



Cross-sectional Study

Prevalence and factors associated with work-related musculoskeletal disorder among health care providers working in the operation room

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ABSTRACT

Background: Work-related musculoskeletal disorder is a major and frequently underappreciated problem on people, countries, healthcare services, and society as a whole. Not only have detrimental health impacts, but it had considerable damage on healthcare services and costs.

Objective: The aim of this study was to determine the prevalence and factors associated with work-related musculoskeletal diseases among health care providers working in the operating room of University of Gondar comprehensive specialized hospital and Tibebe Ghion comprehensive specialized hospital, North West Ethiopia, 2021.

Method: Institution-based cross-sectional study was conducted on 394 healthcare providers. Purposive sampling was used to select the study participants. Data were collected through a self-administer questionnaire using the standard Nordic Musculoskeletal Questionnaire. Descriptive statistics and bivariate logistic regression were done to identify factors associated with work-related musculoskeletal disorders. Variables with $P\text{-value} \leq 0.05$ with 95% confidence interval in a multivariate model were taken as statistically significant. Finally, AOR with 95% confidence interval at a $P\text{-value} < 0.05$ was reported.

Result: The prevalence of work-related musculoskeletal disorder among study participants was 64.2% with 95% CI: (59.4, 69.0). In multivariate logistic regression analysis; working overtime [AOR:1.74; 95% CI (1.05, 2.86)], previous history of MSD [AOR:6.85; 95%CI:(1.91, 22.7)], being diploma holder [AOR:5.27; 95% CI (1.12, 24.68)], being 1st degree holder [AOR:2.65; 95% CI (1.11, 6.28)], absence of assistance during procedures [AOR:1.73; 95% CI (1.02, 2.85)], and working in night shifts [AOR:1.72; 95% CI (1.08, 2.74)] were significantly associated with work related musculoskeletal disease among health care providers working in operation room. **Conclusion:** A high proportion of hospital care providers working in the operation room reported MSD at different body parts. Lower back pain was the most often complained. Working overtime, not having assistance during procedures, educational status (diploma and 1st degree holder), and working at night shifts were statistically significant associated with musculoskeletal disorders.

1. Introduction

Work-related musculoskeletal disorders are syndromes characterized by soft tissue pain, anesthesia, stiffness, swelling, fatigue, irritation, and lack of control [1]. The National Institute for Occupational Safety and Health (NIOSH), in the USA, defines Musculoskeletal Disorder (MSD) as

a disorder and injury that affects a part of the body's musculoskeletal system, which includes bones, nerves, tendons, ligaments, joints, cartilage, blood vessels and spinal discs [2].

According to the Global Burden of Diseases 2017 MSDs are the second most prevalent cause of years lost to injury, although years of life lost are decreasing in Sub-Saharan Africa [3,4]. It also inspired the

Abbreviations: ETB, Ethiopian Birr; MSP, Musculoskeletal Pain; OR, Operation Room; TGCSH, Tibebe Ghion Comprehensive Specialized Hospital; UOGCSH, University of Gondar Comprehensive Specialized Hospital; WRMSD, Work Related Musculoskeletal Disease; AOR, Adjusted Odds Ratio; BMI, Body Mass Index; CI, Confidence Interval; COR, Crude Odds Ratio; SPSS, Statistical Package for Social Sciences.

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attention of the European Agency for Safety and Health at Work [5]. Since it leads to a significant effect on their working populations [6]. Healthcare employees are at a greater risk for musculoskeletal disorders due to their occupational duties [7]; specially operating room health care providers have a high incidence of musculoskeletal disorders because of unique property of working environments [8,9].

Considering the multi-factorial nature of work related musculoskeletal disorders, variations of working in developing countries, the changing nature of surgical techniques and availability of operating room facilities may requires further studding and integrating physical and demographic factors appears to be warranted [10].

Musculoskeletal disorders (MSDs) occurring in the spine, shoulders, and back accounts for about one-third of all cases of sick leave for health care staff. The high exposure to heavy physical burdens involved in healthcare workers is one of the major causes of these conditions [11].

