

ORIGINAL ARTICLE

Work-related musculoskeletal disorders and associated risk factors among urban metropolitan hairdressers in India

SukhDev Mishra  | Kamalesh Sarkar

ICMR-National Institute of Occupational Health, Ahmedabad, India

Correspondence

SukhDev Mishra, Ph.D, ICMR-National Institute of Occupational Health, Ahmedabad-380016, Gujarat, India.

Abstract

Objectives: Ergonomic hazards account for a substantial proportion of work-related diseases and injuries among hairdressers. Awkward posture during work, repetitive movements, prolonged standing, and long working periods to carry out work activities cause mechanical load on the joints and work-related musculoskeletal disorders (WMSDs). This study investigated the musculoskeletal problems among urban hairdressers and associated risk factors.

Methods: This study investigates the prevalence of WMSDs among 768 study subjects (384 hairdressers and control subjects each) from Ahmedabad and New Delhi metropolis in India. Univariate statistical analysis was carried out along with 95% confidence interval for effect estimates.

Results: Findings reveal that the nearly half of the hairdressers suffered from knee and foot pain (49.5%), followed by lower back pain (39.8%) and upper back pain (38.8%). The neck pain and shoulder pain were reported by more than 25% hairdressers. The odds of developing neck pain (OR = 2.04; 95% CI 1.37-3.06) and shoulder pain (OR = 1.85; 95% CI 1.25-2.73) were significantly higher than control. The female hairdressers were more likely to experience work-related musculoskeletal disorder (OR = 2.63; 95% CI 1.18-5.86) than male counterparts. Hairdressers within the age of 18-35 years had significantly higher occurrence of musculoskeletal disorders with longer duration of working hours at the workplace. Longer daily work hours (>12 hours) posed significantly higher risk (OR = 2.47; 95% CI 1.39-4.38) of experiencing MSD for hairdressers.

Conclusion: A very large proportion of hairdressers suffered with work-related musculoskeletal disorders. The long daily working hours and gender of the hairdresser are associated with increased risk of developing WMSDs.

KEYWORDS

hairdressers, musculoskeletal pain, occupational health, prevalence, work-related musculoskeletal disorders

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2021 The Authors. *Journal of Occupational Health* published by John Wiley & Sons Australia, Ltd on behalf of The Japan Society for Occupational Health

1 | INTRODUCTION

Hairdressers represent a fast growing group of professionals especially in urban India. There are approximately 168,000 salons in urban India that are providing services related to hairdressings in different form of arrangements—traditional barber shops, women's beauty salons, and modern unisex salons.¹ Hairdressing typically involves the activities of hair coloring, hair cutting, hair texturing techniques, etc separately or in combination. In India, major workforce in beauty and salon segment is unorganized sector, and it is expected to grow to 12.1 million workers in 2022 from 6.2 million in 2017. Due to unorganized nature of employment, the challenges stand as poor awareness of workplace hazards among workers, unprotected labor legislations, and economic and sexual exploitation; consequently, all these add to neglected occupational health of workers along with no formal provision of paid leaves and medical insurance.^{2,3}

The musculoskeletal system is a complex entity, composed by bones, joints, muscles, tendons, ligaments, bursa, nerves, and blood vessels. Work-related musculoskeletal disorders (WMSDs) also pose as hazard that affect working requirements of hairdressers, and cause the problems due to twisting and repetitive movements or spend long periods of time carrying out work activities in awkward postures. Moreover, the mechanical load on the joints, prolonged standing, longer working hours, missed meals, not taking breaks during work, and attending to a large number of customers in a single day significantly add as important occupational health risks for these professionals.^{4,5} The nature of hairdressing work often requires the individual to maintain extended hours of working with minimal breaks. Hairdressers use both arms extensively. Poorly designed workplaces, difficult work environment, and poor ergonomic design of work tools have the potentials to impact on hairdresser health.⁶ Hairdressers are at risk of lower back, neck, shoulder, arm, wrist, and foot injury.^{6,7} The customer-oriented nature of hairdressing work restrains workers taking frequent and adequate breaks during work.

