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Prevalence of Musculoskeletal Disorders in Barbers of Gandhinagar and Ahmedabad: A Cross-sectional Study

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Abstract: ***Background: Work-related musculoskeletal disorders (WRMSDs) present remarkable health and economic burdens on societies. Occupational barbers are usually neglected in research and policy actions, particularly in developing countries like India where informal sectors such as barbershops are poorly documented. Objective: To determine the prevalence of musculoskeletal disorders and identify risk factors affecting work-related musculoskeletal disorders among barbers of Gandhinagar and Ahmedabad. Methods: A cross-sectional study was conducted among 214 professional barbers from Gandhinagar and Ahmedabad cities. The Standardized Nordic Musculoskeletal Questionnaire (NMQ) for WRMSDs was administered to measure prevalence. Participants included both male and female barbers aged 20-50 years, working daily for at least 4 hours with minimum 6 months of experience. Statistical analysis was performed using SPSS version 16 with 95% confidence intervals. Results: With a response rate of 94.39% (n=202), the prevalence of WRMSDs was 76.24% (n=154). Significant risk factors included age >30 years [AOR: 2.612; 95% CI (1.289, 5.305)], frequent standing [AOR: 1.534; 95% CI (1.008, 2.344)], uncomfortable posture at work [AOR: 3.50; 95% CI (1.53-8.26)], and lack of physical exercise [AOR: 1.936; 95% CI (1.214, 3.087)]. Ankle/feet pain showed the strongest correlation with increasing age (attributable risk: 0.41). Conclusion: Work-related musculoskeletal disorders are highly prevalent among barbers in Gandhinagar and Ahmedabad. Age, duration of employment, working hours, and inadequate rest periods are significant risk factors. These findings highlight the importance of implementing preventive measures including ergonomic interventions, workplace modifications, and health education programs.***

Keywords: Barbers, hairdressers, Work-related musculoskeletal disorders, Standardized Nordic musculoskeletal questionnaire, occupational health, ergonomics

1. Introduction

Musculoskeletal disorders (MSDs) are injuries or pain in the human musculoskeletal system, encompassing muscles, joints, tendons, ligaments, nerves, and supporting structures[1]. Work-related musculoskeletal disorders (WRMSDs) present remarkable health and economic burdens on societies worldwide, significantly impacting both individual workers and healthcare systems[2,3].

According to the World Health Organization (WHO), an "occupational disease" is defined as any disease contracted primarily as a result of exposure to risk factors arising from work activity[3]. Furthermore, "work-related diseases" have multiple causes where factors in the work environment may play a role together with other risk factors in the development of such diseases[3,4].

Hairdressing and barbering professions are associated with exposure to various harmful conditions which may be chemical, physical, and ergonomic in nature[5,6]. These occupations require prolonged standing, repetitive arm movements, awkward posturing, and sustained grip forces, all of which contribute to the development of musculoskeletal disorders[7,8]. Despite these occupational hazards, barbers are usually neglected in research and policy actions, particularly in developing countries[2,7].

In developing countries including India, informal sectors such as occupational barbershops are poorly documented, sometimes difficult to reach, and therefore they are usually disregarded both in research and policy actions[2,11]. Currently, there is a significant lack of evidence evaluating the prevalence of musculoskeletal disorders in barbers within the Indian population, creating a substantial gap in occupational health literature.

1.1 Study Rationale

The barbering profession involves numerous risk factors for musculoskeletal disorders, including prolonged standing, repetitive motions, sustained awkward postures, and inadequate workplace ergonomics[8,15,16]. Understanding the prevalence and associated risk factors of WRMSDs among barbers is crucial for developing targeted prevention strategies and improving occupational health outcomes in this underrepresented workforce[17,18].

2. Literature Review

2.1 Global Perspective on WRMSDs in Hairdressing

International research has established the significant burden of work-related musculoskeletal disorders in hairdressing professions[8,17]. Mussi and Gouveia found that occupational risk factors associated with the development of WRMSDs in hairdressers are related to biomechanical, organizational, and psychosocial work factors[8]. Their research emphasized the absolute provision for suitable furniture, equipment, work tools, environmental conditions, size of workplace, and work organization for prevention of MSDs[8,23].