The operating room is one of the riskiest areas of the hospital, where medical complications can happen in a severe form [12]. Surgeons, nurses, and anesthetists are important members of the surgical team who works for a long period of time and involving in all surgical procedures [13].

Surgery is a physically demanding profession that involves long periods of standing in static positions and may require the surgeon and assistants to manipulate their bodies to gain access to the operative field [12]. Low back pain is a common complaint among doctors [14].

Musculoskeletal disorders are one of the most common public problems in today's world, and there are caused by a variety of risk factors [13]. It is widespread in many professions and the second leading cause of transient work injury next to the common cold [7], as well as a source of workplace accidents and disabilities in developing countries [15]. For a long time, work-related musculoskeletal disorders (WRMSDs) have been recognized as a leading cause of non-fatal accidents and the leading cause of absence from work in manufacturing communities [16].

A pooled study of work-related MSDs among at-risk physicians discovered as high prevalence. A variety of injury burdens, including early retirement, and a high need for action, with a lack of availability from work place [17]. After a year of clinical practice operating room staffs were affected by musculoskeletal problems (58–90%) due to unhealthy ergonomics environments [18]. Work-related musculoskeletal disease can impair surgical ability. Patients may at risk due to important ergonomic problems of visualizing the surgical area, handling surgical equipment, having a heavy mental and physical workload, having an inadequate operating room configuration, and keeping uncomfortable static body postures [19].

The prevalence of MSDs among nurses has been estimated to range from 40% to 90% across the world [20]. Most African countries have high rates of work-related musculoskeletal diseases, ranging from 15% to 93.6%. The majority of the studies were conducted in South Africa, Nigeria, but in the East African region, it is the least studied [21].

Furthermore, musculoskeletal disorders continue to be a major global health issue and a significant financial burden for Low-and Middle-income countries s such as Ethiopia, where health budgets are already extended and devoted to life-threatening conditions. According to one systematic review study done in Ethiopia, musculoskeletal pain affects anywhere from 35% to 74.5% of the working population [22]. In Ethiopia the magnitude and burdens of work-related musculoskeletal disease among health care providers especially operation room staffs had limited studies. As a result, this study will have some role in searching for possible alternatives and bring better solutions for the management of WRMSD among health care providers working in the operation room.

2. Methods

This study was carried out in University of Gondar and Tibebe Ghion comprehensive specialized hospitals after ethical clearance was obtained from those institutions ethical review committee. A cross-

sectional study was conducted from April to May 2021. All health care providers working in the operation room during the study period who could meet inclusion criteria were included in this study. All licensed health care providers having at least one year of working experience in the operating room at selected hospitals were included in this study and those who were not volunteer to participate and not available in the study area during the data collection period were excluded from this study. The sample size was targeted the whole study population of healthcare providers working in the operating room at the University of Gondar and Tibebe Ghion comprehensive specialized hospitals, then the actual size of participants working in operation room from two hospitals were taken with purposive sampling. During the data collection period 481 health care providers were available in the operation room of the two hospitals from those 457 participants were eligible for our study. Finally 394 of them were responded and included as study participant. This study registered at <http://www.researchregistry.com> Research Registry UIN: researchregistry7122 and reported according to STROCSS criteria [39].

2.1. Inclusion criteria

All licensed health care professionals having at least one year of work experience in operating room at selected hospitals and having consent (volunteer) to participate in the research were included in this study.

2.2. Exclusion criteria

Health workers who are taking analgesics for long periods, who have serious medical illness, history of previous musculoskeletal surgery and obvious skeletal deformities such as kyphosis and scoliosis, who were not available in study area during data collection, pregnant or with a known psychiatric disorder, were excluded from the study.

