Certificate               | 4         | 0.17 [0.04–0.74] | 0.260 [0.03–1.82] |
| Diploma                   | 21        | 0.31 [0.14–0.65] | 0.949 [0.30–2.98] |
| Bachelor’s degree         | 127       | 0.58 [0.33–1.01] | 0.666 [0.33–1.32] |
| Master                    | 17        | 1.01         | 1.00          |
| **Job category**          |           |              |               |
| Accounting clerks         | 14        | 0.32 [0.14–0.73] | 0.23 [0.06–0.79] |
| Customer service          | 115       | 0.73 [0.44–1.20] | 0.85 [0.46–1.57] |
| Managers                  | 17        | 1.20 [0.60–2.40] | 1.56 [0.65–3.73] |
| Others                    | 23        | 1.02         | 1.00          |
| **Salary**                |           |              |               |
| ≤ 5240                    | 58        | 0.47 [0.28–0.79] | 0.93 [0.46–1.90] |
| 5241–8500                 | 48        | 0.67 [0.40–1.13] | 0.92 [0.47–1.78] |
| 8501–11200                | 35        | 0.80 [0.46–1.39] | 1.04 [0.54–2.01] |
| > 11200                   | 28        | 1.01         | 1.00          |
| **Smoking behavior**      |           |              |               |
| No                        | 166       | 2.26 [0.67–7.62] | 2.57 [0.47–14.08] |
| Yes                       | 3         | 23           | 1.00          |
| **BMI**                   |           |              |               |
| Normal                    | 117       | 404          | 1.00          |
| Underweight               | 20        | 83           | 1.27 [0.75–2.15] | 1.01 [0.54–1.89] |
| Overweight                | 30        | 73           | 0.70 [0.44–1.13] | 0.82 [0.46–1.48] |
| Obese                     | 2         | 21           | 3.04 [0.70–13.15] | 3.10 [0.60–15.87] |
| **History of MSDs**       |           |              |               |
| No                        | 167       | 558          | 1.00          |
| Yes                       | 2         | 28           | 4.19 [0.98–17.77] | 3.46 [0.68–17.48] |
| **Type of sitting position** |     |              |               |
| Back twisted              | 28        | 177          | 4.76 [2.96–7.65] | 3.59 [2.13–6.08]** |
| Back bent                 | 37        | 271          | 5.52 [3.60–8.46] | 4.06 [2.48–6.66] ** |
| Back straight              | 104       | 138          | 1.00         | 1.00          |
| **Utilization of computer** |    |              |               |
| No                        | 15        | 25           | 1.00          |
| Yes                       | 154       | 561          | 2.18 [1.12–4.24] | 2.38 [0.94–5.99] |
| **Work break in min**     |           |              |               |
| No                        | 148       | 570          | 5.05 [2.57–9.93] | 3.33 [1.44–7.71]** |

Table 4 Multi variable analysis of factors associated with work-related musculoskeletal disorders among bank workers, Addis Ababa, Ethiopia, 2018 (N = 755) (Continued)

| Variable                  | Frequency | COR (95% CI) | AOR (95% CI) |
|---------------------------|-----------|--------------|---------------|
| **History of MSDs**       |           |              |               |
| No                        | 167       | 558          | 1.00          |
| Yes                       | 2         | 28           | 4.19 [0.98–17.77] | 3.46 [0.68–17.48] |
| **Type of sitting position** |     |              |               |
| Back twisted              | 28        | 177          | 4.76 [2.96–7.65] | 3.59 [2.13–6.08]** |
| Back bent                 | 37        | 271          | 5.52 [3.60–8.46] | 4.06 [2.48–6.66] ** |
| Back straight              | 104       | 138          | 1.00         | 1.00          |
| **Utilization of computer** |    |              |               |
| No                        | 15        | 25           | 1.00          |
| Yes                       | 154       | 561          | 2.18 [1.12–4.24] | 2.38 [0.94–5.99] |
| **Work break in min**     |           |              |               |
| No                        | 148       | 570          | 5.05 [2.57–9.93] | 3.33 [1.44–7.71]** |

Discussion

Findings of this study reveal that 77.6% [95% CI 75–81%] of bank workers suffered work-related musculoskeletal disorders. This study was consistent with a study conducted among bank workers in Kuwait (80%) [9]. But higher compared to the studies done in Nigeria 71.6% [10], India 37% [21], and Thailand 63% [22].

By contrast, the current study had lower magnitude as compared to the study conducted in India/Punjab 83.5% [8] and Ghana 83.5% [11]. The difference might be due to difference in sociocultural factors, job stress [21],

*Statistically significant at *p* value < 0.05
**Statistically significant at *p* value < 0.001

CI 1.44–7.71] than those who had work time breaks. Furthermore, respondents who had job stress were 2 times more likely to develop WMSDs [AOR = 2.33, 95% CI 1.19–4.54] than workers who had no job stress (Table 4).
assessment tools, workload, ergonomic design of work station, and sedentary activity of participants [11].

