Work-related Musculoskeletal Disorders, Work Ability and Associated Factors among Hairdressers of South Delhi: A Cross-sectional Study

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ABSTRACT

Introduction: Work-related Musculoskeletal Disorders (WMSDs) are highly prevalent occupational health issues that significantly impair quality of life and work productivity. Hairdressers, due to prolonged standing, repetitive movements and awkward postures, are particularly vulnerable to these disorders. Despite their growing numbers in metropolitan India and a largely unorganised workforce, there is a paucity of research on the prevalence and impact of WMSDs in this population. The present study addresses this gap by evaluating the prevalence of musculoskeletal disorders among hairdressers, their work ability and associated factors.

Aim: To determine the prevalence of WMSDs, Work Ability Index (WAI) and the associated risk factors among hairdressers in South Delhi, based on factors identified in previous literature, including prolonged standing, repetitive movements, awkward postures, forceful exertion, inadequate breaks and high workload.

Materials and Methods: This cross-sectional study was affiliated with the School of Physiotherapy at Delhi Pharmaceutical Sciences and Research University, New Delhi, India and conducted in South Delhi between July 2023 and December 2023 to assess the prevalence of WMSDs and the associated factors among hairdressers. A total of 316 participants, aged 18-40 years, who communicated in Hindi or English and consented to participate, were included. Data were collected using a self-structured questionnaire, the Nordic Musculoskeletal Questionnaire (NMQ) and the WAI. Demographic variables such as age, gender, marital status, education and Body Mass Index (BMI) were considered. Statistical analysis was performed using Pearson's correlation coefficient, with a significance level of p<0.05.

Results: A total of 210 participants (66.7%) reported musculoskeletal disorders, primarily lower back pain, which affected 108 participants (34.3%), with 129 participants (61.3%) experiencing symptoms for one to seven days. The average WAI score was 32.2 (moderate), with 78 participants (24.8%) having poor workability. Prolonged standing was reported as the most common risk factor by 78 participants (24.68%), followed by awkward posture, noted by 58 participants (18.35%). Work ability was negatively affected by longer job hours, older age, health issues and poor exercise habits but was positively associated with higher education, better health behaviour and more work experience.

Conclusion: The study reveals a high prevalence of musculoskeletal disorders among hairdressers in South Delhi, with significant correlations between work ability and factors such as job hours, age, health issues and education. Effective ergonomic interventions and health improvements are crucial for enhancing work ability and reducing injury rates in this profession.

Keywords: Ergonomics, Musculoskeletal diseases, Occupational health, Physical exertion, Risk factors

INTRODUCTION

The WMSDs encompass muscle, tendon and nerve pain disorders such as thoracic outlet syndrome, tension neck syndrome, carpal tunnel syndrome and tendonitis [1]. Recent studies by Mussi G and Gouveia N have reported a prevalence of 71% for WMSDs, while Aweto HA et al., have found an even higher prevalence of 81% [2,3]. Although many health and safety organisations typically limit WMSD definitions to gradual overuse injuries, some also include acute traumas and fractures within this category.

The WMSDs are a major cause of morbidity and represent a significant portion of work disability costs, accounting for nearly 40% of expenses related to work-related injuries. They negatively impact workers' quality of life and productivity [4]. Despite the high-risk, research in the healthcare sector, including professions like nursing, physical therapy and dentistry, has been limited [5].

For hairdressers, the unstructured nature of their work contributes to increased occupational health risks, including a lack of awareness about workplace hazards, inadequate protection and economic and sexual exploitation. Mechanical strain from prolonged standing, long work hours, missed meals and a high client volume exacerbate these risks. Hairdressers often work long hours with minimal breaks, utilising both arms, which increases their risk of lower back, neck, shoulder, arm, wrist and foot injuries. Additionally, poorly designed workspaces and ergonomic equipment further impact their health [3,6,7].

