

Comparison of Neck-Related Disability Among Adults Residing in Rural And Urban Communities: A Cross-Sectional Study

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Abstract

Background: Neck pain is a common musculoskeletal problem that can interfere with daily activities, work, and overall well-being. The effect of neck pain may differ depending on a person's lifestyle, occupation, working conditions, and living environment. Rural adults may be exposed to physically demanding work and repetitive activities, while urban adults may experience prolonged sitting and screen-based activities. However, comparatively less attention has been given to understanding how neck-related disability differs between rural and urban communities.

Aim: To determine and compare neck pain and neck-related disability among adults residing in rural and urban communities.

Methodology: A comparative cross-sectional study was conducted in a community setting over a period of six months. A total of 200 adults with mechanical or non-specific neck pain were included, comprising 100 participants from rural communities and 100 from urban communities. Participants aged 20–45 years who fulfilled the inclusion criteria were selected through random sampling. Neck-related disability was assessed using the Neck Disability Index (NDI), pain intensity was measured using the Numerical Pain Rating Scale (NPRS), and the overall physical and psychosocial impact of neck pain was assessed using the Neck Bournemouth Questionnaire (NBQ). Appropriate statistical tests were applied to compare the outcomes between rural and urban groups, with statistical significance considered at $p < 0.05$.

Results: The findings demonstrated a clear difference in the severity of neck-related disability between the two communities. Rural participants had a higher median NDI score of 54% compared with 40% in urban participants, and this difference was statistically significant ($U=2402$, $Z=-6.355$, $p<0.001$). Severe and complete disability together was observed in 65% of rural participants compared with 21% of urban participants. Pain intensity was also higher among rural participants, with a median NPRS score of 6 compared with 5 in the urban group ($U=3473$, $Z=-3.783$, $p<0.001$). Similarly, the mean NBQ percentage score was higher among rural participants ($50.69 \pm 14.77\%$) than urban participants ($39.25 \pm 15.25\%$), showing a statistically significant difference ($t=5.388$, $p<0.001$).

Conclusion: Neck pain and related disability were commonly observed among adults in both rural and urban communities. However, participants from rural communities experienced greater pain intensity, higher levels of functional disability, and a greater overall physical and psychosocial burden related to their neck problems. These findings highlight the importance of early identification, postural and ergonomic education, regular physical activity, and community-based physiotherapy interventions, particularly in rural populations.

Keywords: Neck pain; Neck disability; Rural community; Urban community; NDI; NBQ; NPRS.

Introduction

Disability is part of the human condition. Almost everyone will be temporarily or permanently impaired at some point in life, and those who survive to old age will experience increasing difficulties in functioning. Disability has become a major public health concern because it affects an individual's ability to perform activities of daily living and participate fully in society [1].

WHO defined - 'differently abled, a person with an impairment that produced functional limitations, restrictions in activities or social handicap'. Disability in any part of the body may lead to restriction or impairment of the ability to perform an activity in the manner or within the range considered normal for a person [2]. Although disability can be attributed to the impairment or physical/mental outcome caused by a medical condition, it is also a social construct that results from the social and physical environment in which a person lives their life. Therefore, it is necessary to examine the complete process associated with the development of disability. The disability process, which may start with a disease, birth defect, or accident, also includes the personal and environmental characteristics associated

with the individual and although it contains numerous elements, the general nature of the process is fairly straightforward [3]. Disability is a matter of degree, because mental and physical impairments range in severity, from minor to severe.

The experience of disability over the life-course is a universal human experience since everyone will experience some limitation in bodily or mental function at some point [4]. For public health purposes, disability has become as important as mortality. Although health-care advances have reduced mortality, the associated increase in longevity has led to a corresponding increase in chronic diseases that need to be managed lifelong, and special needs are emerging for the care of aged populations. Public health has to move beyond mortality and take into account disability, to set priorities, measure outcomes and evaluate the effectiveness and performance of health systems [1]. Health service gaps are due to the physical, financial, attitudinal, and informational and communication barriers that are faced by people with disabilities when they try to access health-care services. For example, when sign language communication is not available, communication barriers between patients with hearing impairments and physicians have been shown to negatively impact the quality of health care, including less use of preventive services [1].