2.3. Data collection techniques

Data collection was held with a self-administered questionnaire measured by Standard Nordic Questionnaires. It was a standard questionnaire developed from a project funded by the Nordic council of ministers [2]. The questionnaire was developed after a review of the available scientific papers in the subject area. The standardized questionnaire has been applied in intensive studies in the literatures, including Ethiopia [22–24].

Standardized Nordic Questionnaire is the most frequently used symptom questionnaire, designed for all musculoskeletal disorders. It was used to assess self-reported musculoskeletal complaints concerning nine body areas such as the neck, shoulder, elbows, wrists/hands, upper back, lower back, hips, knees, and ankles/feet. Questionnaire was used as an instrument for gathering those body part symptoms. WRMSDs in the past twelve months asked for each one of nine body parts. Responses to any of the questions were either “Yes” or “No”. If a respondent answers “NO” to the first question, he/she might not proceed to answer the next questions of the same body part.

2.4. Data management and analysis

The collected data was cleaned, coded, and entered into Epi data 3.1. When the entry of the questioner was completed, cleaning was made to avoid missing values, outliers, and other inconsistencies by running commands like frequencies. Cleaned data was exported to the Statistical Package for Social Sciences (SPSS) version 25.0 for analysis. Frequency tables, percentages, pie chart, or bar graphs were used to present the results of categorical variables whereas mean (\pm std.) was used to summarize continuous variables. Bivariate binary logistic regression analysis was done and thus variables with a p-value less than 0.2 were considered as potential candidates in the final multivariable logistic regression analysis. Moreover, chi-squared assumptions were checked &

then, a multivariable logistic regression analysis was run to identify associated factors of WMSDs among health care providers. Finally, variables with $p < 0.05$ in the final logistic model were considered statistically significant and the strength and direction of association were measured by adjusted odds ratio (AOR) with a corresponding 95% confidence interval.

3. Results

3.1. Sociodemographic characteristics of health care providers

Among 457 eligible participants, 394 of them were involved in the study with a response rate of 86.2%. Most study participants were males (78.17%). A high proportion, 60.6% of the respondent's age was less than 30 years ranging from 24 to 57 years with a mean of 30.56 (SD \pm 4.36) years.

The mean value of their BMI was 22.23 ± 2.384 and majorities of participants 323(81.9%) had normal BMI (18.5–24.9) level, while 19 (4.8%) were underweight (≤ 18.5) and 52(13.2%) were obese (≥ 30).

More than half of the participants, 207(52.5%) were single while 187 (43.46%) were married. It was also observed that the majority of the participants 165(41.8%) were diploma and first-degree holders. The median monthly income of participants was 10000 ETB with the range of 4000–31750 ETB. According to working experience and working hours per week, the study participants the median years of experience was 3 years and the mean of working hours per week was 54.9 ± 28.4 .

3.2. Lifestyle and individual factors of WMSDs

Regarding the lifestyle of the participants, majority which was 268 (68.02%) of them were nonalcoholic and 99% were nonsmokers. Regarding physical activity, the majority 39.6% were not doing physical exercise and most of them 189(47.9%) had a monthly income above 10000 ETB (see [Tables 1 and 2](#)).

3.3. Occupational characteristics of the study participants

The participants' specific working areas were in general surgery (41.3%), gynecology/obstetric (36%) and orthopedics (7.1%) operation rooms. The rest of the participants worked in ophthalmology and other operating departments.

Majority of the participants 76.39% had <5years of working experience and the median work experience in the operation room was 3 years. Only 16 of the participants had an experience of >10 years and 19.5% of participants had between 5 years and 10years of experience in the OR.