In metropolitan India, the hairdressing profession is expanding rapidly, with over 168,000 salons across various settings, including traditional barber shops, women's beauty salons and modern unisex salons. The majority of this workforce is unorganised and the number is expected to grow. Female hairdressers are particularly vulnerable to WMSDs compared to their male counterparts and longer daily work hours are significantly associated with an increased risk of these disorders. Compounding the issue, there are very few studies conducted on this topic in India, leaving a substantial gap in understanding and addressing these occupational hazards.

The WMSDs are a significant occupational health concern, particularly in professions involving repetitive movements, prolonged standing and awkward postures. Hairdressers face unique occupational

risks due to long working hours, inadequate ergonomic set-ups and repetitive physical demands, which predispose them to WMSDs. Despite the growing prevalence of WMSDs globally, there is limited research on the occupational health challenges faced by hairdressers in metropolitan India. The present study aimed to address this gap by evaluating the prevalence of WMSDs, their impact on workability and associated risk factors among hairdressers. Identifying these challenges is essential for developing tailored ergonomic and workplace interventions to improve their occupational health and productivity.

The study stands out due to its focus on an under-researched occupational group in metropolitan India, providing a region-specific perspective on WMSDs among hairdressers. Unlike previous studies, which often emphasise only physical risk factors, this research integrates a comprehensive evaluation of both physical and sociodemographic factors, such as education level, health behaviours and work environment characteristics and their relationship with work ability. The inclusion of validated tools, such as the NMQ and the WAI, ensures robust and reliable data. Furthermore, by exploring the correlation between workability and specific risk factors, the present study contributes new insights that can inform targeted ergonomic and health-promotion strategies, addressing both the physical and mental dimensions of occupational health in this sector.

The primary objective of the present study was to assess the prevalence of WMSDs among hairdressers in South Delhi. The secondary objectives were to evaluate the work ability of hairdressers using the Work Ability Index (WAI), to identify key demographic and occupational factors—such as age, education level, health behaviours, work posture and working hours—that influence the prevalence of WMSDs and work ability and to explore the association between work-related risk factors (e.g., prolonged standing, awkward postures and repetitive movements) and the incidence of musculoskeletal disorders.

MATERIALS AND METHODS

The present study employed a cross-sectional observational design to assess the prevalence of WMSDs and associated factors among hairdressers in South Delhi. The study was affiliated with the School of Physiotherapy at Delhi Pharmaceutical Sciences and Research University, New Delhi, India. Data collection occurred from July 2023 to December 2023. The study received approval from the Research Development Committee of the School of Physiotherapy, Delhi Pharmaceutical Sciences and Research University, with Reference No. 10/505/SOP/DPSRU/2023/21041.

Sample size calculation: The sample size was calculated using the Cochrane formula. A prevalence of 71% was reported in a previous study by Mussi G and Gouveia N in 2008 [2].

$$N=\frac{z^2P(1-P)}{ME^2}$$

$$N=\frac{1.96^2 \times 0.71(1-0.71)}{(0.05)^2}$$

$$\frac{3.84 \times 0.71 \times 0.29}{0.0029}=316$$

N=316

N=Sample size

Z=Statistics for level of confidence (1.96)

P=Prevalence of a condition

M=Margin of error (5%)

Inclusion criteria: Inclusion criteria comprised hairdressers aged 18-40 years, regardless of gender, who were willing to participate and were able to communicate in Hindi or English.

Exclusion criteria: Exclusion criteria included individuals with disabilities, a history of musculoskeletal problems or recent surgeries,

those under 17 years of age and those speaking languages other than Hindi or English.

A convenience random sampling method was employed for participant selection. Outcome measures included sociodemographic details, work ability assessed via the WAI and WMSDs evaluated using the Nordic Musculoskeletal Questionnaire (NMQ). Following informed consent, 316 subjects were selected through convenience random sampling and data were collected and analysed from salons across South Delhi.

Risk factors were evaluated based on factors identified in previous literature, including prolonged standing, repetitive movements, awkward postures, forceful exertion, inadequate breaks and high workload [3,6,7].

