Work related low back pain and associated factors among hairdressers in Mekelle, Tigray, Ethiopia; cross-sectional study.

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Abstract

Background Low back pain is one of the most prevalent musculoskeletal conditions and the most common cause of disability. Hairdressers are one of the high-risk professionals for work-related musculoskeletal disorders like low back pain. However, studies on the prevalence and associated factors of low back pain among hairdressers are scarce. The objective of the current study is to assess the magnitude and associated factors of work related low back pain among hairdressers working in female beauty salons.

Method An institutional-based cross-sectional study was employed from January 05 up to February 28, 2018. The sample (n=344) hairdressers were selected randomly from all-female beauty salons of Mekelle city. A structured questionnaire adapted from a standardized Nordic questionnaire and other similar studies was used. Binary logistic regression analysis was performed to identify factors associated with low back pain. The Adjusted Odds Ratio (AOR) with a 95% Confidence Interval (CI) was estimated to show the strength of association. A p-value of < 0.05 was used to declare statistical significance.

Result A total of 314 hairdressers participated, with a 91.3% response rate. The study found that the self-reported 12 months prevalence of work related low back pain was (47.5%) with 95%CI (41.8- 53.1). Awkward way working posture [AOR: 2.6, 95%CI (1.41- 4.62)], working greater than 4 days in a week [AOR: 7.98, 95%CI (2.54-25.09], hair washing job category [AOR: 4.35, 95%CI (1.87-10.12)], having adjustable washing basin [AOR: 0.30, 95%CI (0.151-0.587)] and job stress [AOR: 2.75, 95%CI (1.61-4.72)] were factors that shows a statically significant association with low back pain.

Conclusion This study found that work-related low back pain is a major health problem among hairdressers.Working in awkward postures, more working days per week, hair washing job category and job stress show strong association with work related low back pain, whereas using adjustable height washing basin has a protective effect for low back pain. Responsible bodies need to give attention to prevent low back pain among hairdressers by giving on job training related to comfortable working posture and utilization of ergonomically designed tools.

Background

Low back pain (LBP) is a common health problem, which most people experience at some point in their lifetime(1). Back pain can be categorized into specific or non-specific back pain. Non-specific back pain is diagnosed when the cause of the back pain is unknown and specific back pain refers to a specific cause for the pain, for example, an infection or a fracture(2). LBP can be acute, sub-acute or chronic, affecting all ages from children to elderly and is a very common reason for medical consultations(3).

The 2010 global burden of disease study estimated that low back pain ranked highest in terms of years lived with disability (YLDs), and sixth in terms of overall burden disability-adjusted living years (DALYs) (4). It has a numerous economic burden on individuals, families, communities, and country in general

with the estimated point prevalence range from 1.0% to 58.1%, and 1-year prevalence from 0.8% to 82.5% globally(1).

[7]Although it was largely thought of as a problem confined to western countries; LBP is also a major problem in low and middle-income countries(5). In Ethiopia, researches are available in the literature on low back pain, especially among professionals like nurses, teachers and taxi drivers with 12-month prevalence ranging (45 -71%) (6-8). LBP may be associated with different biomechanical factors (heavy physical work, awkward static and dynamic working postures, and lifting), psychosocial factors (low level of job control, high psychological demands, and high work dissatisfaction) and individual factors (younger age, female gender, black or African American race, smoking, high BMI, and co-morbidity)(9).

Hairdressing is one of the high-risk occupations to sustain low back pain. According to a study in the USA, hairdressers were one of the top 15 high-risk occupations for back pain attributed to activities at work in females among 45 major occupations(10). In the African continent, a study from Nigeria and Egypt shows that low back pain was one of the highly prevalent work-related musculoskeletal disorders among hairdressers with annual prevalence (76.3%) and (12.5 %) respectively(11, 12). In Ethiopia, one study found that the prevalence of work-related musculoskeletal disorder was 76.6% and the low back was one of the most commonly affected body parts that account 71.5% among the hairdressers of Addis Ababa (13).

