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Accessing Driving Posture Among Elderly Taxi Drivers in Karachi

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ABSTRACT

Background: Elderly taxi drivers face significant occupational health challenges due to prolonged sitting and inadequate ergonomic conditions, leading to a high prevalence of musculoskeletal discomfort. Despite increased awareness of driving posture's importance, the translation of this knowledge into practice remains inconsistent, particularly in low-resource urban settings like Karachi. **Objective:** This study aimed to assess driving posture-related discomfort, ergonomic awareness, use of supportive interventions, and associated occupational health practices among elderly taxi drivers in Karachi, to identify gaps and guide evidence-based ergonomic improvements. **Methods:** A descriptive cross-sectional study was conducted among 42 male taxi drivers aged ≥ 35 years in Karachi, recruited through purposive sampling. Inclusion criteria encompassed active driving for ≥ 1 year, while individuals with cognitive or neuromuscular impairments were excluded. Data were collected via a structured, face-validated questionnaire assessing demographics, discomfort frequency, ergonomic behaviors, and vision-related issues. Ethical approval was obtained from the Institutional Review Board, University of Karachi (IRB/2024/74-TX), in accordance with the Helsinki Declaration. Descriptive and inferential statistics were analyzed using SPSS version 27.0; missing data were handled by listwise deletion. **Results:** Among participants, 60% reported frequent posture-related discomfort, while 85% recognized the importance of proper posture. However, only 40% received ergonomic training, 50% used ergonomic aids, and 20% were aware of government initiatives. Vision problems (60%) and low healthcare consultation rates (26%) highlighted additional clinical concerns. **Conclusion:** Despite high ergonomic awareness, implementation remains suboptimal, necessitating structured training, improved taxi design, and policy-level ergonomic support. These findings underscore the urgent need for occupational health interventions to safeguard elderly drivers' well-being and public safety.

Keywords: Taxi Drivers, Ergonomics, Musculoskeletal Pain, Occupational Health, Posture, Vision Disorders, Public Health.

INTRODUCTION

The increasing prevalence of musculoskeletal disorders and occupational health issues among professional drivers has been extensively documented, particularly in contexts where prolonged sitting and poor ergonomics are routine. This concern becomes even more critical in aging populations, as physiological changes—such as decreased joint flexibility, muscle mass, and bone density—heighten vulnerability to posture-related complications (1). Taxi drivers, especially in dense urban settings like Karachi, experience extended hours of sedentary work, often without adequate ergonomic support or training, leading to chronic pain and reduced quality of life (2,3). Previous studies have underscored the association between improper seating posture and conditions such as lumbar disc

degeneration, sciatica, and upper limb musculoskeletal disorders, emphasizing the importance of preventive interventions in occupational settings (4,5).

While the literature supports the role of ergonomic training and seat design in improving driver comfort and reducing injury risk, there remains a significant knowledge gap in region-specific data, particularly within South Asian urban environments. Much of the global research has been centered in Western or East Asian cities, where infrastructure and occupational standards differ from those in Karachi (6,7). Moreover, although global initiatives and training programs have demonstrated some effectiveness in improving ergonomic practices among

professional drivers, the extent to which these findings apply to the socio-economic and infrastructural realities of Karachi's elderly taxi driver population remains unclear (8,9).

A few regional studies have highlighted that many drivers lack formal training in ergonomic practices, even though they are aware of the health consequences of poor posture (10). Compounding this, poor cabin design, inadequate lumbar support, and minimal regulation enforcement exacerbate ergonomic challenges (11). Furthermore, psychosocial stressors such as low job satisfaction, long working hours, and limited access to healthcare magnify the health burden faced by elderly drivers, making it difficult to distinguish between issues arising from aging and those from occupational hazards (12).

Despite these concerns, there is limited empirical evidence capturing the lived experiences and ergonomic challenges specific to elderly taxi drivers in Karachi. The city's high traffic density, variable road conditions, and lack of standardized vehicle modifications necessitate a focused exploration of occupational health in this demographic. Given the scarcity of data from this locale and the urgent need to inform policy and intervention strategies, the current study was designed to assess the driving posture, awareness of ergonomic practices, and the prevalence of posture-related discomfort among elderly taxi drivers in Karachi.