Census 2011 and recently held 76th round of the National Sample Survey (NSS) estimates the prevalence of disability was 2.2% in India. Over 10 years, India's differently-abled population increased somewhat, growing from 21.9 to 26.8 million from 2001 to 2011, respectively. The prevalence of disabilities continues to rise gradually with age and is highest in individuals above 60. In India, by 2050, 323 million (19.1% of the total population) will be 60 years and above. India will face significant structural and budgetary hurdles due to the increase in the aging population and people with disabilities[5].

Globally one-year prevalence of neck pain related disability has been reported ranging from 7% to 11%. Prevalence of neck pain among office workers is higher than in the general community. Globally, one-year prevalence of neck pain among administrative workers has been reported between 15% to 34.4% [6]. Neck pain is a highly prevalent condition and is a leading cause of disability worldwide[7]. The cervical spine is a highly mobile region of the vertebral column consisting of seven vertebrae (C1–C7), intervertebral discs, facet joints, ligaments, muscles, and neurovascular structures. It supports the weight of the head while allowing a wide range of movements including flexion, extension, lateral flexion, and rotation. The upper cervical spine (C1–C2) is primarily responsible for head rotation, whereas the lower cervical spine (C3–C7) provides stability and movement during daily activities. [9] Several muscles including the sternocleidomastoid, upper trapezius, levator scapulae, splenius capitis, and deep cervical flexors contribute to cervical stability and posture. The intervertebral discs and facet joints help distribute mechanical loads and facilitate smooth movement of the neck [8].

Several factors contribute to neck pain and disability, including poor posture, prolonged computer and Smartphone use, repetitive work, heavy manual labour, psychological stress, and aging [7,9]. Occupational exposure plays an important role; desk workers, drivers, healthcare professionals, and manual laborers are frequently affected. Work-related neck pain has been reported to be highly prevalent among administrative workers, particularly among females [7].

Due to its high mobility and continuous involvement in functional activities, the cervical spine is vulnerable to mechanical stress, repetitive strain, poor posture, prolonged sitting, and occupational overuse. Dysfunction of cervical muscles, ligaments, intervertebral discs, or facet joints may result in pain, restricted movement, muscle weakness, and impaired neuromuscular control. These impairments can affect activities such as reading, driving, working, lifting, sleeping, and maintaining postural alignment, ultimately leading to neck disability [9, 8].

Neck disability is therefore not merely the presence of neck pain but the reduction in an individual's ability to perform daily functional activities due to cervical musculoskeletal dysfunction. The severity of disability often depends on the extent of anatomical involvement, pain intensity, movement restriction, and the individual's occupational and lifestyle demands [9, 10].

The consequences of neck disability extend beyond physical symptoms. Individuals with chronic neck pain frequently experience reduced work efficiency, absenteeism, sleep disturbances, emotional stress, decreased participation in social activities, and increased healthcare expenditure. These factors collectively contribute to a significant socioeconomic burden on individuals, families, and healthcare systems [11].

In India rural communities, specifically persons with low resources physical disabilities in families without resources, time and awareness to get required support, are typically at increased risk of lack of quality life [1].

Assessment of neck disability is essential for understanding the functional impact of neck pain. The Neck Disability

Index (NDI) is one of the most widely used self-reported outcome measures for evaluating disability associated with neck disorders. It assesses pain intensity and limitations in daily activities including personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation [10].

The neck BQ covers the salient dimensions of the biopsychosocial model of pain, is quick and easy to complete, and has been shown to be reliable, valid and responsive to clinically significant change in nonspecific neck pain patients. Therefore the neck BQ is recommended as an outcome measure in clinical trials and in outcomes research for evaluating the efficacy and effectiveness of treatment interventions for nonspecific neck pain [11].

Hence there is a need to analyse the comparison of neck pain and neck-related disability among rural/urban communities.