The result of this study revealed that female respondents were 3 times more likely to develop WMSDs than male participants. This was similar to a study conducted in Kuwait [9], India [21], Ghana [11], Sri Lanka [23], and Nigeria [10]. However, this study was inconsistent to a study conducted among bank workers in India [8] and Bangladesh [24]. This disparity might be due to work load and sociocultural factor [21, 25].

In this study, it has been observed that the type of sitting position was an important predictor of WMSDs among bank workers. Respondents sitting with their back twisted were 3.6 times more likely to develop WMSDs than sitting with their back straight. This finding was consistent with studies done in Rwanda [13] and Dutch [26]. On the other hand, respondents sitting with their back bent were 4 times more likely to develop WMSDs than sitting with a straight aligned back. This finding was in agreement with studies done in Rwanda [13], Sri Lanka [23], Dutch [26], and China [27]. This is due to the fact that poor posture can bring stiffness and compression over all muscle and skeletal areas causing aching and discomfort of body regions [28, 29].

In addition to this, respondents who worked with a fixed position were 1.8 times more likely to develop WMSDs than those workers who worked without fixed position. This was consistent with different studies done on WMSDs of the neck, lower back, and shoulder regions of the body [10, 23, 30–33]. This might because when workers work in a fixed position, the muscle has no opportunity to relax and it restricts the flow of blood [34].

Respondents who had no work time breaks were 3 times more likely to develop WMSDs than those who had work time break. The findings of this study were consistent with the study conducted in Ethiopia [35], Rwanda [13], and China [27]. Most of the participants of this study used movable chairs to perform their work time duties, although sitting in fixed chairs had 2.6 times more likely to develop WMSDs than sitting on movable ones.

Furthermore, respondents who had job stress were 2 times more likely to develop WMSDs than workers who had no job stress. This finding was consistent with studies done among bank workers in Kuwait [9]. This could be due to the fact that high stress may increase muscle tension and decrease micro pauses in muscle activity [11].

Though the study did its best to indicate the magnitude of WMSDs among bank workers, it is not free from limitations. The cross-sectional design might have prevented the work from showing temporal relationships. In addition, since WMSDs has not been verified by clinical diagnosis in the last 12 months, our result is based on self-reporting. Thus, it is possible that participants failed to remember correctly and ultimately end up in a recall bias. In addition, this study did not assess the amount of personal computer and smart phone usage in private and business.

**Conclusion**

The finding of this study has shown that bank workers highly suffered from work-related musculoskeletal disorders at least in one region of the body in the previous 12 months. Of these, high prevalent body regions were the lower back followed by the shoulder, neck, and upper back. The multivariate analysis indicated that the significant predictors for the occurrence of WMSDs among bank workers were being female, awkward posture, static position, no work time break, type of chair and job stress. In order to reduce the problem, bank workers should employ proper types of chairs, practice proper work posture, healthy working conditions, and create awareness programs on how to maintain healthy conditioning and to have enough leisure time.

**Supplementary information**

Supplementary information accompanies this paper at https://doi.org/10.1186/s12919-020-00866-5.

**Additional file 1: Table 1.** Socio-demographic characteristics of bank workers, Addis Ababa, Ethiopia, 2018 (N = 42). **Table 2.** Behavioral characteristics of bank workers in Addis Ababa, April 2018 (n=42).

**Abbreviations**

AOR: Adjusted odd ratio; CI: Confidence interval; BMI: Body mass index; ILO: International Labor Organization; NMQ: Nordic Musculoskeletal Questionnaire; OSHA: Occupational Safety and Health Administration; SD: Standard deviation; SPSS: Statistical Package for Social Science; WMSDs: Work-related musculoskeletal disorders; WHO: World Health Organization

**Acknowledgements**

We would like to thank the University of Gondar’s College of Medicine and Health Sciences for delivering an ethical clearance for this study. We would also like to extend our heartfelt appreciation to the banks found in Addis Ababa for giving us permission to conduct this study. We greatly acknowledge the study participants for their active participation.

**Authors’ contributions**

DD contributed to the study design, data collection and analysis, interpretation of the results, manuscript write-up, and review. AG contributed to the study design, data analysis, interpretation of the result, and manuscript review. SM contributed in study design, data analysis, interpretation of the result, and manuscript review. All authors read and approved the final manuscript.

**Funding**

There is no source of funding.

**Availability of data and materials**

All data generated or analyzed during this study are included in this article. The data that support the findings of this study are also available from the corresponding authors upon reasonable request.

**Ethics approval and consent to participate**

Ethical clearance was obtained from the institutional Ethical committee of the University of Gondar (reference number /IRH/260/2017). Then, official letters were sent to the head office of banks found in Addis Ababa city.
administration as well as different branches of banks found in the city. For each participant, the purpose and importance of the study were explained and informed by written information sheet. The study maintained confidentiality at all levels. Participant’s involvement in the study was on a voluntary basis; participants who were unwilling to participate in the study were respected. Therefore, the study agreed with the Helsinki Declaration of 1964 and its related amendments in this regard.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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Received: 6 December 2019 Accepted: 23 June 2020
Published online: 27 July 2020

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