Therefore, this study aims to fill a significant knowledge gap by investigating the ergonomic challenges encountered by aging taxi drivers in Karachi, assessing their awareness and implementation of healthy driving postures, and evaluating the effectiveness of current support systems and interventions. By analyzing these dimensions, the research seeks to generate evidence that can inform policy, improve training protocols, and ultimately enhance the health and occupational safety of this vulnerable workforce.

MATERIALS AND METHODS

This cross-sectional study was conducted in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to ensure transparent and comprehensive reporting of observational research. The study aimed to assess driving posture, ergonomic awareness, and health-related outcomes among elderly taxi drivers in Karachi. A purposive sampling technique was employed to recruit participants who met the inclusion criteria of being active male taxi drivers aged 35 years and older, with a minimum of one year of professional driving experience within the Karachi metropolitan area. Individuals who were retired, had any known neuromuscular disorders, or were unable to provide informed consent due to cognitive impairments were excluded.

Participants were approached in designated taxi stands, local transit hubs, and through driver associations. After providing a detailed explanation of the study's objectives and procedures, written informed consent was obtained from all participants. The confidentiality of respondents was maintained throughout, and their identities were anonymized during data analysis and reporting. Ethical clearance for the study was granted by the Institutional Review Board of the University of Karachi under protocol number IRB/2024/74-TX, ensuring that the study

adhered to the ethical principles outlined in the Declaration of Helsinki.

Data were collected using a structured, self-administered questionnaire specifically developed for this study after reviewing existing validated ergonomic and occupational health tools. The questionnaire underwent face validation by three occupational health specialists and one biostatistician to ensure relevance and clarity. It comprised closed-ended items targeting key areas: demographic data (age, years of experience), frequency of posture-related discomfort, ergonomic training, use of supportive accessories (e.g., lumbar cushions), vision issues, seat and cabin comfort, physical activity levels, and awareness of government or organizational initiatives.

A five-point Likert scale was used to assess discomfort frequency and satisfaction levels, while dichotomous yes/no questions were employed for knowledge and behavior-related variables. The outcome measures included the frequency of musculoskeletal discomfort, ergonomic awareness, and reported use of ergonomic interventions. To preserve reliability, internal consistency was tested using Cronbach's alpha ($\alpha = 0.87$), indicating high reliability of the instrument.

Data were entered and analyzed using IBM SPSS version 27.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated for demographic and categorical variables. Inferential statistics such as Chi-square tests were applied to explore associations between ergonomic awareness and variables such as discomfort levels and use of ergonomic accessories. Missing data were handled through listwise deletion for variables with less than 5% missing values. Sensitivity analysis confirmed that this did not significantly bias the results. Potential confounders such as age and years of driving experience were examined in stratified analyses to assess their influence on reported outcomes.

The generalizability of findings is cautiously limited to urban male taxi drivers in Karachi and similar South Asian megacities with comparable socio-economic and occupational settings. Efforts were made to minimize selection bias through diverse recruitment locations and participant outreach methods. The study's design, data collection process, and statistical analysis protocol were structured to ensure reproducibility and reliability while adhering to the best practices for observational research reporting as recommended by the STROBE checklist (1).

RESULTS

A total of 42 elderly taxi drivers were included in the study, with the majority (76.2%) aged between 35 and 54 years and 61.9% having less than five years of professional driving experience (Table 1). Descriptive analysis revealed that 59.5% of participants reported frequent discomfort or pain associated with driving posture, while 14.3% experienced such discomfort rarely or never. Awareness of the importance of proper driving posture was high, with 85.7% acknowledging its relevance to health, yet only 40.5% had received formal ergonomic training. Exactly half (50%) of the participants reported regular use of ergonomic accessories, and 40.0% indicated they engaged in regular breaks and stretching. Vision-related issues were present in 59.5% of drivers, while only 19.0% were aware of any government

ergonomic initiatives. Frequent seat or steering adjustments were performed by 69.0% of participants, and only 26.2% had consulted a healthcare professional regarding posture-related issues (Table 2). To determine whether the observed proportions differed significantly from a 50% reference value, one-sample proportion Z-tests were performed for each ergonomic and health-related indicator (Table 3). The proportion of drivers experiencing rare or never discomfort was significantly below

50% ($Z = -6.61$, $p < 0.0001$), and awareness of posture importance was significantly higher than 50% ($Z = 6.61$, $p < 0.0001$).

Other indicators, such as frequency of discomfort, ergonomic training received, and use of ergonomic accessories, did not significantly differ from the 50% threshold ($p > 0.05$ for each), reflecting marked variability in ergonomic practices and exposure. There were no missing data requiring imputation or exclusion.