According to Health and Safety Executive⁸ survey in UK, WMSDs were the most common occupational illnesses. In US, Bureau of Labor Statistics data BLS⁹ found that WMSDs were the most important parts of workers' compensation, which accounted for at least one third of the labor time losses. These illnesses not only affect the workers' quality of life but also put a major economic burden to the society.¹⁰ Wu CY¹¹ reported the most discomfort for shoulders (94.4%), lower back (80.6%), and neck (77.8%) among hairdressers. Moreover, Chuang¹² found that 94.4% of hairdressers complained for discomfort in shoulders, followed by the lower back and neck. In recent years, Mussi, Gouveia⁷ has reported that prevalence for work-related MSDs is as high as 71%; similarly, a high prevalence of 81% has been reported by Aweto, Tella, Johnson.¹³

Hairdressers, in India, majorly constitute of unorganized sector workers despite catering to second most populous (1.3 billion) country in the world. Although the scientific investigations on WMSDs among hairdressers have appeared from different parts of the world, but estimates on work-related musculoskeletal disorders are unknown from India where the numbers of the workers in this sector could be one of the largest^{2,14-16} with a different socio-economic and work-force characteristic (viz. work hours, gender difference, low salary, neglected occupational health and safety(OHS) legislations). Despite the potential risks to hairdresser health, there is a dearth of research studies which examine the occupational health issues including work-related musculoskeletal disorders among Indian hairdressers. Also, work-related musculoskeletal disorders (WRMSDs) remain empirically unrepresented in developing countries (Woolf AD, 2008). Among one of the benefits of this study include drawing attention of respective authorities and other stakeholders to take well-informed decisions for the workplace well-being of hairdressers along with devising effective regulations under health and safety provisions which would be highly valued for informal sector workers especially women who also represent this workforce in large numbers.

Therefore, this study was initiated with the aims of investigating the health problems of urban hairdressers with special focus on musculoskeletal complaints related to physical aspects of the work (muscular pain due to bad postures, repetitive movements, prolonged stretching of muscles, exertion, etc leading to painful discomfort in caring out regular work) based on their self-reported outcomes.

2 | MATERIALS AND METHODS

2.1 | Subject selection and evaluation

In this given cross-section study design survey, a total of 768 participants were recruited which included 384 hairdressers and controls of similar number, each from Ahmedabad and New Delhi metropolitan cities. Control participants were the sales workers who employed in retail cellphone showrooms at Ahmedabad city. These were selected using a non-probability convenient sampling technique. All the hairdressers were all full-time working professionals. An ethical approval was obtained from the Institutional Ethics Committee and written informed consent was obtained from each of the participants. During data collection, the responses from study subjects were recorded in paper-based pre-designed questionnaire and the purpose of the study was clearly explained to all the subjects. The study data collection was carried out during the year 2016-17. The criteria for inclusion as study subjects were participants with working experience as minimum 2 years as hairdressers. Subjects with a history

of known musculoskeletal problems and occupational injury were excluded from study population.

Subjects in the control group were chosen considering both the groups were socioeconomically as well as demographically similar except the musculoskeletal movements and uncomfortable body posture requirements at work (eg, supination/pronation of forearms and flexion/extension of arms) for prolonged period which were present for hairdressers. Socioeconomic and demographic similarity of subjects referred to young adulthood (20's or 30's) characteristic with similar income. Based on ability to afford (as a result of income), the study subjects are supposed to have similar consumption of food/nutrition, education, and access to medical care which is crucial for any health outcome.

The interview for data collection among control workers who worked as full-time sales workers at retail cellphone showrooms was conducted during break time. The information on demographic variables such as age, gender, height, weight, *etc* was recorded. Height and weight were used to calculate the BMI (weight in $\text{kg}^2/\text{height}$ in meters squared). Variables on work-related characteristics such as prior work experience in years and total daily work hours were recorded in questionnaire. Hairdressers were also asked on daily frequency of hairdressing activities and recorded on a subjective scale regularly/sometimes/rarely/never. Information on training and qualifications of subjects was also obtained.

Musculoskeletal complaints were recorded using the modified Nordic questionnaire based on MSD pain in last 12 months.¹⁷ The questionnaire recorded relevant details of work history to confirm that reported symptom was thought to be work related. Participants were explained that the work-related symptoms were those which aggravated at work or improved on rest days. Questions about hygiene practices, equipment use, and cleaning techniques between each client were also included in questionnaire. The survey consists of objective-type questions with multiple-choice responses to record information on demographic, social, and professional characteristics. Interviews were taken in person at the workplace and lasted approximately 15 to 20 minutes. The important covariates (age, gender, daily work hours, and work experience) were included into the model to minimize the impact of possible difference imbalance/difference among subjects.