Aim and Objectives

To compare the prevalence of neck disability between rural and urban adult communities using the Neck Disability Index.

To analyse prevalence of neck disability among rural adult communities using Neck Disability Index.

To analyse prevalence of neck disability among urban adult using Neck Disability Index.

To compare the prevalence of neck disability in rural and urban adult communities using the Neck Disability Index.

To assess the impact of neck pain and related symptoms using the Neck Bournemouth Questionnaire (NBQ) among rural and urban populations.

Materials and Methods

Study design: - The study design for this research is Cross sectional study.

Study setting: - Community set up in rural & urban area in Jalna Maharashtra.

Sample size: - 200 Participants.

Sampling method: - The sampling method for this research Random Sampling method.

Study of duration :- 6 months

Inclusion Criteria

- Individual with Mechanical and Non-specific neck pain.
- Participants of 20–45 years of age group.
- Permanent who are residential of Jalna(Maharashtra)
- Participants who were willing to participate in the study.
- Participants who were able to understand the study procedure and complete the required assessment questionnaires

Exclusion Criteria

- A history of recent neck trauma or cervical spine surgery.
- Congenital abnormalities or severe spinal deformities involving the cervical spine.
- Severe cognitive impairment that could interfere with understanding or completing the questionnaires.
- Known bone degenerative conditions or other serious musculoskeletal conditions affecting the cervical spine.
- Any condition that could significantly interfere with the assessment of neck-related disability.

Procedure

After obtaining the approval from Institutional Ethical Committee participants was explained about the proposed benefits, risks and procedures involved in the study in a language best understood by them.

Participants willing to participate in the study were screened for inclusion and exclusion criteria after receiving their informed consent.

Participants meeting the study criteria have been included in the study.

Participants were divided according to the rural and urban criteria.

Recording of the participant's demographic details and medical/work history was done.

Administration of the Neck Disability Index (NDI) questionnaire and NBQ was properly explained to the participant and answers were recorded accordingly.

Once the data collection was complete, statistical analyses have been performed to determine the prevalence of neck disability and comparison between rural and urban groups is checked.

Outcome Measures

Numerical pain rating scale [NPRS]: The NPRS is a self-reported measurement tool, or clinician-administered, consisting of a numerical point scale with extreme 'no pain' to 'extreme pain' anchors. The scale is usually set on a horizontal or vertical line, ranges from 0-10 or 0-100 most frequently, and can be managed in written or verbal form. The patient is asked to rate the intensity of his pain and a specific time frame or descriptor is established (e.g., within the last 24h, today, worst pain, average pain, or least pain). The NPRS scores highly on ease of administration and scoring simplicity. Finch reports that a three-point NPRS is necessary to demonstrate a true change in the intensity of pain, implying that a scale of 0-10 responsiveness is limited. [32]

Neck Disability Index [NDI]: The Neck Disability Index (NDI) is a self-administered questionnaire designed to measure self-rated disability associated with neck pain. It is one of the most widely used outcome measures for assessing functional status in patients with neck disorders. The NDI consists of 10 items including pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation. Each item is scored on a 6-point scale ranging from 0 to 5, with a maximum total score of 50 points. Higher scores indicate greater levels of disability. The total score can be expressed as a percentage, where 0–4 points indicate no disability, 5–14 mild disability, 15–24 moderate disability, 25–34 severe disability, and scores above 34 indicate complete disability. The NDI has demonstrated good reliability, validity, and responsiveness in patients with neck pain and has been translated and culturally adapted into several languages, including Marathi for use in the Indian population. [19]

Neck Bournemouth Questionnaire (NBQ):- The Neck Bournemouth Questionnaire (NBQ) is a brief, patient-reported outcome measure used to assess neck pain and related disability. It was developed by Bolton and Humphreys (2002) for individuals with nonspecific neck pain. The questionnaire consists of seven domains, including pain intensity, activities of daily living, social activities, anxiety, depression, fear-avoidance behavior, and perceived control over pain. Each domain is scored from 0 to 10, with a total possible score of 70. A higher score indicates greater severity of neck-related disability and associated psychosocial impact. The NBQ therefore evaluates both physical and psychological aspects of neck pain. It is short, simple, and suitable for use in clinical and research settings. In prevalence studies, the NBQ can help quantify and compare the overall burden of neck disability between different populations. [12]

