

Association Between Low Back Pain Disability and Quality of Life Among Fishermen: A Cross-Sectional Study

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ABSTRACT

Background: Fishing is a physically demanding occupation involving repetitive pulling and pushing, lifting and carrying loads, forward bending, trunk rotation, prolonged postures, boat vibration and irregular working hours. These occupational demands may contribute to low back pain and may adversely affect quality of life.

Objective: To determine the association between low back pain disability and quality of life among fishermen.

Methods: A cross-sectional study was conducted among 113 male fishermen aged 18–45 years from Naigaon and Vasai. Participants were selected using purposive sampling. Low back pain disability was assessed using the Oswestry Disability Index (ODI), version 2.1a and quality of life was assessed using the SF-12 Health Survey version 2, including the Physical Component Summary (PCS-12) and Mental Component Summary (MCS-12). Data were entered in Microsoft Excel and analysed using SPSS. The Shapiro–Wilk test was used to assess normality, followed by Spearman’s rank correlation.

Results: The mean age of participants was 38.68 ± 6.36 years. 50% of participants had minimal disability, 42% had moderate disability and 8% had severe disability. 49% had affected physical health according to the study’s stated PCS-12 interpretation, while 5% were classified as having an affected mental health component. ODI showed a significant negative correlation with PCS-12 ($\rho = -0.506$, $p < 0.001$) and MCS-12 ($\rho = -0.350$, $p < 0.001$).

Conclusion: Greater low back pain disability was significantly associated with poorer physical and mental health-related quality of life among fishermen.

Keywords: Fishermen; Low back pain; Disability; Quality of life; Oswestry Disability Index; SF-12

INTRODUCTION

Musculoskeletal diseases are common occupational health problems affecting individuals exposed to repetitive physical tasks, sustained postures, forceful exertion and other workplace demands. [1] Fishing is a physically demanding and potentially hazardous occupation. In India, the fishing industry provides employment to a large population and fishermen may work for prolonged hours, sometimes remaining away from their families for extended periods. [2]

The work of fishermen involves catching fish, handling and storing fish, pulling and throwing heavy nets, lifting and carrying fish containers and repeatedly bending and twisting the trunk. These activities can expose the lumbar spine to repetitive and combined mechanical loads. Boat vibration and continuous movement may further contribute to physical stress. [2,3] Previous research has identified the lower back as one of the most commonly affected body regions among fishing-industry workers. [2]

Fishermen are exposed to a combination of occupational risk factors, including repetitive movements, awkward or prolonged postures, heavy lifting, vibration, cold, noise, slippery or congested work environments, and irregular working hours. The intensity, frequency and duration of exposure to these demands may contribute to fatigue, musculoskeletal symptoms and work-related disability. [3,4,5]

Low back pain is not limited to pain itself; it may interfere with activities of daily living, work responsibilities, social participation and leisure activities. [6,7,8] Consequently, disability associated with low back pain may have implications for physical and mental health-related quality of life. This is particularly relevant in fishing communities where fishing may be the primary source of income and prolonged absence or reduced work capacity may affect both individuals and families. [9,10]

Previous studies among fishermen have reported a high burden of musculoskeletal complaints, with the lower back frequently

identified as one of the most affected regions. However, the relationship between low back pain-related disability and quality of life in fishermen has received comparatively less attention in the study population described in the present work. [1,2,3,4,8]

Therefore, the present study aimed to determine the association between low back pain disability and quality of life among fishermen using the Oswestry Disability Index and the SF-12 Health Survey.

MATERIALS & METHODS

Study design and setting

This was a cross-sectional, observational study conducted over a period of six months in two coastal fishing communities: Naigaon village and Vasai village in Maharashtra, India. These sites were selected because fishing constitutes the primary occupation for most residents, with substantial exposure to physically demanding tasks aboard small and medium-sized fishing vessels.

Participants and sampling

The study population comprised male fishermen aged between 18-45 years who were actively engaged in fishing and reported low back pain. Participants were required to have at least two years of continuous work experience in fishing to ensure sufficient exposure to occupational risk factors. The sample size was calculated using Cochran's formula $N = Z^2 p(1-p)/d^2$, with $N = 200$, $p = 0.5$, $Z = 1.96$ and margin of error = 0.06, giving a final sample size of 113.

Purposive sampling was employed to recruit fishermen from the two communities. Initially, 160 individuals were screened using an eligibility checklist and 113 met the inclusion criteria and consented to participate.

Inclusion criteria were: willingness to participate; male sex; age 18–45 years; current complaint of LBP; and ≥ 2 years of active fishing work experience.

Exclusion criteria were: no longer active in fishing; presence of neurological impairments, congenital spinal conditions or cardiopulmonary disorders; involvement in other occupations that predispose to LBP; diagnosed osteoarthritis or limb length discrepancy; and chronic illnesses or severe metabolic or endocrine disorders.

Ethical considerations

Ethical approval for this study was obtained from the Institutional Scientific Research Committee, The SIA College of Health Sciences, College of Physiotherapy, Dombivli, Maharashtra. The study was conducted in accordance with the Declaration of Helsinki. The purpose of the study was explained in detail to each potential participant using a participant information sheet in appropriate languages. Written informed consent was obtained before enrolment and participants were assured of confidentiality and the right to withdraw at any time without consequences.