2.2 | Statistical analysis

Data description for continuous variables such as age and BMI is presented as mean \pm SD, while all categorical variables are reported as count (n) and percentage (%). To assess the significance among categories, Chi-square test was used for analyzing proportion data. Logistic regression analysis was used to calculate odds ratios (OR) and 95% confidence

intervals to estimate the effect of occupation on musculoskeletal problems. All tests were carried out at 5% level of significance. All statistical analysis was carried out using statistical software IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

3 | RESULTS

The demographic characteristics and socioeconomic characteristics of surveyed workers have been given in Table 1. The mean age of hairdressers and control subjects was observed as 34.23 ± 10.96 and 25.26 ± 4.83 . Among hairdressers 296 (77.1%) were men and 88 (22.9%) were women, whereas in control subjects 358 (93.2%) were men and 26 (6.8%) were women. In both the groups, the proportion of male workers were higher in comparison to female workers. The difference of proportions for men and women was statistically significant between hairdressers and control subjects. The proportion of married workers was higher (76.0%) for hairdressers group, however, more subjects with unmarried (62.8%) status were observed higher in control group. Among hairdressers, nearly 3% study subjects were illiterate while all the control subjects were educated up to primary or higher level. The percentage distribution of education was significantly different between hairdressers and control subjects considering primary as a cut-off criteria. Alcohol consumption was reported significantly lower (11.23%) among hairdressers than control subjects. Proportion of tobacco users was also lower in hairdressers (36.5%) in comparison to controls (41.9%).

Furthermore, Table 1 presents a summary of professional characteristics of workers. Hairdressers were found working in different roles in a salon, majority of the subjects were working as an employee (64.8%) in their salon and 31.8% reported being owner of salon among hairdressers, control group also consists of largely the subjects who were an employee (87.0%) at the workplace. Subjects who worked as a manager were 3.4% among hairdressers in comparison to control (9.1%) group. The distribution for role of hairdressers was statistically different than that of control subjects ($P < .05$). Hairdressers who participated in the study reported to have mean work experience of 14.35 ± 10.51 years while control subjects had mean work experience of 3.95 ± 2.94 years.

The daily work hours have been observed of long duration among hairdressers and cellphone showrooms sales workers as well. The daily work hours of hairdressers were reported as 8-10 hours for 27.4%, 10-12 hours (26.1%), and 13-14 hours (46.5%). For Control Subjects, work hours were reported as 8-10 hours for 15.1%, 10-12 hours (77.3%), and 12-14 hours (7.6%). The daily work hours' distribution for hairdressers was statistically different from the control group work hour pattern ($P < .05$). A large percentage of hairdressers reported working for a very long (12 to 14) hours in a day.

TABLE 1 Demographic, Socio-economic, and Professional characteristics of study subjects

Characteristics	Study Group	
	Hairdresser (N = 384)	Control (N = 384)
Age (in y)		
Mean ± SD	34.23 ± 10.96	25.26 ± 4.83
Median (Min, Max)	32(18,75)	24(18,42)
Gender		
Male	296 (77.1%)	358 (93.2%)
Female	88 (22.9%)	26 (6.8%)
BMI (kg/m²)		
Mean ± SD	22.58 ± 3.85	21.65 ± 3.99
Alcohol Use^a		
Count (%)	43 (11.23%)	95 (24.7%)
Tobacco Use		
Count (%)	140 (36.5%)	161 (41.9%)
Marital Status		
Married	292 (76.0%)	141 (36.7%)
Unmarried	90 (23.5%)	241 (62.8%)
Separated/Divorced	2 (0.5%)	2 (0.5%)
Education		
Illiterate	11 (2.9%)	0 (0.0%)
Primary	114 (29.7%)	15 (3.9%)
10th	142 (37.0%)	60 (15.6%)
12th	53 (13.8%)	123 (32.0%)
Graduation	61 (15.9%)	170 (44.3%)
Post-Graduation	3 (0.7%)	16 (4.2%)
Professional Characteristics		
Role in Saloon		
Owner (working)	122(31.8%)	15(3.9%)
Manager	13(3.4%)	35(9.1%)
Employee	249(64.8%)	334(87.0%)
Owner (working)	122(31.8%)	15(3.9%)
Work Experience (in years)		
Mean ± SD	14.35 ± 10.51	3.95 ± 2.94
Daily Work Duration^a		
8-10 h	105 (27.4%)	58(15.1%)
10-12 h	100(26.1%)	297(77.3%)
12-14 h	179(46.5%)	29(7.6%)

^aOccasional use (1-2 drinks in a week)

Comparatively, among control workers who usually follow a more fixed schedule of business hours, 75% of retail shop employee worked 10-12 hours per day.