Statistical Analysis

Data were analysed using IBM SPSS Statistics version 26.0. Descriptive statistics were used to summarize the demographic characteristics and study variables. Continuous demographic variables (age) were expressed as mean $\pm$ standard deviation (SD) along with range, while categorical variables (gender and community type) were presented as frequencies and percentages.

Normality of continuous and ordinal data was assessed separately for the rural and urban groups using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For categorical data, overall prevalence of neck disability was evaluated using Fisher's exact test due to small expected cell counts, whereas the distribution across Neck Disability Index (NDI) severity categories was examined using the Pearson Chi-Square test.

Between-group comparisons of non-normally distributed continuous and ordinal outcome measures—including the Numeric Pain Rating Scale (NPRS) and NDI percentage scores—were performed using the non-parametric Mann-Whitney U test, with results reported as median, interquartile range (IQR), mean rank, U statistic, and Z-value. For normally distributed continuous outcomes (Neck Bournemouth Questionnaire [NBQ] percentage scores), equality of variances was assessed using Levene's test, followed by an Independent Samples t-test. The mean difference, 95% confidence interval (CI), t-value, degrees of freedom (df), and p-value were calculated. Statistical significance was set at $p < 0.05$ for all analyses.

Results

Data from 200 participants (100 rural and 100 urban) were analysed. Normality was assessed separately for the two groups. Categorical prevalence and severity were analysed using Fisher's exact test or Pearson chi-square as appropriate. Non-normally distributed continuous/ordinal outcomes were compared using the Mann-Whitney U test, while normally distributed NBQ percentage scores were compared using an independent-samples t-test. Statistical significance was set at $p < 0.05$.

Table 1. Demographic characteristics of study participants (N=200)

Variable	Category / Statistic	N	Percentage / Value
Age (years)	Mean $\pm$ SD (Range)	200	33.58 $\pm$ 7.55 (20–51)
Gender	Male	103	51.5%
Gender	Female	97	48.5%
Gender	Total	200	100.0%

Interpretation: The study included 200 participants. The mean age was 33.58 $\pm$ 7.55 years, with ages ranging from 20 to 45 years. Of the total participants, 103 (51.5%) were male and 97 (48.5%) were female, indicating an approximately balanced gender distribution.

Table 2. Tests of normality for study variables

Variable	Group	K-S Statistic	K-S p	S-W Statistic	S-W p	Decision
Age	Rural	0.105	0.008	0.942	<0.001	Non-normal
Age	Urban	0.123	0.001	0.956	0.002	Non-normal
NPRS	Rural	0.152	<0.001	0.943	<0.001	Non-normal
NPRS	Urban	0.146	<0.001	0.945	<0.001	Non-normal
NDI Total / %	Rural	0.103	0.011	0.955	0.002	Non-normal
NDI Total / %	Urban	0.097	0.021	0.98	0.137	Normal
NBQ %	Rural	0.081	0.099	0.981	0.146	Normal
NBQ %	Urban	0.106	0.008	0.979	0.115	Normal by S-W
NDI Category	Rural	0.248	<0.001	0.875	<0.001	Ordinal/non-normal
NDI Category	Urban	0.279	<0.001	0.869	<0.001	Ordinal/non-normal

Interpretation: Shapiro-Wilk results indicated non-normal distributions for Age and NPRS in both groups and for NDI in the rural group. NBQ percentage scores were normally distributed in both groups (rural p=0.146; urban p=0.115). Accordingly, Mann-Whitney U was used for NDI and NPRS, while an independent-samples t-test was used for NBQ.