Study Procedure

The self-structured questionnaire designed for the present study included several sections to capture various participant characteristics. It assessed age, gender, marital status, educational background and Body Mass Index (BMI). The BMI categories are as follows:

- Severely underweight: <16.5 kg/m²
- Underweight: <18.5 kg/m²
- Normal weight: 18.5-24.9 kg/m²
- Overweight: 25-29.9 kg/m²
- Obesity: ≥30 kg/m² [8].

Health-related information was gathered, including any reported health issues, health behaviours such as smoking and alcohol consumption and hospitalisation history. Information regarding associated risk factors like work posture, repetitive movements, awkward posture and workload was also collected through the questionnaire. Additionally, the questionnaire inquired about exercise habits, working hours and frequency of work.

The Nordic Musculoskeletal Questionnaire (NMQ), a validated and reliable instrument, was used for evaluating musculoskeletal disorders. The NMQ scoring involves recording responses based on the frequency and severity of musculoskeletal pain across various body regions. Scores are interpreted to assess the prevalence and impact of pain. It consists of two parts: a general questionnaire that identifies problematic body areas and a body map detailing nine specific sites (neck, shoulder, upper back, elbows, low back, wrists/hands, hips/thighs, knees and ankles/feet). Participants indicated whether they had experienced musculoskeletal issues in the past 12 months and whether these problems impacted their work performance [9].

The Workability Index (WAI), a comprehensive tool, was used to assess an individual's work capacity. It consists of seven components: current ability, workability in relation to job demands (both physical and mental), diagnosed health conditions, estimated impairments from health status, sick leave over the past year, self-assessment of future workability for the next two years and mental resources. WAI scores range from 7 to 49, categorised as poor (7-27), moderate (28-36), good (37-43) and exceptional (44-49). Additionally, the Work Ability Score (WAS) is a self-assessment rating from 0 to 10, with scores categorised as poor (0-5), intermediate (6-7) and good (8-10) [10].

STATISTICAL ANALYSIS

Data collected via the questionnaires were entered into Microsoft Excel 2019. After removing confidential information, statistical analysis was conducted using IBM's Statistical Package for the Social Sciences (SPSS) software, version 24.0. Descriptive statistics were presented in tables and Pearson's correlation coefficient was employed to assess the nature of correlations between variables, with a significance level set at p<0.05.

RESULTS

The participants' average age as 26 years, weight as 60 kg, height as 163 cm and BMI as 22.6 as summarised in [Table/Fig-1]. The participants had an average work experience of 6.5 years, worked 9.4 hours per day, took 0.25 days of leave and scored 31.2 on the WAI.

Variables	Mean±SD
Age (years)	26.13±6.915
Weight (kg)	59.87±12.355
Height (cm)	162.92±9.581
BMI (kg/m²)	22.56±4.182
Work experience (years)	6.55±6.243
Job hours	9.41±2.414
Leaves (no. of days)	0.25±0.432

[Table/Fig-1]: Descriptive statistics.

As shown in [Table/Fig-2], 226 (71.1%) of participants were aged 18-27 years, with a slightly higher proportion of females, totalling 170 (54%) and 183 (58.1%) participants were unmarried. A total of 143 (45.4%) participants had an educational level of graduation and 178 (56.5%) had a BMI in the 18-25 range. Most participants reported no health issues (271 or 97.6%) and did not engage in smoking or alcohol use (250 or 79.4%). Only 94 (29.8%) participants exercised regularly and 240 (76.2%) reported working out for less than 30 minutes a day, with 224 (71.1%) exercising three times a week or more.