Hairdressers need to work for a longer period in standing position and in odd postures during the work activities. The work-related musculoskeletal disorders (WMSDs) were

reported as given in Table 2. The magnitude of problem of various kind of MSDs was observed significantly higher among hairdressers than control group subjects. Knee and foot pain was reported highest among all categories in both hairdressers and control subjects, however, this was experienced by almost half (49.5%) of hairdressers. The hairdressers have odds of developing knee/foot pain 1.52 times higher than control group ($P < .05$). Among other reported MSDs in hairdressers, a large number of subjects were suffering from Upper Back Pain (38.8%) and Lower Back Pain (39.8%), whereas Neck Pain and Shoulder Pain were reported by more than 25% among hairdressers. The hairdressers have odds of developing neck pain 2.05 times and odds of developing shoulder pain 1.85 times higher than control group ($P < .05$). Similarly, hairdressers have odds of developing upper back pain 1.60 times and odds of developing lower back pain 1.43 times higher than control group ($P < .05$). Elbow Pain and Wrist-Hand Pain were reported by 16.4% and 22.4%, respectively. The statistically significant higher odds ratios were found for all WMDs except elbow pain.

Table 3 describes the relationship between age of the workers and daily work hours which was found statistically significant. It can be read from presented data that a very large proportion of hairdressers (78.64%) worked more than 12 hours per day. The interpretation indicated that young workers worked for longer duration; in both the categories of work hours (>12 and <12 hours), the proportion of workers with age 18-35 years were significantly higher ($P < .05$).

Further analysis was carried out for long working hours with respect to MSD complaints among subjects. Table 3 also indicates the association for occurrence of MSD with long duration of daily work hours. Long work hours have been found to be significantly ($P < .001$) associated with MSD complaints among hairdressers. Proportion of hairdressers with a MSD complaint was significantly higher (73.55%) who worked more than 12 hours per day in comparison to hairdressers who were working less than 12 hours (26.45%) in a day. The OR indicated that risk of experiencing any kind of reported MSD was 2.47 times more likely among hairdressers than other category.

We further analyzed the MSDs with respect of age groups and it was revealed from the table that prevalence of different musculoskeletal pains was significantly higher for younger group who were working for longer daily hours at workplace. The significantly higher difference was noticed for lower (29.42%) and upper back (26.18%) pain. Although the odds ratios were not statistically significant for any of MSDs with respect to age category but those were highest for lower and back pain.

Table 4 presents age-wise distribution of WMSDs among hairdressers. It could be read from results that workers in age group 18-35 have reported maximum discomfort

TABLE 2 Work-related musculoskeletal disorders (MSDs) among subjects

WMSDs category	Hairdresser (N = 384)	Control (N = 384)	Odds Ratio (OR Age Adjusted) (95% CI)
Neck pain	101(26.3%)	57(14.8%)	2.05 (1.37, 3.06) ^a
Shoulder Pain	107(27.9%)	65(16.9%)	1.85 (1.25, 2.73) ^a
Elbow pain	63(16.4%)	42(10.9%)	1.56 (0.98, 2.50) ^a
Wrist and hand pain	86(22.4%)	41(10.7%)	2.42 (1.55, 3.77) ^a
Upper back pain	149(38.8%)	109(28.4%)	1.60 (1.13, 2.24) ^a
Lower back pain	153(39.8%)	124(32.3%)	1.43 (1.02, 2.00) ^a
Knee/foot pain	190(49.5%)	147(38.3%)	1.52 (1.10, 2.11) ^a
Any of above	242(63.0%)	185(48.1%)	1.82 (1.37, 2.44) ^a

^a*P* < .05**TABLE 3** Age, work hours, and Occurrence of WMSD among hairdressers

Age Group	Work Hours (Daily)		Significance
	>12 h (n = 302)	<12 h (n = 82)	
18-35 y (n = 232)	171 (56.62%)	61 (74.39%)	<i>P</i> < .001
36-Above (n = 152)	131 (43.38%)	21 (25.61%)	

Work hours and Occurrence of WMSD			
Work Hours (Daily)	MSD Complaints		Odds Ratio (95% CI)
	Yes (n = 242)	No (n = 142)	
>12 h (n = 302)	178 (73.55%)	124 (87.32%)	2.47 ^a (1.39, 4.38)
<12 h (n = 82)	64 (26.45%)	18 (12.68%)	

^a*P* < .05

of body regions. Since the work requirement of hairdressers needs standing position for long hours with elevated arms, it is evident that a large proportion of workers have reported associated MSDs problems. In this study, the exposure group comprised of currently working hairdressers

and the 12-month prevalence of work-related musculoskeletal disorders considering the presence of at least one symptom of WMSDs among hairdressers was 62.76% (N = 384).

Gender has shown a significant association with the occurrence of WMSDs among hairdressers. For neck and shoulder pain, the odds for female hairdressers were 3.67 and 3.04 times higher male hairdressers, respectively. The odds for the risk of developing upper and lower back pain was 2.46 and 2.18 times higher for female hairdressers in comparison to male hairdressers. Similarly, the odds for the MSD related to elbow, wrist/hand, and knee/foot was also higher for female hairdressers than male hairdressers. (Table 5).