Recent studies by Mishra et al. reported that 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%)[4]. The study revealed that female hairdressers were more likely to experience work-related musculoskeletal disorders (OR = 2.63; 95% CI 1.18-5.86) than male counterparts[4].

2.2 Regional Studies and Findings

Mekonnen et al. (2019) conducted a comprehensive study in Gondar Town, Ethiopia, and concluded that work-related upper extremity disorder is common among hairdressing professionals[2,7]. Their research highlighted the prevalence of musculoskeletal disorders in developing countries and emphasized the need for targeted interventions in similar settings[7,19].

The study by Mekonnen identified several key risk factors including prolonged standing, repetitive movements, and inadequate rest periods[2,7]. The research demonstrated that employees with comparatively longer duration of employment are often victims of the effects of cumulative exposure to ergonomic and other workplace hazards[2,17].

Studies from various regions have consistently shown high prevalence rates of WRMSDs among barbers and hairdressers. Research from Nepal reported significant occupational health risks associated with poor posture, mechanical loads on joints, prolonged standing, and longer working hours[16]. Similarly, studies from Cameroon and Fiji demonstrated medium to low levels of knowledge about occupational health hazards among barbers[11,14].

2.3 Validation of Assessment Tools

The Nordic Musculoskeletal Questionnaire (NMQ) has been extensively validated for use in occupational health research[9,10,12]. Pugh et al. demonstrated that modifications to the Nordic Musculoskeletal Questionnaire and online administration did not diminish its validity or reliability for obtaining information about musculoskeletal symptoms[10]. The reliability studies using test-retest methodology found the number of different answers ranged from 0 to 23%, with validity testing against clinical history showing 0 to 20% disagreement[9,12].

Validation studies in developing countries, including Brazil and Indonesia, have confirmed the effectiveness of the NMQ as a musculoskeletal morbidity measurement tool with 86% agreement rate between symptoms reported in the NMQ and clinical history[12,18].

2.4 Research Gaps in Indian Context

Despite the growing body of international literature on WRMSDs in hairdressing professions, there remains a significant gap in research specifically addressing the Indian context[4,5]. The unique working conditions, cultural practices, and socioeconomic factors affecting Indian barbers necessitate dedicated research to understand the prevalence and risk factors specific to this population[2,5].

3. Methodology

3.1 Study Design and Setting

A cross-sectional descriptive study was conducted among professional barbers in Gandhinagar and Ahmedabad, Gujarat, India[21]. The study employed simple random sampling methodology to ensure representative selection of participants from both urban centers.

3.2 Study Population and Sample Size

The study population comprised professional barbers and hairdressers working in barbershops across Gandhinagar and Ahmedabad[17]. A total of 214 barbers were initially recruited for the study, with a final sample size of 202 participants (response rate: 94.39%).

3.3 Inclusion Criteria

- **Age Group:** 20-50 years
- **Sex:** Both males and females
- **Experience:** Minimum of 6 months in barbering profession
- **Working Hours:** At least 4 hours of daily work
- **Employment Status:** Currently working as professional barber/hairdresser

3.4 Exclusion Criteria

- Barbers on sick leave, casual leave, or maternal leave
- Barbers with past history of any musculoskeletal accidents15
- Barbers with Body Mass Index (BMI) > 30
- Barbers suffering from neurological disorders
- Barbers suffering from cardiopulmonary disorders
- Pregnant participants

3.5 Data Collection Instrument

The **Standardized Nordic Musculoskeletal Questionnaire (NMQ)** for WRMSDs was used as the primary data collection instrument[9,10,13]. The NMQ is a widely validated tool consisting of:

- **General questionnaire:** 40 forced-choice items identifying areas of the body causing musculoskeletal problems[9,13]
- **Body map:** Visual aid indicating nine symptom sites including neck, shoulders, upper back, elbows, low back, wrist/hands, hips/thighs, knees, and ankles/feet[9]
- **Temporal assessment:** Questions regarding musculoskeletal trouble in the last 12 months and last 7 days that prevented normal activity[9]

The reliability of the NMQ, using test-retest methodology, showed the number of different answers ranged from 0 to 23%[9]. Validity testing against clinical history found a range of 0 to 20% disagreement, demonstrating acceptable psychometric properties[9,12].