Table 1

Socio demographic characteristics of healthcare providers working in operation room at UOG and TG comprehensive specialized hospital, Amhara, northwest Ethiopia April 2011, (n = 394).

| Variables | Category | n (%) |
|-------------------|-------------|-----------|
| Sex | Male | 308(78.2) |
| | Female | 86(21.6) |
| Age(years) | <30 | 235(59.6) |
| | >30 | 159(40.4) |
| BMI | Underweight | 19(4.8) |
| | Normal | 323(82) |
| | Overweight | 52(13.2) |
| Educational level | Diploma | 13(3.3) |
| | 1st degree | 152(38.6) |
| | MSc | 31(7.9) |
| | Residency | 155(39.3) |
| | Specialty | 43(10.9) |
| Religion | Orthodox | 323(82) |
| | Muslim | 36(9.1) |
| | Protestant | 33(8.4) |

Table 2

Individual and lifestyle factors of health care providers working in UOGCSH and TGCSH, Amhara, Ethiopia, July 2021(n = 394).

| Variables | Categories | Frequency | Prevalence of WRMSD (%) | |
|----------------------------|--------------------------------|--------------|-------------------------|------|
| | | | Yes | No |
| Gender | Male | 308 (78.17%) | 64.3 | 35.7 |
| | Female | 86(21.8%) | 64 | 36 |
| Age group(years) | <30 | 239(60.6%) | 63.2 | 36.8 |
| | 30–50 | 153(38.8%) | 66 | 34 |
| | >50 | 2(0.8%) | 50 | 50 |
| Marital status | Married | 187 (43.46%) | 63.4 | 36.6 |
| | Single | 207(52.5%) | 65.2 | 34.8 |
| Profession | Anesthetists | 72(18.2%) | 69.4 | 30.6 |
| | Surgeons | 226(57.3%) | 58.8 | 41.2 |
| | Nurses | 96(24.3%) | 72.9 | 27.1 |
| Educational status | Degree and below | 165(41.8%) | 73.3 | 26.7 |
| | Postgraduate | 31(7.8%) | 64.5 | 35.5 |
| | Residents | 155 (39.34%) | 55.5 | 44.5 |
| Working place | Specialists | 43(10.9%) | 60.5 | 39.5 |
| | General surgery | 146(41.3%) | 68.5 | 31.5 |
| | Gynecology/obstetric | 142(36%) | 59.2 | 40.8 |
| | Orthopedics | 28(7.1%) | 57.1 | 42.9 |
| | Ophthalmology | 23(5.8%) | 69.6 | 30.4 |
| | Others | 55(13.9%) | 67.3 | 32.7 |
| BMI | Underweight (≤ 18.5) | 19(4.8%) | 63.2 | 36.8 |
| | Normal (18.5–24.9) | 323(81.9%) | 64.4 | 35.6 |
| | Overweight/obese (≥ 25) | 52(13.2%) | 63.5 | 36.5 |
| Working experience (years) | <5 | 301 (76.39%) | 62.1 | 37.9 |
| | 5–10 | 77(19.5%) | 68.8 | 31.2 |
| | >10 | 16(4%) | 81.7 | 18.3 |
| Monthly income (ETB) | <5000 | 21(5.3%) | 61.9 | 38.1 |
| | 5000–10000 | 184(46.7%) | 69 | 31 |
| | >10000 | 189(47.9%) | 59.8 | 40.2 |
| Physical exercise | Yes | 211(60.4%) | 51 | 49 |
| | No | 83 (39.6%) | 49 | 51 |

Irrespective of regions, musculoskeletal pain during the last 12 months was complained by 72.9% of nurses, 69.4% of anesthetists, and 58.8% of surgeons/residents ([Table 1](#)).

The study also found that 24.7% (N = 97) of the participants indicated their working posture was bending/twisting, 38% (N = 151) Maintained a position for a prolonged period, and 16.1% (N = 63) Working in an awkward or cramped position.

3.4. The prevalence of work-related musculoskeletal disorder among health care providers in the operation room

Among 394 respondents, 253 (64.2%) [95% CI (59.4, 69)] of them had experienced work-related musculoskeletal disease at least at one body part. Only 36(9.1%) of study participants had a history of musculoskeletal disease (before engaging the operation room) (see [Fig. 1](#)).

Among all the symptoms, low back pain was the highest (39.8%), followed by hip/thigh pain (23.4%), neck pain (20.6%), shoulder pain (16%), and whereas ankle/feet, wrist, and elbow pain were the least reported, as shown in [Fig. 2](#).