A multivariate logistic regression modelling results indicate that there was a significantly increased risk of developing musculoskeletal disorders with Gender (OR = 2.63, 95% CI 1.18, 5.86) controlling for other factors among hairdressers. Age, daily work hours, and work experience were also associated with increased risk, Overall model estimates for all study subjects also showed Gender as significantly increased risk for assessed outcome along with daily work hours. History of more than 5 years' work experience was also found with increased risk for developing MSDs, although not statistically significant. Overall, the hairdressers faced significantly higher odds (OR = 1.60, 95% CI 1.13, 2.24) for the risk of developing work-related musculoskeletal disorders. (Table 6).

TABLE 4 Age-wise distribution of WMSDs among hairdressers

Age Group (n)	Neck Pain (101)	Shoulder Pain(107)	Elbow Pain (63)	Wrist and Hand Pain (86)	Upper Back Pain (149)	Lower Back Pain (153)	Knee/Foot Pain (190)
18-35 (n = 232)	59 (58.42%)	63 (58.88%)	39 (61.9%)	53 (61.63%)	94 (63.09%)	99 (64.71%)	115 (60.53%)
36-Above (n = 152)	42 (41.58%)	44 (41.12%)	24 (38.1%)	33 (38.37%)	55 (36.91%)	54 (35.29%)	75 (39.47%)
<i>P</i> -value	0.02	0.01	0.01	0.003	0.001	0.001	0.001
Odds Ratio	0.89	0.92	1.08	1.07	1.2	1.35	1.01
95% CI	(0.6, 1.4)	(0.6, 1.4)	(0.6, 1.9)	(0.7, 1.7)	(0.8, 1.8)	(0.9, 2.1)	(0.7, 1.5)

WMSDs Category	Female (N = 88)	Male (N = 296)	Odds Ratio (OR _{Age Adjusted}) (95% CI)
Neck pain	42 (47.7%)	59 (19.9%)	3.67 (2.2, 6.1) ^a
Shoulder Pain	41(46.6%)	66(22.3%)	3.04 (1.8, 5.1) ^a
Elbow pain	21(23.9%)	42(14.2%)	1.88 (1.1, 3.4) ^a
Wrist and hand pain	33(37.5%)	53(17.9%)	2.75 (1.6, 4.6) ^a
Upper back pain	49(55.7%)	100(33.8%)	2.46 (1.5, 3.9) ^a
Lower back pain	48(54.5%)	105(35.5%)	2.18 (1.3, 3.5) ^a
Knee/foot pain	57(64.8%)	133(44.9%)	2.25 (1.4, 3.7) ^a
Any of above	73(82.9%)	169(57.1%)	3.65 (2.1, 6.6) ^a

^a $P < .05$

Factor	Estimates (Hairdressers)		Estimates (Overall ^b)	
	b (SE)	Odds Ratio (95% CI)	b (SE)	Odds Ratio (95% CI)
Age (years)	0.002 (0.012)	1.01 (0.98, 1.03)	-0.005 (0.011)	0.99 (0.97, 1.01)
Gender (female)	0.964 (0.411)	2.63 (1.18, 5.86) ^a	0.644 (0.293)	1.90 (1.07, 3.38) ^a
Daily Work Hours	0.136 (0.098)	1.15 (0.97, 1.39) ^a	0.152 (0.074)	1.16 (1.01, 1.34) [*]
Work Experience (>5 y)	0.381 (0.319)	1.46 (0.78, 1.93)	0.261 (0.204)	1.29 (0.87, 1.93)
Group (hairdressers)	—	—	0.478 (0.203)	1.60 (1.13, 2.24) ^a

CI, Confidence Interval

^a $P < .05$

^bOverall model estimates includes all study subjects

^{*} indicate significance < 0.05

TABLE 5 WMSDs distribution with respect to gender of hairdressers

TABLE 6 Multiple logistic regression model estimates with multivariate adjusted odds ratios of WMSDs for various risk factors among subjects