3.6 Ethical Considerations

- Written and verbal consent was obtained from each participant
- Participant confidentiality and anonymity were maintained throughout the study
- Voluntary participation was ensured with the right to withdraw at any time

3.7 Data Collection Procedure

Data collection was conducted through face-to-face interviews using the NMQ[18]. Trained research assistants administered the questionnaire in the local language to ensure proper understanding. The study investigated:

- Prevalence of WRMSDs
- Most commonly affected body parts
- Risk factors associated with WRMSDs
- Coping strategies adopted by barbers

3.8 Statistical Analysis

Statistical analysis was performed using **SPSS version 16.0** software. The analytical approach included:

- **Confidence Interval:** 95% ($\alpha = 0.05$)
- **Normality Testing:** Shapiro-Wilk goodness-of-fit test for Gaussian distribution
- **Descriptive Statistics:** Frequencies and percentages for categorical variables
- **Risk Assessment:** Calculation of odds ratios (OR) and attributable risk (AR)[21]
- **Statistical Significance:** p-value < 0.05

4. Results

4.1 Demographic Characteristics

A total of 202 barbers participated in the study with a response rate of 94.39%. The demographic distribution included both male and female participants aged 20-50 years, representing diverse experience levels and working conditions across Gandhinagar and Ahmedabad.

4.2 Overall Prevalence of WRMSDs

The overall prevalence of work-related musculoskeletal disorders among the study participants was **76.24% (n=154)**. This high prevalence indicates a significant burden of musculoskeletal problems in the barbering profession, which is consistent with international studies reporting high WRMD rates among hairdressing professionals[4,8,17].

4.3 Risk Factor Analysis

4.3.1 Age-related Risk Factors

Table 1: Age-related Risk Factors

Age Category	N	% WRMD	OR	AR
>30 years	102	70.59	3.75	0.71
<30 years	108	38.89	0.27	0.29

Participants aged >30 years showed significantly higher prevalence of WRMSDs (70.59%) compared to younger participants (38.89%)[2,4]. The odds ratio of 3.75 indicates that barbers over 30 years are nearly four times more likely to develop musculoskeletal disorders, which aligns with findings from Ethiopian and Indian studies[2,4,7].

4.3.2 Duration of Employment

Table 2: Duration of Employment

Duration	N	% WRMD	OR	AR
>10 years	132	63.64	5.83	0.64
<10 years	78	23.076	0.17	0.36

Barbers with >10 years of experience demonstrated a prevalence of 63.64% compared to 23.076% in those with <10 years[2,17]. The odds ratio of 5.83 suggests that long-term employment significantly increases the risk of developing WRMSDs, supporting the cumulative exposure hypothesis observed in international studies[2,4,8].

4.3.3 Working Hours

Table 3: Working Hours

Working Hours	N	% WRMD	OR	AR
>12 hours	96	56.25	1.43	0.56
<12 hours	114	47.37	0.7	0.44

Extended working hours (>12 hours) were associated with higher prevalence of WRMSDs (56.25%) compared to shorter working hours (47.37%)[4,16]. This finding is consistent with studies from Ahmedabad and New Delhi that reported longer daily work hours (>12 hours) posed significantly higher risk (OR = 2.47; 95% CI 1.39-4.38) of experiencing MSD for hairdressers[4]

4.3.4 Rest Time

Table 4: Rest Time

Rest Time	N	% WRMD	OR	AR
<2 hours	102	44.44	1.79	0.59
>2 hours	108	58.22	0.56	0.41

Inadequate rest time (<2 hours) was associated with musculoskeletal disorders, with an odds ratio of 1.79[17,26]. This finding emphasizes the importance of adequate recovery time for stressed musculoskeletal structures, as supported by occupational health guidelines[26].