 Despite the hairdressing salon, businesses are growing in number and the professionals are prone to low back pain, epidemiological studies that assess the magnitude of LBP among these workers are limited and little is known about the associated factors of LBP among the hairdressers in Mekelle and other parts of Ethiopia. Implementing a rehabilitation course brought a good outcome on the musculoskeletal pain value and prevention after 1.5 years of follow-up among Finland hairdressers who had visited a physician and a physiotherapist(14). Therefore, identifying the associated factors is essential for prevention, providing rehabilitation courses and professional recommendation on the ergonomic and biomechanical posture for hairdressers. The main aim of this study is to determine the magnitude and associated factors that contribute to the development of LBP among workers engaged in hairdressing activity.

Methods

Study design and setting

An institutional-based cross-sectional study was conducted in Mekelle city, Tigray, northern Ethiopia from January 05 up to February 28, 2018. Mekelle city is located in the northern part of Ethiopia in Tigray national regional state, at a distance of 783 km from Addis Ababa. Its location is 13°32" North latitude and 39 ° 28' East longitude. Mekelle has a city administration, municipality, 7 sub-cities(15). According to the Tigray Bureau of trade, industry and urban development office 451 licensed and registered female beauty salons were found in the city.

Study and source population

The source populations of the study were all hairdressers working in all-female beauty salons of Mekelle city. All hairdressers who had one year and above work experience on the job and working in the sampled female beauty salons of Mekelle city were the study participants.

Sample size and sampling technique

The sample size for the study was determined using the formula of the single population proportion. Assuming 5% margin of error (d), 95% confidence level (alpha, α =0.05, two-tailed), prevalence 71.5% (13). Finally, the sample size (n=344) was obtained by the addition of a 10% non-response rate.

There were 451 female beauty salons registered by license registration of the Tigray Bureau of trade, industry and urban development office. The registration list contains the name and address of the beauty salons. The sample, 344 beauty salons were selected using simple random sampling by a lottery method using the name of beauty salons from the list. Then the sample 344 hairdressers were collected randomly from the selected female beauty salon.

Data collection and quality control

An interviewer-administered questionnaire was used. The questionnaire was first prepared in English then translated into the local language "Tigrigna" and then back to English to ensure consistency. The data collection tool was pretested in 10% of the sampled population. Some modification on the questioners was done and the same understanding in all the data collectors was created. The questions to detect the self-reported low back pain were adapted from the standardized Nordic questionnaire (16). Questions adapted from other studies with some modification was used to assess the socio-demographic, working environment and psychosocial status of the participants. The psychosocial factors job satisfaction and job stress were measured using the 9 items of job satisfaction scale as yes (32 - 50) and no (10 - 31)(17) and the workplace stress by 8 item scale as yes with a total score of (16 - 40) and no (≤ 15) (18).

 Eight data collectors (physiotherapists and nurses) and two supervisors (physiotherapists) were involved in this data collection. Both the data collectors and supervisors had taken two days of training before the actual data collection time about all aspects of data collection tools, questioning techniques, and ethical issues. The collected data were checked out for completeness and clarity by the principal investigator and supervisors. Data cleanup and cross-checking were done before analysis.

Data analysis

Data were entered, coded, cleaned and analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 23 for windows. Mean with its standard deviation and median with its range were determined to summarize and present numeric variables. Summarized frequencies and proportions of categorical variables were presented using text and tables.

The logistic regression model was used to identify factors associated with low back pain. Independent variables with a p-value less than < 0.25 in the bivariate logistic regression were fitted into the multivariate logistic regression for controlling the possible main effect of confounders and are reported using CORs. Model fitting was checked using log-likelihood, Hosmer and Lemeshow goodness of fit test. Finally, variables with P < 0.05 in the multivariate analysis were considered statically significant and presented by AOR with 95% C.I.

Operational definition

Work related low back pain: is self-reported pain, ache or discomfort for at least 2 working days during the last 12 months in the lower back. These symptoms often appear and aggravated at work that disappears during rest and after work ends (19).