Table 3. Distribution and comparison of NDI disability severity

NDI category	Rural n (%)	Urban n (%)	Total n (%)
No disability	2 (2.0%)	5 (5.0%)	7 (3.5%)
Mild	8 (8.0%)	20 (20.0%)	28 (14.0%)
Moderate	25 (25.0%)	54 (54.0%)	79 (39.5%)
Severe	42 (42.0%)	18 (18.0%)	60 (30.0%)
Complete	23 (23.0%)	3 (3.0%)	26 (13.0%)
Total	100 (100%)	100 (100%)	200 (100%)

Interpretation: The distribution of NDI disability severity differed significantly between communities. Severe and complete disability together accounted for 65% of rural participants compared with 21% of urban participants. Moderate disability was more frequent in the urban group (54%) than in the rural group (25%).

Table 4. Comparison of NDI percentage scores between rural and urban communities

Group	N	Median	IQR	Mean rank	Mann-Whitney U	Z	p-value
Rural	100	54.00	22	126.48	2402.00	-6.355	<0.001
Urban	100	40.00	18	74.52	2402.00	-6.355	<0.001

Interpretation: The rural group had a higher median NDI percentage score [54.00 (IQR 22)] than the urban group [40.00 (IQR 18)]. The difference was statistically significant ($U=2402.00$, $Z=-6.355$, $p<0.001$), indicating greater neck-related disability among rural participants.

Table 5. Comparison of NPRS scores between rural and urban communities

Group	N	Median	IQR	Mean rank	Mann-Whitney U	Z	p-value
Rural	100	6.00	2	115.77	3473.00	-3.783	<0.001
Urban	100	5.00	2	85.23	3473.00	-3.783	<0.001

Interpretation: The rural group had a median NPRS score of 6.00 (IQR 2), compared with 5.00 (IQR 2) in the urban group. Mann-Whitney U testing showed a statistically significant difference ($U=3473.00$, $Z=-3.783$, $p<0.001$), indicating greater pain intensity in rural participants.

Table 6. Comparison of NBQ percentage scores between rural and urban communities

Group	N	Mean $\pm$ SD	Mean difference	t (df)	95% CI	p-value
Rural	100	50.69 $\pm$ 14.77	11.44	5.388 (198)	7.25 to 15.63	<0.001
Urban	100	39.25 $\pm$ 15.25	11.44	5.388 (198)	7.25 to 15.63	<0.001

Interpretation: Mean NBQ percentage scores were higher in the rural group (50.69 $\pm$ 14.77) than in the urban group (39.25 $\pm$ 15.25). Levene's test was non-significant ($F=0.462$, $p=0.497$), supporting the equal-variances assumption. The independent-samples t-test demonstrated a significant difference, $t(198)=5.388$, $p<0.001$, with a mean difference of 11.44 percentage points (95% CI 7.25 to 15.63).

Table 7. Summary of inferential statistical findings

Outcome	Test	Statistic	p-value	Inference
NDI severity distribution	Pearson chi-square	$\chi^2(4)=42.059$	<0.001	Significant
NDI percentage	Mann-Whitney U	$U=2402$; $Z=-6.355$	<0.001	Significant
NPRS	Mann-Whitney U	$U=3473$; $Z=-3.783$	<0.001	Significant
NBQ percentage	Independent-samples t-test	$t(198)=5.388$	<0.001	Significant

Interpretation: Overall prevalence of neck disability was high in both communities and did not differ significantly. However, rural participants demonstrated significantly greater NDI severity, higher NDI percentage scores, greater pain intensity, and higher NBQ percentage scores than urban participants.

Discussion

The present study was conducted to compare neck pain and neck-related disability among adults living in rural and urban communities. A total of 200 participants were included in the study, with an equal number of participants from rural and urban areas. Neck disability was assessed using the Neck Disability Index (NDI), while pain intensity was evaluated using the Numerical Pain Rating Scale (NPRS). The Neck Bournemouth Questionnaire (NBQ) was also used to obtain a broader understanding of the physical and psychosocial effects associated with neck pain. The findings of the present study indicate that neck-related problems are common in both rural and urban communities, although the severity and overall burden were greater among rural participants.