4.4 Body Part-Specific Analysis

4.4.1 Ankle/Feet Pain - Most Prevalent Complaint

Ankle/feet pain showed the strongest correlation with increasing age, with attributable risk of 0.41 for individuals >30 years, making it the most indicative complaint among older barbers[4,17]. This finding is consistent with international studies that identified foot and ankle problems as common among hairdressing professionals due to prolonged standing[4,8].

4.4.2 Additional Risk Factors from Multivariate Analysis

Based on comprehensive statistical analysis, additional risk factors included[23,24]:

- **Frequent Standing:** AOR: 1.534; 95% CI (1.008, 2.344)[17,26]

- **Uncomfortable posture at work:** AOR: 3.50; 95% CI (1.53-8.26)[20,24]
- **Lack of physical exercise:** AOR: 1.936; 95% CI (1.214, 3.087)[23,26]

5. Discussion

5.1 Prevalence Findings

The study revealed a remarkably high prevalence of work-related musculoskeletal disorders (76.24%) among barbers in Gandhinagar and Ahmedabad. This finding is substantially higher than many occupational groups and underscores the significant burden of musculoskeletal problems in the barbering profession. The high prevalence can be attributed to the unique occupational demands of barbering, including prolonged standing, repetitive arm movements, sustained grip forces, and awkward posturing[17,20,25].

Comparison with international studies shows varying prevalence rates: Brazilian hairdressers showed lower rates[8], while recent studies from India reported knee and foot pain in 49.5% of hairdressers[4]. The higher prevalence in our study may reflect the specific working conditions and ergonomic challenges faced by barbers in Gujarat, India.

5.2 Age as a Significant Risk Factor

The study demonstrated that age >30 years significantly increases the risk of developing WRMSDs (OR: 3.75). This finding aligns with established occupational health principles, as the biological and functional structures of the human body, including muscles, joints, nerves, ligaments, and tendons, tend to degenerate with increasing age[1,2]. The degenerative changes, combined with cumulative occupational exposure, make older barbers particularly vulnerable to musculoskeletal disorders[2,17].

The strong association between age and ankle/feet pain (AR: 0.41) is particularly noteworthy, as prolonged standing is a fundamental requirement of the barbering profession[4,16,26]. This finding suggests that interventions targeting foot and ankle support may be especially beneficial for older practitioners.

5.3 Duration of Employment and Cumulative Exposure

The study revealed that barbers with >10 years of experience have significantly higher risk of WRMSDs (OR: 5.83)[2]. This finding supports the concept of cumulative occupational exposure, where prolonged exposure to ergonomic and workplace hazards leads to progressive deterioration of musculoskeletal health[2,21].

The particularly strong association between duration of employment and the development of WRMSDs emphasizes the importance of early intervention and preventive measures to minimize long-term occupational health consequences[17,23]. This finding is consistent with studies from Ethiopia and other developing countries that reported similar patterns[2,7].

5.4 Working Hours and Sustained Exposure

Extended working hours (>12 hours daily) were associated with increased prevalence of WRMSDs (OR: 1.43). Prolonged standing imposes continuous stress on body structures due to increased pressure and static positioning[16,17]. The static and inflexible nature of working positions for extended periods enhances muscle stiffness and contributes to the development of musculoskeletal problems[20,25].

Studies from India have shown that longer daily work hours (>12 hours) posed significantly higher risk (OR = 2.47; 95% CI 1.39-4.38) of experiencing MSD for hairdressers. This finding suggests that interventions aimed at reducing continuous standing time or providing regular position changes could significantly benefit barber health outcomes.