Results

Socio-demographic/Individual characteristics of hairdressers

There were 344 sampled hairdressers participated in this study giving a response rate of 314 (91.3%) of the total study participants. The majority of the hairdressers 289 (92%) were females with the mean age of 25.3 ± 4.1 years. Most of the hairdressers were single 218 (69.4%) and have no child 223 (71%). Regarding the educational status of the hairdressers, 183 (58.3%) attended secondary school (9-12). The median monthly income for the hairdressers was 2000 Ethiopian Birr with a range of 300 to 10,000. 239 (76.1%) of the participants were served less than 5 years with a median year for 3 years, minimum and maximum of 1 and 16 years respectively. The majority of the participants 284 (79.0%) had a healthy or normal body mass index (BMI). Only 27 (8.6%) of the participants have the practice of physical activity and all of them were non-smokers (Table: 1).

Table 1: Socio-demographic /individual characteristics of hairdressers in Mekelle city, February 2018 (n=314)

Variables	Low back pain		Total N (%)
	Yes N (%)	No N (%)	
Gender			
Female	140(48.4)	149(51.6)	289(92.0)
Male	9(36.0)	16(64)	25(8.0)
Age group			
<20	11(52.4)	10(47.6)	21(6.7)
20-24	52 (39.7)	79(60.3)	131(41.7)
25-29	58(51.8)	54(48.2)	112(35.7)
30-34	28(56)	22(44)	50(15.9)
Marital status			
Married	57(59.4)	39(40.6)	96(30.6)
Single	92(42.3)	126(57.7)	218(69.4)
Number of children			
≤2child	46(56.1)	36(43.9)	82(26.1)
>2child	5(55.6)	4(44.4)	9(2.9)
No child	98(43.9)	125(56.1)	223(71.0)
Educational status			
Primary school(1-8)	48(53.9)	41(46.1)	89(28.3)
Secondary school(9-12)	78(42.6)	105(57.4)	183(58.3)
Higher education	23(54.8)	19(45.2)	42(13.4)
Work experience(years)			
≤2 years	46(39.3)	71(60.7)	117(37.3)
3-5 years	65(53.3)	57(46.7)	122(38.9)
>5 years	38(50.7)	37(49.3)	75(23.8)
Monthly income (Birr)			
≤1500	52(39.1)	81(60.9)	133(42.4)
1501-3000	62(58.5)	44(41.5)	106(33.8)
>3000	23(47.9)	25(52.1)	48(15.2)

Body mass index(BMI)			
Underweight	11(28.2)	28(71.8)	39(12.4)
Healthy	99(39.9)	149(60.1)	248(79.0)
Overweight	17(63)	10(37)	27(8.6)
Household activity			
Yes	57(62)	35(38)	92(29.3)
No	92(41.4)	130(58.6)	222(70.7)
Physical activity			
Yes	7(25.9)	20(74.1)	27(8.6)
No	142(49.5)	145(50.5)	287(91.4)

Working environment and Ergonomic characteristics of the hairdressers

The majority of hairdressers 280 (89.2%) were performing their hairdressing activity in a standing position for greater than two hours per day and 219 (69.7%) of the participants used awkward posture (bending or twisting uncomfortably) to perform their tasks. Out of the participants, 226 (72%) worked on the same (static) position for at least 2 hours per day. The majority of the participants 282 (89.8%) work for more than 4 days per week and have 1 to 5 numbers of customers per day with the median number of (5.0) customers. Hairdressers were asked about the height of the tools used in the salon, 64 (20.4%) were using an adjustable chair and 241 (76.8%) were using an adjustable washing basin. Two hundred sixty-one 261 (83.1%) of the hairdressers pursued professional training from known local training centres, of which only 91 (29%) of the hairdressers were attained formal training related to ergonomics (Table: 2).