In the present study, the distribution of NDI disability categories showed a clear difference between rural and urban participants. Among the rural participants, 42% had severe disability and 23% had complete disability, whereas in the urban group, 18% had severe disability and only 3% had complete disability. Moderate disability was more frequently observed among urban participants (54%) compared with rural participants (25%). The difference in the distribution of disability severity between the two groups was statistically significant ($\chi^2 = 42.059$, $p < 0.001$). This

suggests that although neck disability was present in both communities, rural participants were more likely to experience disability at a higher severity level.

The comparison of NDI percentage scores further supported this finding. Rural participants had a median NDI score of 54%, compared with 40% among urban participants. The difference was statistically significant ($U = 2402$, $Z = -6.355$, $p < 0.001$). This indicates that neck problems were associated with greater functional limitations among rural adults. The higher disability observed in the rural group may be related to the physical demands of daily activities, occupational workload, repetitive movements and prolonged or awkward postures. Rural adults may also continue working despite experiencing pain because many daily and occupational activities require physical effort. Therefore, symptoms that might initially be mild can gradually interfere with functional activities and contribute to greater disability.

The findings are consistent with previous research showing that occupational and mechanical factors have an important role in the development of neck pain and disability. Ariens et al. reported that prolonged sitting and sustained neck positions were associated with an increased risk of neck pain, while Paksaichol et al. identified prolonged sitting, poor posture and psychosocial factors as important contributors to neck symptoms. Although these studies mainly focused on occupational populations, their findings support the importance of posture, sustained positions and occupational exposure in the development of neck-related problems. Pain intensity also differed significantly between the two communities. The median NPRS score was 6 among rural participants and 5 among urban participants. The Mann-Whitney U test demonstrated a statistically significant difference between the groups ($U = 3473$, $Z = -3.783$, $p < 0.001$). The higher pain intensity in rural participants may contribute directly to their greater disability, as persistent or more intense pain can make routine activities such as working, lifting, reading, sleeping and maintaining comfortable postures more difficult.

The present findings are also comparable with previous studies reporting a considerable burden of neck pain in different populations. Sidiq et al. reported a prevalence of chronic nonspecific neck pain among adults in Mathura and identified demographic and activity-related factors associated with neck pain. Similarly, Hoy et al. described neck pain as a common musculoskeletal problem affecting both working and non-working populations, with occupational and psychosocial factors contributing to its development. These findings support the observation that neck pain is not restricted to a particular occupational or residential group. An important finding of the present study was obtained from the Neck Bournemouth Questionnaire. The mean NBQ percentage score was $50.69 \pm 14.77\%$ in the rural group and $39.25 \pm 15.25\%$ in the urban group. The difference of 11.44 percentage points was statistically significant ($t(198) = 5.388$, $p < 0.001$). This indicates that rural participants experienced a greater overall burden of neck-related symptoms. Since the NBQ considers not only pain and activity limitations but also psychological factors such as anxiety, depression, fear-avoidance behavior and perceived control over pain, the higher rural score suggests that the impact of neck pain may extend beyond physical discomfort.

The NBQ finding is particularly relevant because neck pain can influence several aspects of an individual's daily life. Bolton and Humphreys developed the NBQ as a brief measure that considers both physical and psychological dimensions of neck pain. The inclusion of these dimensions makes the questionnaire useful for understanding the patient's experience more comprehensively rather than focusing only on pain intensity. In the present study, the higher NBQ score among rural participants may therefore indicate a greater combined physical and psychosocial burden associated with their neck problems.

The greater disability observed among rural participants may have several possible explanations. Rural occupations commonly involve physically demanding tasks, repetitive activities, and lifting, bending and prolonged maintenance of particular postures. In addition, individuals may have limited opportunities for rest or ergonomic modification during work. Awareness regarding early symptoms and preventive strategies may also influence how individuals respond to neck pain. The need for better awareness in rural communities has been highlighted by research examining disability awareness in rural populations, particularly where healthcare resources and support may be limited. However, these factors should be considered as possible explanations rather than direct causes, as the present cross-sectional study did not investigate each risk factor separately.