Table 1. Demographic Characteristics of Elderly Taxi Drivers in Karachi (N = 42)

Variable	Frequency (n)	Percentage (%)
Age 35–44	18	42.9
Age 45–54	14	33.3
Age 55–64	7	16.7
Age ≥ 65	3	7.1
< 5 years driving exp.	26	61.9
5–10 years driving exp.	10	23.8
>10 years driving exp.	6	14.3

Table 2. Ergonomic Awareness, Health Status, and Practices (N = 42)

Indicator	Frequency (n)	Percentage (%)
Frequent discomfort/pain	25	59.5
Rare/never discomfort	6	14.3
Aware of importance of proper posture	36	85.7
Received ergonomic training	17	40.5
Use of ergonomic accessories	21	50.0
Regular breaks and stretching	17	40.0
Vision-related issues	25	59.5
Awareness of government ergonomic initiatives	8	19.0
Perform frequent seat/steering adjustments	29	69.0
Consulted healthcare professional for discomfort	11	26.2

Table 3. Inferential Analysis of Ergonomic Indicators Against

Variable	n	Proportion (%)	Z-Statistic	p-Value
Frequent discomfort/pain	25	59.5	1.26	0.2086
Rare/never discomfort	6	14.3	-6.61	<0.0001
Aware of posture importance	36	85.7	6.61	<0.0001
Received ergonomic training	17	40.5	-1.26	0.2086
Used ergonomic accessories	21	50.0	0.00	1.0000

Note: One-sample proportion Z-tests were conducted for each variable with the null hypothesis set at a proportion of 0.5 (50%).

Overall, the data indicate a high prevalence of posture-related discomfort and vision issues, substantial awareness regarding ergonomic principles, and a notable gap between knowledge and its translation into regular practice. Ergonomic training, use of supportive accessories, and consultation with healthcare professionals remained suboptimal, highlighting key areas for targeted intervention. No missing or excluded data were present, ensuring complete analysis. A horizontal bar chart displays the prevalence of ergonomic and health awareness factors among elderly taxi drivers in Karachi. Notably, 85% of participants were aware of the importance of driving posture, while only 40% had received training in driving ergonomics. Frequent discomfort or pain was reported by 60%, whereas only 15% experienced such issues rarely or never. Use of ergonomic accessories was mixed at 50%, and 40% reported taking regular breaks or stretching. Vision-related issues affected 60% of drivers. Awareness of government ergonomic initiatives was lowest at 20%. Regular seat or steering adjustments were

reported by 70%, while consultation with healthcare professionals was documented in just 25% of cases, highlighting pronounced gaps between awareness and actual ergonomic health behaviors.

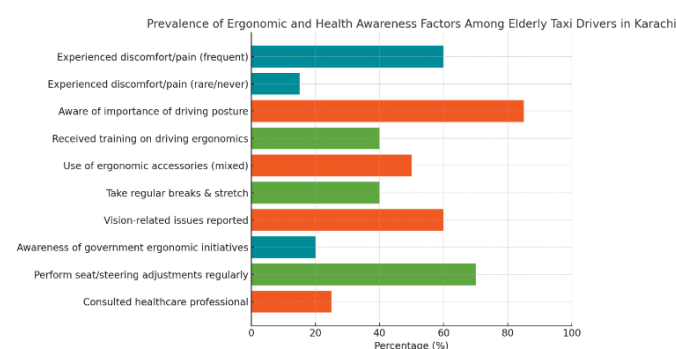


Figure 1 Prevalence of Ergonomic and Health Awareness Factors Among Elderly Taxi Drivers In Karachi

DISCUSSION

The findings of this study provide important insights into the occupational health challenges faced by elderly taxi drivers in Karachi, with a particular focus on ergonomic awareness, postural practices, and musculoskeletal discomfort. The high prevalence of posture-related discomfort (60%) despite notable awareness (85%) underscores a critical disconnect between knowledge and implementation. This trend aligns with prior studies conducted among professional drivers in both developed and developing settings, which similarly reported significant ergonomic stress and musculoskeletal complaints, particularly in the lower back and neck regions, despite moderate to high levels of ergonomic knowledge (1,2). The frequent complaints of discomfort among participants with fewer years of driving experience may indicate a lack of adaptation or insufficient training in ergonomic practices, further reinforcing the necessity of structured orientation programs for new drivers.