4 | DISCUSSION

The study identifies health problems related to musculoskeletal disorders along with overall prevalence of the WMSDs and associated risk factors among hairdressers in Indian metropolitan urban settings. Despite the busy schedule of hairdressers to attend clientele, we received a very good response and time to contribute in this research study by study subjects during personal visits to salons. The access to control subjects was quite challenging and we could collect data only after multiple turned down requests by mega sales outlets. The 12-month prevalence of work-related musculoskeletal disorders among hairdressers was 62.76%. Our finding of prevalence is considerably less than previous reports by Aweto, Tella, Johnson¹³ and Mussi, Gouveia⁷ who have reported WRMSDs prevalence as 81% and 71%, respectively. The prevalence burden of WMSDs is sizeable, and it could also be a reason for high attrition rate among employees of this sector in India due to lack of paid leave benefits under

sick leaves and medical insurance to these unorganized sector workers.²

Age-wise classification indicates that subjects with 18-35 years have highest prevalence for reported discomforts of WMSDs. Among these subjects, the largest proportion (approximately 40%) suffered from lower and upper back pain may be attributed to long working duration (10-14 hours) continuously which consists of large proportion (72%) of hairdressers in our study. These findings corroborate with the results from Aweto, Tella, Johnson¹³ who have reported highest onset of WMSDs in less than 35 years age group.

Findings also reveal the nearly half of the hairdressers suffered from knee and foot pain (49.5%), followed by lower back pain (39.8%) and upper back pain (38.8%). The neck pain and shoulder pain were reported by more than 25% hairdressers. The odds of developing neck pain (OR = 2.04; 95% CI 1.37-3.06) and shoulder pain (OR = 1.85; 95% CI 1.25-2.73) were significantly higher than control. Hairdressers work with elevated arms which has previously been associated

with neck and shoulder pain,¹⁸ and a possible causal relationship has been suggested by several systematic reviews.¹⁹ It was observed that close to half proportion of hairdressers were working for more than 12 hours in a day which can be linked to availability of work in late evening hours in hairdressing occupation. Important consideration which could be emphasized on the basis of prevalence of WMDSs is that the youngest population of hairdressers have almost equal risk of WMDSs. Pay cut for a sick leave absenteeism may force hairdressers to continue to work despite suffering from musculoskeletal pain, which could play as a multiplying factor for deteriorating occupation health of hairdressers.²

The observed risk for work-related musculoskeletal disorder due to work experience (5 years or more) in current study (OR = 1.29; 95% CI 0.87-1.93) was similar to the results reported in Ethiopian hairdressers (OR = 1.51; 95% CI 1.03-2.20).²⁰ Adoption of coping strategy to reduce the MSD pain is a natural response in form of taking sufficient breaks, not attending customers, etc¹³, similar approach has also been observed among all hairdressers in our study by opting rest/lie down during lunch break along with occasional stretching of body.

Our study identify gender as a significant risk factors in occurrence of WMDSs among hairdressers, and the study finding correlate with reported evidences that mechanical stress and subjective muscular tension is a risk factor for pain in the shoulders and neck in female apprentices in technical occupations.^{21,22} Female gender has also been found significantly associated with the occurrence of WMDSs by DeSmet De Smet, Germeys, De Smet.²³ The appreciation of the physiological and anatomical differences between female and male could also explain the increased risk of development of MSDs. Females have less muscle strength and higher proportion of type 1 muscle fibers (weaker in nature) than men of the same size which is even more pronounced for upper limbs.^{24,25} Present study also found higher odds for upper limbs region for female workers. A recently published meta-analysis also confirms our observation which indicated a moderate evidence for an association between physical stress and shoulder diseases for hand-arm elevation (OR 1.9, 95% CI 1.5-2.5) and shoulder load (OR 2.0, 95% CI 1.9-2.1).²⁶ For present study data, a multivariate modelling of risk factors also showed a significant independent risk association with gender; furthermore, this risk was significantly higher (OR = 2.63, 95% CI 1.18-5.86) among hairdressers.

Significance of present study can also be derived by associated untoward employment-related outcomes among occupational workers historically reported as early retirement, sickness absence, and disability.²⁷⁻³⁰ A major proportion of MSDs are caused by physical work exposures.³¹ Musculoskeletal disorders are second most common cause of disability worldwide by measurement of lived with disability

(YLDs) and heavily concentrated in working age (ie, from 20 to 54 years). Present study findings could also be critical as WMDSs cause dual burden through loss of work and productivity and financial costs to the healthcare system in both the developed and developing countries³² across the unorganized and organized sectors.