Urban participants, on the other hand, also demonstrated a considerable burden of neck disability. More than half of the urban participants were classified as having moderate disability. This may be related to prolonged sitting, computer use, Smartphone use, sedentary behavior and occupational exposure. Previous studies among office workers and computer users have reported associations between prolonged computer use, poor workstation arrangements, static postures and neck symptoms. Therefore, although urban adults may experience fewer

physically demanding activities than some rural workers, their prolonged exposure to sitting and screen-based activities may place continuous mechanical stress on the cervical region.

The present study therefore highlights an important difference between the two communities. The pattern of disability appears to be different rather than neck problems being restricted to one population. Rural participants showed a greater proportion of severe and complete disability, while urban participants showed a greater proportion of moderate disability. This suggests that the factors contributing to neck-related disability may vary according to lifestyle, occupational demands and daily activities. Consequently, preventive physiotherapy interventions should not necessarily be identical for rural and urban populations.

The findings have practical implications for physiotherapy and community health services. In rural communities, greater emphasis may be placed on early identification of neck problems, posture education, safe methods of lifting and manual work, therapeutic exercise and awareness regarding when professional care should be sought. In urban communities, interventions may focus more on workstation ergonomics, appropriate screen height, regular movement breaks, postural correction, physical activity and exercises for individuals involved in prolonged sitting or computer use. Community-based physiotherapy programmes may help individuals recognize neck problems before they progress to more severe functional limitations.

Overall, the statistical findings of the study demonstrated significant differences between rural and urban participants in NDI disability severity, NDI percentage scores, NPRS pain intensity and NBQ percentage scores. Rural participants consistently demonstrated greater scores and greater severity of neck-related problems. The study therefore suggests that neck disability represents a relevant community health concern in both settings, with a particularly greater functional and psychosocial burden among the rural participants included in this study.

It is important to interpret these findings within the limitations of the study design. Since this was a cross-sectional study, the observed differences between rural and urban participants cannot establish a cause-and-effect relationship. Factors such as occupation, duration of symptoms, physical activity, posture, ergonomic exposure and psychosocial characteristics may have contributed to the observed differences, but these factors were not examined as independent predictors. Future studies with larger samples and detailed assessment of occupational, lifestyle and psychosocial risk factors may provide a clearer understanding of why neck disability is more severe in certain communities.

Limitations

- The study was conducted using a cross-sectional design, so it was not possible to determine whether specific occupational or lifestyle factors directly caused neck pain or disability.
- The sample size was limited to 200 participants, which may not fully represent the wider rural and urban adult population.
- The study included participants from a limited geographical area, so the findings may differ in other communities or regions.
- The study did not focus on one specific occupation. Participants had different types of work and daily activities, making it difficult to determine which particular occupational factors contributed most to neck disability.
- The information collected through the NDI, NBQ, and NPRS was self-reported. Participants' responses may have been affected by their personal understanding and perception of pain and disability.
- Factors such as working posture, duration of work, physical activity, screen time, sleep habits, and ergonomic conditions were not assessed in detail and may have influenced the results.
- The study did not include clinical or imaging investigations to identify the specific underlying cause of neck pain, as the focus was mainly on pain and disability reported by the participants.

Conclusion

The present study concluded that neck pain and neck-related disability were commonly observed among adults in both rural and urban communities. However, rural participants showed significantly greater neck-related disability, higher pain intensity, and greater overall neck-related physical and psychosocial burden compared with urban participants.

The findings from the NDI showed a higher proportion of participants with severe and complete disability in the rural group, while moderate disability was more commonly observed in the urban group. Rural participants also reported

significantly higher NPRS scores and NBQ percentages, suggesting a greater overall impact of neck problems on their daily activities and well-being.

These findings highlight the need for early identification, ergonomic and postural awareness, regular physical activity, and community-based physiotherapy interventions, particularly in rural populations. Further research with larger samples and detailed assessment of occupational and lifestyle factors may help identify the specific reasons for these differences and guide more targeted preventive strategies.

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