3.5. Factors associated with work-related musculoskeletal disorders

Bivariate analysis showed that sex, profession (nurses and residents/surgeons, monthly income, educational status, the adequate break between procedures, previous history of MSD, overtime, nightshift, absence of assistance, duration of the procedure, and ergonomic condition of operation room (furnishing condition) were the factors

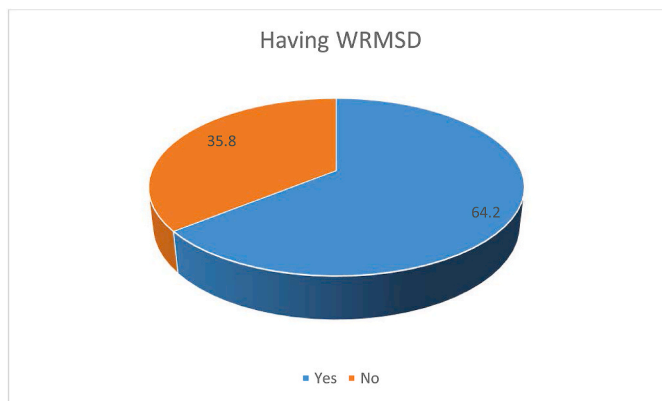


Fig. 1. Overall prevalence of work-related musculoskeletal disease among health care providers working in operation room at UOGCSH and TGCSH.

substantially associated with work-related musculoskeletal disorders (p value < 0.2).

After controlling for confounders in a multivariable logistic regression analysis, educational status, previous history of MSD, absence of assistance during procedures, night shift, and doing overtime remained statistically significant with the developments of work-related musculoskeletal disorders (p value < 0.05).

Accordingly, participants having a previous history of musculoskeletal diseases were 6.585 times more at risk for developing work-related musculoskeletal diseases than those not having a history of MSD. The odds of experiencing WRMSD were 5.278 and 2.653 times more likely among diploma and degree holders [AOR:5.27; 95% CI (1.12,24.68) and [AOR:2.653; 95% CI (1.11,6.28)] respectively than postgraduate [AOR: 1.28; 95% CI (0.44,3.70) and residents [AOR: 1.11; 95% CI (0.52,2.39)].

Moreover, 1.74 times likelihood of developing musculoskeletal disease among participants who worked overtime; 95% CI (1.05,2.86)].

Participants who had worked without assistance during the procedure were 1.713 times more likely to develop musculoskeletal disease than those who worked with assistance [AOR: 1.71; 95% CI (1.02, 2.88)].

As a result, educational status, previous history of MSD, absence of assistance during procedures, night shift, and doing overtime remained statistically significant with the developments of work-related musculoskeletal disorders (see Tables 3 and 4).

4. Discussion

The prevalence of musculoskeletal disorders varies across occupational groups and over national boundaries. Studies have shown that musculoskeletal problems are common in health care workers [25]. The majority of our study participants (64.2%) had experienced work-related musculoskeletal disorders. This result was almost comparable to a study performed in Netherland which showed 58% prevalence of work-related musculoskeletal disorder among operation room health care providers [11].

The overall yearly prevalence of work-related musculoskeletal disorders among different health care providers working in operation rooms varies from 58.8% to 72.9%.

The prevalence rate of this study for reported musculoskeletal symptoms among surgeons and residents was 58.8% % which was lower than 86% prevalence rate reported in the Indian surgeons [26]and 82% in China [27]. which was almost comparable to a range reported in Italy 60.8–78.2% [28].

The study results revealed that high prevalence of WMSDs, specifically in the lower back among the operating room personnel. Considering the difficult conditions of working in the operating room, MSDs and particularly back pain seems like unpreventable [20].

The prevalence of MSDs has been reported from 40% to 90% among nurses around the globe which was in-line with our study the prevalence of work-related musculoskeletal disorder among operation room nurses was 79% [29].