Table 2: Working environment and Ergonomic characteristics and prevalence of LBP of the female beauty salon hairdressers of Mekelle city, February 2018 (n= 314)

| Variables | Low back pain | | Total N (%) |
	Yes N (%)	No N (%)	
Prolonged standing			
Yes	140(50)	140(50)	280(89.2)
No	9(26.5)	25(73.5)	34(10.8)
Static posture			
Yes	107(47.3)	119(52.7)	226(72.0)
No	42(47.7)	46(52.3)	88(28.0)
Awkward posture			
Yes	121(55.3)	98(44.7)	219(69.7)
No	28(29.5)	67(70.5)	95(30.3)
Repeating activity			
Yes	51(53.7)	44(46.3)	95(30.3)
No	98(44.7)	121(55.3)	219(69.7)
Working hours per day			
2-5 hours	13(28.3)	33(71.7)	46(14.6)
6-10 hours	62(48.4)	66(51.6)	128(40.8)
>10 hours	74(52.9)	66(47.1)	140(44.6)
Working days per week			
≤4 days	6(18.7)	26(81.3)	32(10.2)
>4days	143(50.7)	139(49.3)	282(89.8)
Number of customers per day			
1-5 customers	90(45.5)	108(54.5)	198(63.1)
6-10 customers	59(50.9)	57(49.1)	116(36.9)
Break time in a day			
Yes	23(46)	27(54)	40(15.9)
No	126(47.7)	138(52.3)	264(84.1)
Adjustable chair			
Yes	32(50)	32(50)	64(20.4)

No	117(46.8)	133(53.2)	250(79.6)
Adjustable washbasin			
Yes	103(42.7)	138(57.3)	241(76.8)
No	46(63)	27(37)	73(23.2)
Professional and ergonomics training			
Yes	34(37.4)	57(62.6)	91(29.0)
No	92(54.1)	78(45.9)	170(54.1)
No training	23(43.4)	30(56.6)	53(16.9)

Psychosocial characteristics of the hairdressers

Regarding psychosocial factors of the hairdressers, 161 (51.3%) of the hairdressers were not satisfied with their current job, while 185 (58.9%) of the hairdressers had job stress. About their relationship, 301 (95.9 %) of hairdressers reported that they had a good working relationship with their customers. Of the total study participants, 118 (37.6 %) had a boss on their work, out of these 100 (84.7%) had a good working relationship with their boss (Table3).

Table 3: Psychosocial characteristics and prevalence of LBP of the female beauty salon hairdressers of Mekelle city, February 2018 (n= 314)

Variables	Low back pain		Total N (%)
	Yes N (%)	No N (%)	
Job stress			
Yes	106(57.3)	79(42.7)	185(58.9)
No	43(33.3)	86(66.7)	129(41.1)
Job satisfaction			
Yes	54(35.3)	99(64.7)	153(48.7)
No	95(59)	66(41)	161(51.3)
Relationship with boss			
Good	37(37)	63(63)	100(31.8)
Fair	12(66.7)	6(33.3)	18(5.8)
Have no boss	100(51)	96(49)	196(62.4)
Relationship with customers			
Good	140(46.5)	161(53.5)	301(95.9)
Fair	7(53.85)	6(46.15)	13(4.1)

Prevalence of work related low back pain among the hairdressers

Out of 314 hairdressers, the prevalence was 149 (47.5 %) with 95%CI (41.8- 53.1), in which participants reported they had pain or ache for at least 2 days in the lower back for the past 12 months and the pain was caused or aggravated during the working activity. The prevalence of WRLBP in those who used an awkward working posture was 121 (55.3%). Similarly, 143 (50.7%) of the hairdressers who were working greater than 4 days per week develop WRLBP. Among the hairdressers who participated in the hair washing job category, the prevalence was 136 (50.9%). Among the participants who used an adjustable washing basin, only 103 (42.7%) of them developed WRLBP. Additionally, 106 (57.3%) of those who were stressed in their job develop WRLBP. Among the participants who had WRLBP 108 (72.5%) and 68 (45.6%) of them reported WRLBP affected their work and leisure time activities respectively. Five (3.4%) of the participants with WRLBP changed their job or duties because of WRLBP (Table 4).