Characteristics of the participants	n (%)
Age category (years)	
18-27	226 (71.1%)
Above 27	89 (28.3%)
Gender	
Female	170 (54%)
Male	145 (46%)
Marital status	
Unmarried	183 (58.1%)
Married	132 (41.9%)
Education	
Primary	41 (11%)
10th	59 (18.7%)
12th	60 (19%)
Graduation	143 (45.4%)
Postgraduation	12 (3.8%)
BMI (kg/m²)	
<18	56 (17.8%)
18-25	178 (56.5%)
26-30	51 (16.2%)
>30	10 (3.2%)
Health issues	
None	271 (97.6%)
Diabetes	7 (2.2%)
Hypertension	21 (6.7%)
Other	11 (3.5%)
Health Behaviour	
None	250 (79.4%)
Smoking	58 (18.4%)
Alcohol	7 (2.2%)
Hospitalisation history	
Yes	20 (6.3%)
No	295 (93.7%)

Exercise habit	
Yes	94 (29.8%)
No	221 (70.2%)
Working hours	
Less than 30 minutes	240 (76.2%)
More than 30 minutes	75 (23.8%)
Working frequency	
Thrice a week	224 (71.1%)
More than thrice a week	91 (28.9%)

[Table/Fig-2]: Demographic data.

The data from the NMQ [Table/Fig-3] indicate that 210 (66.7%) participants experienced musculoskeletal disorders in the past year. Among these individuals, 129 (61.3%) had trouble for 1 to 7 days, 20 (9.8%) for 8 to 30 days, 50 (24.1%) for more than 30 days and 10 (4.8%) reported experiencing issues daily. The lower back was the most frequently affected area, with 108 (34.3%) of participants reporting pain. Other commonly affected regions included the neck 81 (25.7%), knee 78 (24.8%), wrist and hand 69 (21.9%) and shoulder 66 (21%). Less common issues were reported in the upper back 54 (17.1%), ankle and foot 59 (18.7%), hip and thigh 20 (6.3%) and elbow 17 (5.4%).

Response on NMQ	n (%)	
Presence of musculoskeletal disorder in last 12 months	210 (66.7%)	
Total length of time you had trouble in last 12 months	1-7 days 8-30 days >30 days everyday	61.3% 9.8% 24.1% 4.8%
Body region		
Neck	81 (25.7%)	
Shoulder	66 (21%)	
Elbow	17 (5.4%)	
Wrist and hand	69 (21.9%)	
Upper back	54 (17.1%)	
Lower back	108 (34.3%)	
Hip and thigh	20 (6.3%)	
Knee	78 (24.8%)	
Ankle and foot	59 (18.7%)	

[Table/Fig-3]: Nordic musculoskeletal disorders with respect to pain in different regions of the body.

The prevalence of various risk factors among hairdressers, with "Prolonged Standing" being the most common at 78 (24.68%), followed by "Awkward Posture" at 58 (18.35%). "Forceful Exertion" was the least reported risk factor, with 28 (8.86%) participants as displayed in [Table/Fig-4].

Risk factors	n (%)
Prolonged standing	78 (24.68)
Repetitive movements	56 (17.72)
Awkward posture	58 (18.35)
Forceful exertion	28 (8.86)
Inadequate breaks	50 (15.82)
High workload	49 (15.50)

[Table/Fig-4]: Risk factors.

The mean Work Ability Index (WAI) score was 32.2, indicating moderate work ability as shown in [Table/Fig-5]. A total of 78 participants (24.8%) had poor work ability, 146 (46.3%) had moderate work ability and 91 (28.9%) had good work ability. The analysis reveals several significant correlations with work ability. Specifically, job hours show a strong negative correlation (r=-0.401,

Work Ability Index (WAI)	n (%)	Score
Poor	78 (24.8%)	32.2
Moderate	146 (46.3%)	
Good	91 (28.9%)	

[Table/Fig-5]: Work Ability Index (WAI) of study participants.

p<0.001*), indicating that longer working hours are associated with lower work ability scores. Additionally, lower work ability is linked to older age (r=-0.225, p<0.001*), health issues (r=-0.173, p=0.002*) and poorer exercise habits (r=-0.229, p=0.022*). Conversely, better work ability is associated with higher education (r=0.249, p<0.001*), improved health behaviour (r=0.318, p=0.036*) and more work experience (r=0.412, p<0.001*). Gender, marital status, BMI and job frequency showed non-significant or marginal correlations with work ability [Table/Fig-6].