Among anesthetists, 69.4% of respondents had experienced musculoskeletal symptoms at least one body region attributed to the daily activities of their clinical practice during the past 12 months. This finding is in line with a study conducted in Turkey which was (70.7%) [7] and lower than a study in Iran (90.9%) [13].

Lower back symptoms were found to be the most prevalent problems (39.8%) in our finding. This was in accordance with the findings of the literatures [20,30]. Our study showed lower back pain (39.8%), neck pain (20.6%), hip/thigh (23.4%) and knee pain (19.8%) respectively which was lower than a study found prevalence of WRMSD on the neck, shoulder, back, and upper extremity of 65%, 52%, 59%, and 39% respectively among health workers [17]. Another study showed that the most frequent symptoms were low back pain (LBP), neck pain, and knee pain (74.5%, 45.2%, and 31.3%, respectively) [31] which is also higher than our study.

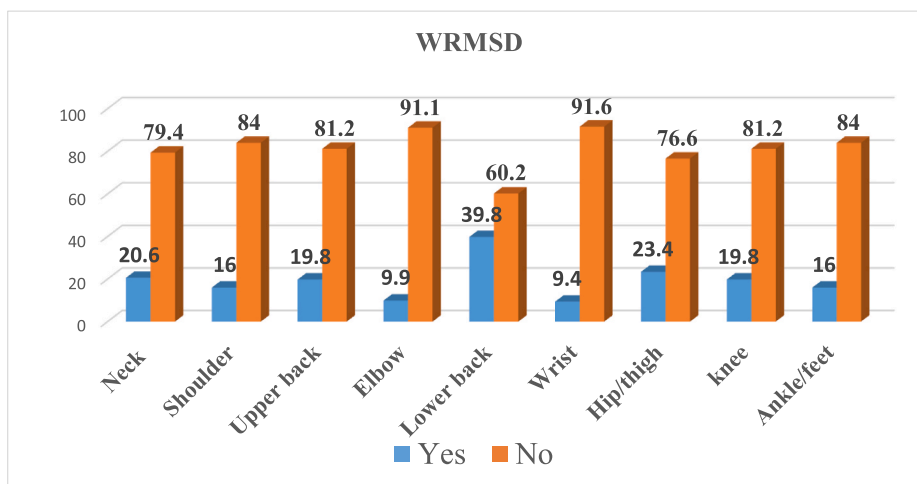


Fig. 2. Prevalence of WRMSDs distribution in body parts among health professionals working in operation room at UOGCSH and TGCSH, Ethiopia, July 2021 (N = 394).

Table 3

Frequency of work-related ergonomic aggravating factors in operation room which was aggravating/ causing musculoskeletal disorders among those that had WRMSD (N = 394).

| Factors | Activities | n(%) |
|--|---|------------|
| Ergonomic activities that aggravate WRMSDs | Lifting | 85 (26.1) |
| | Bending or twisting | 97 (24.7) |
| | Positioning of patients on the table | 54 (13.8) |
| | Transferring patient | 76 (19.4) |
| | Maintaining a position for a prolonged period | 151(38) |
| Working conditions | Working in an awkward or cramped position | 63 (16.1) |
| | Pain aggravated at night | 143 (36.3) |
| | Having assistance during procedure | 270 (68.5) |
| | Getting adequate break between procedures | 160 (40.6) |
| | Having MSD before engaging OR | 36(9.1) |
| | Working hours per week | 146 (37.1) |
| | > <40hrs | 102 (25.8) |
| | > 40-60hrs | 146 (37.1) |
| | > >60hrs | 185 (46.9) |
| | > Night shifts | 212 (53.8) |
| | Overtime | 212 (53.8) |

4.1. Factors influencing WRMSDs for health workers at operation room

In this study doing over time was significantly associated with work-related disorders among participants. Participants who worked overtime were 1.74 times higher [AOR:1.743; 95% CI (0.541,1.121)] for the development of the work-related disorder. It was in comparable with the study showed in Thailand with overtime (AOR = 1.62; 95% CI = 1.10, 2.90) associated with WRMSD [32]. The relationship of overtime to WMSD has been also reported for many industry sectors, with injury risks increasing as working hours increased [33,34].