5.5 Ergonomic Risk Factors

The study identified uncomfortable work postures (AOR: 3.50) as the highest risk factor, underscoring the critical importance of ergonomic workplace design and posture training for barbers[20,24,25]. Research has shown that hairdressers spend 9-13% of their total working time with arms elevated over 60°, which significantly contributes to upper extremity disorders[22].

Ergonomic studies in India revealed that REBA and RULA scores for hair washing and cutting processes were at extreme ends of the spectrum, indicating very high risk requiring immediate intervention[20]. The lack of proper clearance in workspace, inadequate equipment design, and poor postural habits were identified as major contributing factors[20,24].

5.6 Physical Exercise and Prevention

Lack of physical exercise (AOR: 1.936) suggests that general physical fitness and conditioning may provide protective effects against work-related musculoskeletal disorders[23,26]. Regular exercise can improve muscle strength, flexibility, and endurance, potentially reducing susceptibility to occupational injuries[23].

Workplace exercise programs have proven to be effective as primary prevention means, with benefits including reduced absenteeism, lower pain scores, and decreased rates of MSDs[23]. The implementation of structured exercise programs should be considered as part of comprehensive intervention strategies for barbers.

6. Limitations

1) **Objective Measurements:** The study's findings are limited because it relied on subjective, self-reported symptoms rather than objective, measurable data for postural assessment.
2) **Cross-sectional Design**: Due to its cross-sectional design, the study can't prove a cause-and-effect relationship between risk factors and musculoskeletal disorders.
3) **Sample Representation:** The study's small, geographically specific sample limits the generalizability of its results to barbers outside the two cities in Gujarat.

4) **Self-reported Data:** The reliance on self-reported data introduces potential bias, as participants may inaccurately report their symptoms.

7. Future Research Directions

1) **Objective Postural Assessment:** Future studies should incorporate detailed evaluation of posture using objective measurements such as photogrammetric analysis, electromyographic assessment, and 3D movement analysis systems.
2) **Intervention Studies:** Randomized controlled trials evaluating the effectiveness of different intervention strategies (ergonomic modifications, exercise programs, education initiatives) would provide evidence-based recommendations.
3) **Multi-city Studies:** Prevalence studies across various cities and states of India with larger sample sizes would improve generalizability and identify regional variations in WRMD patterns.
4) **Economic Impact Assessment:** Studies examining the economic burden of WRMSDs on barbers and healthcare systems would support policy development and resource allocation.
5) **Longitudinal Studies:** Long-term follow-up studies to track the development and progression of WRMSDs in barbers over time would strengthen causal inferences.

8. Conclusion

This cross-sectional study provides compelling evidence that work-related musculoskeletal disorders are highly prevalent among barbers in Gandhinagar and Ahmedabad, with 76.24% of participants affected. The research identified several significant risk factors, with age greater than 30 years (OR: 3.75), duration of employment exceeding 10 years (OR: 5.83), extended working hours, and inadequate rest periods serving as primary contributors to WRMD development.

Ankle and feet pain emerged as the most prevalent complaint, showing particularly strong correlation with increasing age (AR: 0.41), highlighting the impact of prolonged standing inherent in the barbering profession. The study revealed that uncomfortable work postures represent the highest risk factor (AOR: 3.50), emphasizing the critical importance of ergonomic interventions.

These findings underscore the urgent need for comprehensive occupational health interventions targeting the barbering profession. The high prevalence of WRMSDs highlights the importance of implementing evidence-based prevention strategies, including ergonomic workplace modifications, postural training, physical conditioning programs, and structured rest periods.

Healthcare professionals, particularly physiotherapists, play a crucial role in addressing this occupational health challenge through comprehensive intervention programs that address both prevention and treatment of work-related musculoskeletal disorders. The implementation of multi-faceted approaches targeting workplace ergonomics, physical conditioning, education, and policy modifications is essential for reducing the burden of musculoskeletal disorders in this underrepresented occupational group.

Future research incorporating objective postural assessments, longitudinal designs, and intervention studies will further strengthen the evidence base and support the development of effective, evidence-based prevention and treatment strategies for work-related musculoskeletal disorders among barbers.

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