On limitation aspects, this study was conducted under a cross-sectional design and recorded the responses of hairdressers through questionnaire in self-assessment manner. The data collection required hairdressers to recall the information for past occurrences which could be a potential source of bias. The study outcome parameter was self-reported occurrence of musculoskeletal disorder, measured in the form of binary response for different body regions. However, self-reported outcomes in WMDSs epidemiology and surveillance have been found to be a valuable data source as a measure of musculoskeletal disorders at workplace.³³ Although utmost accuracy has been asserted while recording the responses on predictor parameters, but workers with long work hours were prone to report overestimated daily work hours for themselves, however, the self-reported work hours have been reported reasonably accurate on aggregate levels.³⁴

5 | CONCLUSIONS

The study has identified a high prevalence of Work-related musculoskeletal disorders (WMDSs) among hairdressers. Findings indicate that most discomfort body regions are knee, lower and upper back, neck, and shoulder. The most probable cause of these symptoms are being in a standing position throughout the workday, working with elevated high upper limbs during prolonged duration, and repetitive movements. The study findings underline that there is an immediate need to disseminate the guidelines on impact of repetitive and awkward movement, and these group of workers need be educated and encouraged to adopt measures to prevent musculoskeletal disorders. This will promote a healthy and productive life at workplace for hairdressers.

ACKNOWLEDGEMENTS

The investigator would like to express the deepest appreciation to all subjects who participated in this study and provided us the opportunity to complete this project. Encouragement and guidance from the Director NIOH is also appreciated. A special gratitude to technical staff Mr Arun Patel, Mr Ashvin Malhotra, and Mr Jayanti Valodara who helped in execution of the study.

CONFLICTS OF INTEREST

The authors declare that no conflict of interest exists with anyone pertaining to this study.

DISCLOSURES

Approval of the research protocol: This study was approved by Institutional Ethics Committee vide (Agenda No 3.1 - 11/2015). **Informed consent:** Written informed consent was obtained from each of the participants. **Registry and the registration no. of the study/trial:** N/A. **Animal studies:** N/A. **Conflict of interest:** Authors declare no conflict of interest for this article.