Work ability	r-value	p-value
Age	-0.225	0.001*
Gender	-0.349	0.068
Marital status	0.366	0.058
Education	0.249	0.003*
Health issues	-0.173	0.002*
Health behaviour	0.318	0.036*
Exercise habits	-0.229	0.022*
Duration	-0.215	0.089
Frequency	-0.148	0.079
BMI	0.074	0.191
Work experience	0.412	0.002*
Job hours	-0.401	0.003*

[Table/Fig-6]: Correlation of various factors with WAI using Pearson's coefficient of correlation test.

DISCUSSION

The present study explored the prevalence and impact of work-related musculoskeletal disorders (WMSDs) among 316 hairdressers in South Delhi and identified factors influencing their work ability. The findings reveal that 66.7% of participants experienced WMSDs in the past year, with lower back pain (34.3%) being the most prevalent issue, followed by neck pain (25.7%) and knee pain (24.8%). These results align closely with the findings of Saini RK et al., who reported lower back pain as the most common WMSD among urban hairdressers, indicating consistent ergonomic challenges across different settings [11].

In comparison to the 70.2% prevalence rate reported by Work related musculoskeletal disorders among hairdressers in Oromia, Ethiopia, the prevalence observed in the present study is slightly lower [12] This disparity could be attributed to regional differences in workplace practices, socioeconomic conditions, or variations in the ergonomic environments of salons. Similarly, Mussi G and Gouveia N in 2008 reported a 71% prevalence rate among Brazilian hairdressers, which is comparable to the findings of the current study [2]. These comparisons highlight the global nature of WMSDs as a significant occupational health issue in the hairdressing profession.

The study's average WAI score of 32.2, indicating moderate work ability, corroborates findings by Mokarami H et al., who observed an average WAI score of 38.2 in Iranian workers [13]. The negative correlation between job hours and work ability (r=-0.401, p<0.05) aligns with Caruso CC et al., who noted that extended work hours adversely affect job performance and health [14]. Additionally, older age and poor exercise habits were significantly associated with reduced work ability, consistent with studies by Ilmarinen JE in 2001 and Haskell WL et al., in 2007, which emphasised the detrimental effects of ageing and physical inactivity on work capacity [15,16].

The association between prolonged standing, awkward posture and musculoskeletal discomfort found in the present study supports previous research by Kozak et al., who identified these as significant risk factors for WMSDs in hairdressers [17]. Moreover, the findings reinforce the importance of addressing ergonomic hazards, as highlighted by Sarfraz et al., where systematic workplace interventions, including ergonomic training and task modifications, were shown to significantly reduce pain and enhance function in physically demanding professions [18]. Unlike past studies that primarily focused on physical factors, the present research included a broader range of variables, such as education and health behaviours and found that higher education levels positively influenced work ability. This aligns with Hanushek EA et al., who demonstrated the role of education in enhancing occupational performance [19].

The findings provide valuable insights and highlight the urgent need for targeted ergonomic interventions, regular health assessments and workplace modifications to reduce the risk of WMSDs and improve work ability. Evaluating demographic factors helps identify groups that might benefit from customised interventions to enhance their work capacity and overall wellbeing. The future scope of the present study necessitates ergonomic education for workers as well as workstation adjustments. Postural correction is a major need in this sector of the industry. The results of the current study could also be especially important because WMSDs result in dual burdens: financial expenses to healthcare systems in both rich and developing nations and structured industries. The relationship between various workplace characteristics in this occupation can also be examined by other researchers.

Limitation(s)

Limitations of the study included the use of convenience sampling, which limits generalisability and its focus on South Delhi, which may not reflect other regions. Reliance on self-reported data could introduce bias and a comprehensive assessment of ergonomic factors or mental health aspects influencing WMSDs was not conducted.

CONCLUSION(S)

The study reveals a high prevalence of musculoskeletal disorders among hairdressers in South Delhi, with significant correlations between work ability and factors such as job hours, age, health issues and education. Effective ergonomic interventions and health improvements are crucial for enhancing work ability and reducing injury rates in this profession.

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