Outcome measures

1. **Oswestry Disability Index (ODI), version 2.1a:** LBP-related disability was assessed using ODI v2.1a, a widely used disease-specific instrument for quantifying functional disability in individuals with LBP. ODI contains 10 sections addressing different aspects of daily functioning, each scored from 0 to 5, and the total score is expressed as a percentage of maximum disability. ODI has demonstrated good validity and reliability, including in Indian populations using English and Marathi versions. Based on established interpretation criteria, scores of 0–20 indicate minimal disability, 21–40 moderate disability, 41–60 severe disability, 61–80 crippled, and 81–100 completely disabled. [11]
2. **Short Form-12 Health Survey version 2 (SF-12 v2):** Health-related quality of life was assessed using the SF-12 version 2 (SF-12v2), a generic 12-item questionnaire derived from the SF-36.

The SF-12v2 comprises 12 items drawn from eight health domains and yields two summary scores: the Physical Component Summary (PCS-12) and the Mental Component Summary (MCS-12). The PCS-12 is derived from six items (general health, moderate activities, climbing stairs, accomplished less due to physical health, limited in work due to physical health and pain interference), while the MCS-12 is derived from six items (accomplished less due to emotional problems, did work less carefully due to emotional problems, calm and peaceful, energy/vitality, downhearted and blue, and social limitations). Scores were calculated using the standard scoring algorithm with norm-based transformation, resulting in T-scores with a mean of 50 and standard deviation of 10 in the general population reference. Scores range from 0 to 100, with higher scores indicating better functioning. [12,13]

In this study, a PCS-12 score of ≤ 50 was interpreted as indicating below-average physical health relative to the general population, consistent with published recommendations.¹⁴ An MCS-12 score of ≤ 42 was considered suggestive of potentially impaired mental health, as this cut-off has been proposed in the literature as indicative of possible clinical depression.¹⁴ However, it is important to note that the SF-12 is a screening and health-status measure, not a diagnostic instrument for depression or other mental health disorders. The MCS-12 findings should therefore be interpreted as indicating possible mental health concerns requiring further evaluation, rather than as a clinical diagnosis. [14]

Data collection procedure

Following ethical approval, data collection was carried out in the two fishing communities. Fishing cooperatives and local contacts facilitated access to fishermen. The

purpose of the study was explained to eligible participants and written informed consent was obtained. Participants were screened according to the inclusion and exclusion criteria. Demographic and occupational information was recorded, including age, occupation, years of fishing experience and major job demands. The ODI was administered in interview format to assess low back pain disability, followed by the SF-12 to assess health-related quality of life. Data were entered in Microsoft Excel and subsequently analysed using SPSS.

Statistical Analysis

Data analysis was performed using MS Excel for descriptive statistics and SPSS

software for inferential analysis. Continuous variables such as age and questionnaire scores were summarised using mean and standard deviation; categorical variables were presented as frequencies and percentages. The Shapiro–Wilk test was used to assess normality of ODI, PCS-12 and MCS-12 scores. Since all three variables showed $p < 0.05$, indicating non-normal distribution, non-parametric statistics were used. Spearman's rank correlation coefficient (ρ) was employed to examine the association between ODI and PCS-12 and between ODI and MCS-12. The level of statistical significance was set at $p < 0.05$ for all tests.

RESULT

Table 1. Sociodemographic and occupational characteristics

Variable	Category	N	Percentage (%)
Age	Mean $\pm$ SD	38.68 $\pm$ 6.36	-
Education	Up to 10th standard	111	98
	Up to 12th standard	2	2
Fishing experience	Up to 10 years	15	13.3
	11–20 years	66	58.4
	21–30 years	31	27.4
	More than 30 years	1	0.9
Total		113	100

A total of 113 fishermen participated in the study. The mean age of the participants was 38.68 $\pm$ 6.36 years. Most participants had education up to the 10th standard (98%). Regarding occupational experience, 58.4% had been involved in fishing for 11–20 years, followed by 27.4% with 21–30 years of experience, 13.3% with up to 10 years and 0.9% with more than 30 years of experience.

The distribution of ODI, PCS-12 and MCS-12 scores was assessed using the Shapiro–

Wilk test (ODI: $W = 0.953$, $p < 0.001$; PCS-12: $W = 0.906$, $p < 0.001$; MCS-12: $W = 0.896$, $p < 0.001$), which indicated significant deviation from normality for all three variables. Mean $\pm$ SD and median (IQR) values are presented in Table 2 for completeness; however, median and IQR are considered the more appropriate summary statistics given the non-normal distribution, and non-parametric tests (Spearman's rank correlation) were used for subsequent inferential analysis.