A cross-sectional study at Southampton which showed the risk of developing WRMSD was particularly lower with (AOR 3.3, 95% CI 1.9, 5.8) among health professionals who reported the previous history of WRMSD whereas in our study 6.585 times to developed WRMSD than those who had no previous history [AOR:6.585 95% CI:(1.910,22.70)] [35].

The participants who worked at night shifts had a higher chance of developing WRMSD as compared to those who have no night shifts [AOR:1.72: 95% CI (1.08,2.74)], which is in line with the result of previous studies performed in Iran [AOR:1.69: 95% CI (1.12,2.55)] and higher than Indian study [AOR:1.08: 95% CI (0.55,2.13)] [36,37]. It may be because of a continuing lack of night sleep that can cause circadian cycle disturbance.

Our study demonstrated significant difference was detected in WRMSDs among health care providers according to absence of assistance in the operating room. Working with assistance may facilitate the work of the health care providers in the operating room. But a cross-sectional study performed in Turkey found no association among the presence of assistance for the development of the work-related musculoskeletal disorder.

In this study, educational status was also significantly associated with developing WMSDs (Table 3). Among diploma 5.2 times and 2.56 times among degree holders more likely developed WMSDs than those who had higher educational level. These finding supported with a cross-

Table 4

Bivariate and multivariate logistic regression analysis of associated factors with WMSDs among health care providers working in operation room at UOGCSH and TGCSH, northwest Amhara, Ethiopia, July 2021 (N = 394).

| Variables | WRMSD | | Bivariate | Multivariate (95%) | |
|--------------------------------|-------------|-------------|---------------------|---------------------|---------|
| | Yes (%) | No (%) | COR (95%) | AOR (95% CI) | P value |
| Professions | | | | | |
| Anesthetists | 50 (69.4) | 22(30) | 0.87 (0.44,1.71) | 0.93 (0.41,2.09) | 0.86 |
| Surgeons/ residents | 133 (58.8) | 93 (41.2) | 0.52 (0.31,0.88) | 1.16 (0.46,2.89) | 0.74 |
| Nurses | 70 (72.9) | 26 (27.1) | 1 | 1 | 0.87 |
| Sex | | | | | |
| Male | 198 (64.3) | 110 (35.7) | 1 | 1 | |
| Female | 55(64) | 31 (36.0) | 0.98 (0.59,1.62) | 1.704 (0.926,3.136) | 0.08 |
| Educational status | | | | | |
| Diploma | 10(4) | 3(2.1) | 2.674 (0.71, 10.01) | 5.27 (1.12,24.68) | 0.03* |
| Degree | 121 (73.3) | 44 (26.7) | 2.17 (1.34,3.50) | 2.65 (1.11,6.28) | 0.02* |
| Postgraduate | 20 (64.5) | 11 (35.5) | 1.46 (0.65,3.25) | 1.28 (0.44,3.70) | 0.63 |
| Residents | 26 (60.5) | 17 (39.5) | 1.22 (0.61,2.44) | 1.11 (0.52,2.39) | 0.77 |
| Specialists | 86 (55.5) | 69 (44.5) | 1 | 1 | 0.16 |
| Previous history of MSD | | | | | |
| Yes | 33 (91.7) | 3(8.3) | 0.145 (0.44,0.48) | 6.58 (1.91,22.70) | 0.003** |
| No | 220 (61.5) | 138 (38.5) | 1 | | |
| Break between procedure | | | | | |
| Yes | 94 (64.8) | 51 (35.2) | 1 | | |
| No | 159 (63.9) | 90 (36.1) | 0.76 (0.53,1.08) | 1.13 (0.71,1.80) | 0.56 |
| Assistance during procedure | | | | | |
| Yes | 181 (62.6) | 108 (37.4) | 1 | 1 | |
| No | 72 (68.6) | 33 (31.4) | 1.22 (0.61,2.44) | 1.71 (1.028,2.85) | 0.04* |
| Night shift | | | | | |
| Yes | 134 (72.4) | 51 (27.6) | 1.95 (1.27,2.98) | 1.72 (1.08,2.74) | 0.02* |
| No | 119 (56.9) | 90 (43.1) | 1 | 1 | |
| Overtime | | | | | |
| Yes | 12(80) | 3(20) | 0.77 (0.54,1.12) | 1.74 (1.05,2.86) | 0.03* |
| No | 170 (65.8) | 91 (34.2) | 1 | 1 | |
| Good OR furnishing | | | | | |
| Yes | 42 (16.6%) | 211 (83.4%) | 0.64 (0.34,1.19) | 0.74 (0.37,1.45) | 0.38 |
| No | 16 (11.3%) | 125 (88.3) | | | |
| Duration of surgical procedure | | | | | |
| <3hrs | 221 (87.4) | 32 (12.6) | 1 | 2.35 (1.01,5.42) | 0.45 |
| >3hrs | 132 (93.6) | 9(64) | 2.12 (0.98,4.58) | | |
| Monthly income (ETB) | | | | | |
| <5000 | 12 (4.7%) | 8 (5.7%) | 1.01 (0.39,2.58) | 2.40 (0.75,7.61) | 0.13 |
| 5000-10000 | 128 (50.6%) | 57 (40.4) | 1.51 (0.98,2.31) | 2.98 (0.84,10.55) | 0.90 |
| >10000 | 113 (44.9%) | 76 (53.9%) | 1 | | 0.23 |