Factors associated with work related low back pain

After the bivariate logistic regression was done for each variable to limit the number of variables and unstable estimates in the final model, only variables with P-value less than 0.25 in the bivariate were taken in the multivariate analysis. The multivariate binary logistic regression analysis identified that; awkward posture, working day per week, hair washing job category, adjustable height washing basin, and job stress had a statistically significant association with WRLBP.

Hairdressers working on bending and twisting in awkward back posture were 2.6 times more likely to develop WRLBP than those not working on awkward back posture [AOR: 2.6, 95%CI (1.41- 4.62)]. Participants who work more than 4 days in a week were 7.98 times more likely to develop WRLBP than those who work less than or equal 4 days [AOR: 7.98, 95%CI (2.54-25.09]. Hairdressers who work in the hair washing job category were 4.35 times more likely to develop WRLBP than those who were not working as washing job categories [AOR: 4.35, 95%CI (1.87-10.12)]. Hairdressers who used washing basin with adjustable height were 70% less likely to develop WRLBP compared to those who were not used [AOR: 0.30, 95%CI (0.151-0.587)]. Participants who had job stress were 2.75 times more likely to develop WRLBP than those who were not stressed on their job [AOR: 2.75, 95%CI (1.61-4.72)] (Table 4).

Discussion

The study was designed to evaluate the prevalence and associated factors of the WRLBP among hairdressers in Mekelle city, Tigray Ethiopia. This study found that the prevalence rate of WRLBP within the past 12 months was (47.5%) which is comparable with studies done in, South Africa, Brazil, Greece and United Kingdom (39%-53%) (20-23). The prevalence was higher compared to the studies conducted in Ibadan Southwest Nigeria, France, and Egypt which were (12.5% -31%) (12, 24, 25). However, it is lower relative to studies done in Taiwan, Nigeria and Addis Ababa, Ethiopia (71.5% - 83%) (11, 13, 26). The difference might be due to differences in sample size, the definition of low back pain, study area, workload and the difference in assessment tools of the studies. Example, The study conducted in Egypt, that reported a low prevalence of LBP (12.5%) was a comparative study with a small sample size among 80 hairdressers and 50 office workers(12). On the other way hairdressers in Addis Ababa, Ethiopia showed more prevalence of LBP(71.5%) than this study(13). It could be due to more sample size or as the participants were from the capital city of the country they might be open enough to report their pain. In general, the high prevalence of LBP among hairdressers might be due to the stress imposed on the lower vertebral structures by working in prolonged bending and twisting in awkward way working posture. This was supported by the study in the USA, on which hairdressers were one of the top 15 high-risk occupations for back pain among 45 major occupations(10).

In this study, the majority of the hairdressers, 72.5% and 45.6% of those with WRLBP reported that LBP affected their working and leisure time activities respectively. The United States Bureau of labor statistics found that 53% reported taking sick leave and 10% of them got a permanent work disability pension as a result of back pain(27). Similarly, studies conducted in Greece cosmologist, UK, and Egypt hairdressers

indicate LBP affected carrying out normal activities and absence from work was indicated because of LBP(12, 20, 21). This may show that LBP has a negative impact on the economic, social and productivity of hairdressers.

This study found that hairdressers working on bending and twisting in awkward back posture were more likely to develop WRLBP. This is supported by the study conducted among Egypt and Brazil hairdressers(12, 22). Incorrect body mechanics during tasks such as bending, turning and focusing on the task places stress on the highly mobile lumbosacral part of the spine(23). Bending incorrectly places a mechanical strain on the posterior longitudinal ligament, which results in stress on the facet joints thereby resulting in LBP(23, 28). On the contrary, awkward posture was not significantly associated with the musculoskeletal study conducted in Addis Ababa, Ethiopia(13). This might be due to the difference in hairdressing style in different settings and variation in hairdressers' awareness towards comfortable body posture when performing tasks and availability of modernized ergonomic tools.