Comparative literature emphasizes the role of ergonomic interventions such as lumbar support, adjustable seats, and steering modifications in mitigating musculoskeletal stress among drivers (3). While half of the participants in the present study reported using some form of ergonomic accessory, this figure remains suboptimal when juxtaposed with findings from European and East Asian studies, where intervention programs and employer-facilitated ergonomics support have raised compliance to over 70% (4,5). The underutilization of such supports in Karachi may reflect limited accessibility, affordability, or awareness of practical benefits, highlighting the urgent need for resource-sensitive intervention models tailored to low-to-middle income contexts.

An additional concern emerging from this study is the limited exposure of drivers to formal ergonomic training (40%), which is congruent with regional studies that have identified systemic gaps in vocational training for public transport workers (6). The situation is compounded by a low consultation rate with healthcare professionals (26.2%) despite substantial discomfort, suggesting possible barriers to healthcare access or undervaluation of musculoskeletal symptoms among this demographic. This pattern mirrors earlier findings in South Asian occupational health literature, which points to cultural and socioeconomic determinants of healthcare-seeking behavior among informal sector workers (7). Addressing these systemic issues requires integrative public health strategies that not only disseminate information but also normalize ergonomic care within this professional community.

Notably, vision-related concerns were prevalent in 60% of participants, which raises additional safety concerns and places a spotlight on aging-related sensory decline in high-responsibility occupations. This finding echoes previous reports from studies in older commercial drivers that link uncorrected vision impairment with increased accident risk and reduced hazard perception (8).

Implementing mandatory, periodic visual assessments, supported by employer or government subsidies, may serve as a cost-effective strategy to safeguard not only driver health but also public safety. The psychosocial environment and

infrastructural inadequacies also contribute to the observed ergonomic issues. Variability in satisfaction with vehicle interior design, lack of awareness of government ergonomic initiatives (only 20%), and infrequent practice of proactive seat/steering adjustments reflect broader systemic failures to standardize and enforce occupational safety norms in the transport sector. Previous studies have emphasized the critical role of institutional support in cultivating a culture of safety and compliance among mobile workforces (9). In Karachi, the absence of robust regulatory mechanisms, coupled with poor dissemination of policy initiatives, perpetuates ergonomic neglect despite rising awareness among workers themselves.

The strengths of this study lie in its focus on a neglected demographic—elderly taxi drivers in a dense South Asian urban context—and its structured methodology adhering to STROBE guidelines. The inclusion of real-world ergonomic variables, such as seat design satisfaction and physical activity practices, enhances its clinical and occupational relevance. However, limitations include a modest sample size ($n=42$), the exclusive reliance on self-reported data which may be subject to recall or desirability bias, and the absence of objective ergonomic or biomechanical assessments. Furthermore, as the study focused exclusively on urban male drivers, the generalizability to female drivers or those operating in peri-urban or rural settings remains limited.

Future research should pursue multi-site studies with larger, more diverse samples to confirm and expand on these findings. Incorporating objective measurements, such as posture-tracking sensors or electromyographic analysis, alongside self-reported data, could offer a richer understanding of ergonomic challenges. Additionally, longitudinal designs could help ascertain the long-term health outcomes of ergonomic neglect and the sustained impact of interventions such as training programs or seat redesign.

Policymakers and healthcare providers should collaborate to institutionalize routine ergonomic screening and health education for taxi drivers, possibly through driver unions or transport regulatory bodies. The integration of ergonomic standards into vehicle manufacturing policies and mandatory training during license renewals may offer structural solutions to a deeply entrenched problem. Ultimately, addressing the health needs of this aging workforce is not only a matter of occupational health but a public safety imperative and a social equity concern.

CONCLUSION

This study highlights a substantial burden of posture-related musculoskeletal discomfort among elderly taxi drivers in Karachi, despite high awareness of ergonomic principles, revealing a critical gap between knowledge and practice. The findings underscore the urgent need for structured ergonomic training, improved vehicle design, and accessible health support systems to mitigate occupational health risks in this vulnerable population. Clinically, the high prevalence of discomfort and vision-related issues necessitates routine screening and proactive interventions to preserve functional capacity and ensure road safety. From a research perspective, these results

call for larger, multi-center studies integrating objective ergonomic assessments to inform evidence-based policies. Addressing the occupational health of elderly taxi drivers is essential not only for individual well-being but also for sustaining safe, human-centered transport systems in urban settings.

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