OR=Odd ratio, CI=Confidence interval, COR=Crude odd ratio, AOR = Adjusted odd ratio, OR = operation room, ETB = Ethiopian birr * Significantly + associated (p value < 0.05) with WRMSD, ** (p value < 0.001), 1: reference.

sectional study in Egypt which revealed low educational status significantly correlate with WMSDs prevalence among physical therapists [38]. Another study in Ethiopian bankers those who had lower educational status had higher chance of developing WRMSD, Even though it was not on health care providers, it supported our finding [24]. The possible reason might be those who had a low educational status may have less knowledge and fewer skills in terms of ergonomics in the workplace.

5. Conclusion & recommendation

A high proportion of hospital care providers working in the operation room reported WMSD at body parts with the low back being injured most often. The significant associated factors responsible for the occurrence of work-related musculoskeletal disorders include the previous history of musculoskeletal disease, low educational status, doing over time, working at night shifts and absence of assistance during surgical procedures.

Health care providers should emphasize comfortable body posture when performing their tasks, do physical exercise, take ergonomic training, and have breaks during working hours as a means of preventive strategies to avoid WMSDs. It is also mandatory that health care providers should be advised to visit physiotherapists when they have work-related musculoskeletal disorders.

Ethical approval

Ethical approval was obtained from ethical committee board of university of Gondar specialized Hospital.

But reference number is not necessary it is already approved.

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Author contribution

This work was carried out in collaboration among all authors. MA contributed to the conception and design of the study, acquired; analyzed and interpreted the data drafted and revised the manuscript. MA, SY, HE and TG participated in reviewing the design and methods of data collection, interpretation and preparation of the manuscript. All authors participate in preparation and critical review of the manuscripts. In addition, all authors read and approved the manuscript.

Registration of research studies

Researchregistry7122.

Guarantor

Mekuanent Asmare Yizengaw, Salh Yalew Mustofa, Henos Enyew Ashagrie and Tadael Gudayu Zeleke.

Consent

Not necessary because it has no harm and personal information to participants.

Consent to publication

Not applicable (the article did not contain any personal or any clinical detail of any individual participant).

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Declaration of competing interest

All authors declared that they have no competing interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.102989>.

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