In this study hairdressers who spent more working days in a week (more than 4 days) in hairdressing, activity was more likely to develop WRLBP which is consistent with two studies conducted in Nigeria(11, 25). But not among the Taiwanese hairdressers(26). The possible explanation could be as the number of working days increased, the number of customers or workload exceeds this may expose the hairdressers to the risk factors of LBP repeatedly. The study on which the majority of participants worked more days per week indicated that hours spent working per week correlated significantly (p=0,002) with how participants bent during their tasks, using their backs rather than their hips and knees(29). This may result in muscle fatigue, decrease fitness and increase pain or discomfort in the musculoskeletal system.

Hairdressers who work in the hair washing job category were more likely to develop WRLBP in this study. It might be due to the washing job category more involves the bending and twisting movements of the spine that can lead to mechanical LBP. This is supported by the study from the USA which reported the prevalence of back pain increased as the time spent on repeated strenuous physical activities and the time spent on repeated bending, twisting, or reaching on a typical job is increased(10). On the other way, hairdressing tasks do not significantly affect discomfort in body regions of Taiwanese hairdressers(26). The difference might be the economical difference between the countries which may affect to get the latest and adjustable hairdressing tools.

This study found that hairdressers who used a washing basin with adjustable height were less likely to develop WRLBP or had a preventing role compared to those who were not used. Similarly, the incidence of back pain was significantly lower in those hairdressers who used ergonomically adjusted types of equipment(13, 23). An ergonomically correct washing basin is easily adjustable and maneuverable and allows for easy and regular changes in posture, thereby breaking the chain of a sustained position(23). The possible explanation maybe when the height is adjustable to the height of hairdressers the spine will be in an upright or erect position that could decrease the awkward or uncomfortable posture of the hairdressers. A study on ergonomic analysis of a hair salon revealed that fixed-height chairs and tables

could put hairdressers in uncomfortable positions like twisting and bending to reach the different hairdressing materials(28, 29).

Hairdressers who had job stress in this study were more likely to develop WRLBP this is supported by the study conducted among France hairdressers and WHO report, psychosocial factors appear to play a substantial role in the frequency of low back pain(2, 24). Similarly, job stress was one of the psychosocial demands associated with increased risk of LBP(31). It might be those who were stressed in their job had different physical influences and workloads that may affect the occurrence of LBP.

This research addressed one of the major occupational health problems among the neglected group of hairdressing workers. However, as it is a 12-month self-reported pain or discomfort there might be recalled bias, hence there might be over and underestimation of the magnitude of LBP. These could lead to a possible variation in the estimation of association among WRLBP and other variables. It is also a cross-sectional study design, in which the temporal occurrence of LBP outcomes cannot be proved and the study also lacks a comparison group. It is advised in future research projects to analyze in-depth by considering postural assessment and objective measurement of the ergonomic tools.

Conclusions

This study has shown that low back pain is a common work-related health problem among hairdressers. Working in awkward postures, more working days per week, hair washing job category and job stress show statistically significant association with work related low back pain, whereas using adjustable height washing basin has a protective effect for low back pain. The study results suggest that effective intervention strategies most likely have to take into account both ergonomic improvements and behavioural aspects. It is recommended to give attention for promoting health and prevent low back pain among hairdressers by giving on job training related to comfortable working posture and utilization of ergonomically designed tools.

Abbreviations And Acronyms

AOR: Adjusted Odds Ratio; BMI: Body mass index; CI: Confidence Interval; COR: Crude Odds Ratio; DALYs: Disability-adjusted living years; LBP: Low back pain; MSD: Musculoskeletal disorder; RBTR: Repeated bending, twisting, or reaching; SPSS: Statistical Package for Social Sciences; WHO: World Health Organization; WRLBB: work-related low back pain; WRMSD: Work-related musculoskeletal disorder; YLDs: Years lived with disability.