ORCID

SukhDev Mishra  <https://orcid.org/0000-0002-0842-1657>

REFERENCES

1. L'Oréal. Developing the Hair Salon Industry in India. 2015; <https://mediaroom.loreal.com/en/beauty-in/beauty-in-india/loreal-in-india/developing-the-hair-salon-industry-in-india/>. Accessed 18 June 2020
2. National Skill Development Corporation, NSDC - KPMG. *Human Resources and Skill Requirements in the Beauty and Salon Sector (2013–17, 2017–22)*. Ministry of Skill Development and Entrepreneurship, Govt of India; 2017.
3. Lakhani R. Occupational health of women construction workers in the unorganised sector. *J Health Manag.* 2004;6(2):187-200.
4. English CJ, Maclaren WM, Court-Brown C, et al. Relations between upper limb soft tissue disorders and repetitive movements at work. *Am J Ind Med.* 1995;27(1):75-90.
5. Deschamps F, Langrand J, Lesage F-X. Health assessment of self-employed hairdressers in France. *J Occup Health.* 2014;56(2):157-163.
6. Arokoski JP, Juntunen M, Luikku J. Use of health-care services, work absenteeism, leisure-time physical activity, musculoskeletal symptoms and physical performance after vocationally oriented medical rehabilitation-description of the courses and a one-and-a-half-year follow-up study with farmers, loggers, police officers and hairdressers. *Int J Rehabil Res.* 2002;25(2):119-131.
7. Mussi G, Gouveia N. Prevalence of work-related musculoskeletal disorders in Brazilian hairdressers. *Occup Med.* 2008;58(5):367-369.
8. HSE. Health and safety at work : summary statistics for Great Britain. 2019. <https://www.hse.gov.uk/statistics/>
9. BLS. Nonfatal Occupational Injuries and Illnesses Requiring Days Away From Work. 2015. Accessed 08 July 2020.
10. Morse TF, Dillon C, Warren N, Levenstein C, Warren A. The economic and social consequences of work-related musculoskeletal disorders: the connecticut upper-extremity surveillance project (CUSP). *Int J Occup Environ Health.* 1998;4(4):209-216.
11. Wu CYYC, Lu CW, Chang KF, Chang CH. Evaluating the musculoskeletal disorders in the employee working in the beauty salon. Paper presented at: Proceeding of the Health and Safety Conference 2004; Taiwan. 2004.
12. Chuang W. Research on the musculoskeletal disorders of hairdressers in beauty salons. *J Cheng-Shiu University-Taiwan.* 2005;18:65-70.
13. Aweto HA, Tella BA, Johnson OY. Prevalence of work-related musculoskeletal disorders among hairdressers. *Int J Occup Med Environ Health.* 2015;28(3):545-555.
14. National Hair Beauty Federation, (NHBf). Hair & Beauty Industry Statistics. 2019; <https://www.nhbf.co.uk/documents/hair-and-beauty-industry-statistics/#:~:text=The%20NHBf%20is%20the%20UK's,over%201%2C000%20since%20last%20year.> Accessed 09 Nov 2020
15. Hinton T. Number of hairdressers in Australia 2008–2022. 2020; <https://www.statista.com/statistics/618532/number-of-hairdressers-in-australia/#:~:text=Number%20of%20hairdressers%20in%20Australia%202008%2D2022&text=In%202018%2C%20around%2066.7%20thousand,of%20the%20country's%20services%20sector.> Accessed 09 Nov 2020
16. United States Census Bureau, (USCB). Hairdressers, hairstylists, & cosmetologists : Industries by Share. 2018; https://datausa.io/profile/soc/hairdressers-hairstylists-cosmetologists#tmap_ind. Accessed 09 Nov 2020
17. Dickinson CE, Campion K, Foster AF, Newman SJ, O'Rourke AMT, Thomas PG. Questionnaire development: an examination of the Nordic Musculoskeletal questionnaire. *Appl Ergon.* 1992;23(3):197-201.
18. Leclerc A, Chastang JF, Niedhammer I, Landre MF, Roquelaure Y, Study Group on Repetitive w. Incidence of shoulder pain in repetitive work. *Occup Environ Med.* 2004;61(1):39-44.
19. Van der Windt DA, Thomas E, Pope DP, et al. Occupational risk factors for shoulder pain: a systematic review. *Occup Environ Med.* 2000;57(7):433-442.
20. Mekonnen TH, Kekeba GG, Azanaw J, Kabito GG. Prevalence and healthcare seeking practice of work-related musculoskeletal disorders among informal sectors of hairdressers in Ethiopia, 2019: findings from a cross-sectional study. *BMC Public Health.* 2020;20:718.
21. Hanvold TN, Wærsted M, Mengshoel AM, Bjertness E, Twisk J, Veiersted KB. A longitudinal study on risk factors for neck and shoulder pain among young adults in the transition from technical school to working life. *Scand J Work Environ Health.* 2014;40(6):597-609.
22. Hanvold TN, Wærsted M, Mengshoel AM, Bjertness E, Veiersted KB. Work with prolonged arm elevation as a risk factor for shoulder pain: a longitudinal study among young adults. *Appl Ergon.* 2015;47:43-51.
23. De Smet E, Germeys F, De Smet L. Prevalence of work related upper limb disorders in hairdressers: a cross sectional study on the influence of working conditions and psychological, ergonomic and physical factors. *Work.* 2010;34(3):325-330.
24. Almeida CGdSTGd, Fernandes RdCP. Musculoskeletal disorders in distal upper extremities among women and men: results of a study in the industry sector. *Revista Brasileira de Saúde Ocupacional.* 2017;42.
25. Côté JN. A critical review on physical factors and functional characteristics that may explain a sex/gender difference in work-related neck/shoulder disorders. *Ergon.* 2012;55(2):173-182.
26. Van der Molen HF, Foresti C, Daams JG, Frings-Dresen MHW, Kuijper P. Work-related risk factors for specific shoulder disorders: a systematic review and meta-analysis. *Occup Environ Med.* 2017;74(10):745-755.
27. Hallman DM, Holtermann A, Björklund M, Gupta N, Nørregaard Rasmussen CD. Sick leave due to musculoskeletal pain: determinants of distinct trajectories over 1 year. *Int Arch Occup Environ Health.* 2019;92(8):1099-1108.
28. Podniece Z. *Work-related Musculoskeletal Disorders: Back to Work Report*. Office for Official Publications of the European Communities. 2007.
29. Roquelaure Y, Bodin J, Descatha A, Petit A. Musculoskeletal disorders: how to recognize them as occupational diseases. *La Revue du praticien.* 2018;68(10):1132-1134.

30. Woolf AD, Brooks P, Akesson K, Mody GM. Prevention of musculoskeletal conditions in the developing world. *Best Pract Res Clin Rheumatol*. 2008;22(4):759-772.
31. Gómez-Galán M, Pérez-Alonso J, Callejón-Ferre AJ, López-Martínez J. Musculoskeletal disorders: OWAS review. *Ind Health*. 2017;55(4):314-337.
32. Karwowski W, Marras WS. *Occupational Ergonomics: Principles of Work Design*. CRC Press; 2003.
33. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *J electromyogr Kinesiol*. 2004;14(1):13-23.
34. Williams RD. Investigating hours worked measurements. *Labour Market Trends*. 2004;121:71-79.

How to cite this article: Mishra S, Sarkar K. Work-related musculoskeletal disorders and associated risk factors among urban metropolitan hairdressers in India. *J Occup Health*. 2021;63:e12200. <https://doi.org/10.1002/1348-9585.12200>