Declarations

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Ethics approval and consent to participate

Ethical clearance was obtained from the ethical review committee of the College of Health Sciences of Mekelle University. Written informed consent was obtained from each of the study participants after being informed in detail about the objective, purpose, benefit, risk, and the confidentiality of the information and the voluntary nature of participation. Besides, participants who had severe low back pain during the data collection time were advised and referred, for further care to the department of physiotherapy, Ayder Comprehensive Specialized Hospital.

Consent for Publication

Not applicable.

Availability of data and materials

Data will be available upon request from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Authors' contribution

GST* and SDG designed the study, developed the tool and coordinated the data collection activity. GST*, BFG, and DMT revised the proposal, carried out the statistical analysis, interpretation of the finding and writing of the manuscript. All authors read and approved the final manuscript.

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Table 4

Table 4: The adjusted effect of factors on LBP among hairdressers of Mekelle city, February 2018 (n=314)

| Variables | Low back pain | | COR (95% CI) | AOR (95% CI) | p-value |
	Yes N (%) (%)	No N (%)			
Work experience					
≤2 years	46(39.3)	71(60.7)	1.00		
3-5 years	65(53.3)	57(46.7)	**1.76(1.053-2.943)***	0.735(0.318-1.698)	0.471
>5 years	38(50.7)	37(49.3)	1.585(0.883-2.846)	1.487(0.735-3.005)	0.270
Physical activity					
Yes	7(25.9)	20(74.1)	**0.357(0.147-0.87)***	2.085(0.574-7.569)	0.264
No	142(49.5)	145(50.5)	1.00		
Prolonged standing					
Yes	140(50)	140(50)	**2.778(1.25-6.164)***	0.976(0.343-2.774)	0.963
No	9(26.5)	25(73.5)	1.00	1.00	
Awkward posture					
Yes	121(55.3)	98(44.7)	**2.95(1.765-4.946)***	**2.555(1.41-4.62)****	0.002
No	28(29.5)	67(70.5)	1.00	1.00	
Working hours per day					
2-5 hours	13(28.3)	33(71.7)	1.00		
6-10 hours	62(48.4)	66(51.6)	**2.385(1.15-4.945)***	0.630(0.249-1.594)	0.329
>10 hours	74(52.9)	66(47.1)	**2.846(1.38-5.86)***	1.111(0.610-2.022)	0.732
Working days per week					
≤4 days	6(18.7)	26(81.3)	1.00	1.00	
>4days	143(50.7)	139(49.3)	**4.458(1.78-11.16)***	**7.97 (2.53-25.09)****	<0.001
Hair washing					
Yes	136(50.9)	131(49.1)	**2.715(1.37-5.374)***	**4.349 (1.87-10.1)****	0.001
No	13(27.7)	34(72.3)	1.00	1.00	
Adjustable washing basin					
Yes	103(42.7)	138(57.3)	**0.438(0.255-0.75)***	**0.297 (0.15-0.587)****	<0.001
No	46(63)	27(37)	1.00	1.00	
Training of ergonomics					
No	92(54.1)	78(45.9)	0.65(0.349-1.21)	1.709(0.765-3.819)	0.191
Yes	34(37.4)	57(62.6)	**0.506(0.300-0.852)***	1.116(0.466-2.67)	0.805
Not professional	23(43.4)	30(56.6)	1.00	1.00	
Job stress					
Yes	106(57.3)	79(42.7)	**2.684(1.68**	**2.753 (1.61-**	<0.001

			-4.284)*	4.716)**	
No	43(33.3)	86(66.7)	1.00	1.00	
Job satisfaction					
Yes	54(35.3)	99(64.7)	0.379(0.24-0.60)*	1.855(1.042-3.300)	0.36
No	95(59)	66(41)	1.00	1.00	
Relationship with boss					
No boss	100(51)	96(49)	1.00		
Good	37(37)	63(63)	0.564(0.344-0.92)*	0.961(0.483-1.915)	0.911
Fair	12(66.7)	6(33.3)	1.920(0.693-5.320)	0.386(0.65-2.285)	0.294

*= significant association (bivariate), **=significant association (multivariate), COR=crude odds ratio, AOR=adjusted odds ratio, 1.00= references.