Table 2. Descriptive statistics of ODI, PCS-12 and MCS-12 (n = 113)

Variable	Mean $\pm$ SD	Median (IQR)	Range
ODI score (%)	22.71 $\pm$ 10.91	22.00 (14.00–28.80)	6.0–52.0
PCS-12	46.90 $\pm$ 6.58	50.10 (41.06–51.90)	29.7–56.5
MCS-12	55.06 $\pm$ 6.45	56.10 (51.82–59.94)	32.7–64.9

The mean ODI score was 22.71 $\pm$ 10.91%, with a median of 22.00 (IQR 14.00–28.80), indicating that most participants had minimal-to-moderate disability. The mean PCS-12 score was 46.90 $\pm$ 6.58 (median 50.10, IQR 41.06–51.90), and the mean MCS-12 score was 55.06 $\pm$ 6.45 (median 56.10, IQR 51.82–59.94). Both PCS-12 and

MCS-12 medians were below the normative population mean of 50, suggesting a modest reduction in physical and mental health-related quality of life among fishermen relative to the general population, with a comparatively greater reduction in the physical component.

Table 3. Major occupational demands

Domain	Occupational demand	N	Percentage (%)
Strength	Lifting	45	40
	Carrying	41	36
	Pulling	36	32
	Fine finger work	36	32
	Gripping	20	18
	Handling	11	10
	Pushing	5	4
Mobility	Balancing	96	85
	Neck motion	88	78
	Bending	57	50
	Throwing	37	33
	Twisting	34	30
	Standing	28	25
	Sitting	18	16
Sensory-perceptual	Hearing	113	100
	Vision	113	100
Work environment	Outdoor work	113	100
	Noise	113	100
	Vibration	113	100
	Travelling conditions	113	100
	Irregular working hours	113	100
	Congested worksite	108	96
	Slippery surface	60	53
	Humidity	28	25
	Vapour/fumes	12	11
	Cold exposure	3	3

In the strength domain, lifting (40%), carrying (36%), pulling (32%) and fine finger work (32%) were commonly reported. The most frequently reported mobility-related demand was balancing (85%), followed by neck motion (78%) and bending (50%). All participants reported

hearing, vision, outdoor work, noise, vibration, travelling conditions and irregular working hours as major occupational demands. Congested worksites were reported by 96% of participants, followed by slippery surfaces (53%), humidity (25%),

vapour or fumes (11%) and cold exposure (3%).

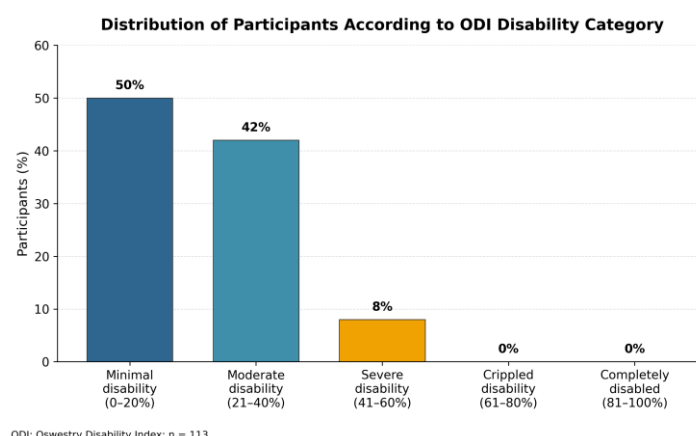


Figure 1: Distribution of participants according to ODI disability category

Figure 1 demonstrates that minimal disability was the most common category, affecting 50% of the fishermen. Moderate disability was observed in 42% of participants, while only 8% had severe

disability. None of the participants were classified as having crippled or completely disabling LBP according to the ODI categories.

Table 4: Distribution of participants according to PCS-12 and MCS-12 health-status categories

SF-12 component	Category	n	Percentage (%)
PCS-12	Affected physical health	55	49
	Not affected physical health	58	51
MCS-12	Affected mental health	6	5
	Not affected mental health	107	95

Based on the predefined SF-12 cut-off criteria, 49% of participants had affected physical health according to PCS-12, while 51% did not. For the mental health component, 5% of participants had affected

mental health according to MCS-12, whereas 95% did not. The MCS-12 findings should be interpreted as indicating possible mental health concerns and not as a clinical diagnosis of depression.

Table 5: Association between ODI and SF-12 component scores

Variables	Spearman's rho (ρ)	p value	Interpretation
ODI and PCS-12	-0.506	<0.001	Significant negative correlation
ODI and MCS-12	-0.350	<0.001	Significant negative correlation

A statistically significant, moderate-to-strong negative correlation was observed between ODI and PCS-12 scores ($\rho = -0.506$, $p < 0.001$), indicating that fishermen with greater low back pain-

related disability tended to report poorer physical health-related quality of life. A statistically significant, weak-to-moderate negative correlation was also observed between ODI and MCS-12 scores ($\rho =$

−0.350, $p < 0.001$), indicating that greater disability was associated with poorer mental health-related quality of life, though this association was less pronounced than that seen with the physical component.

DISCUSSION

The present study investigated the association between low back pain (LBP)-related disability and quality of life (QoL) among fishermen. Of the approximately 160 individuals screened, 113 met the eligibility criteria and were included in the analysis. Participants were assessed using the Oswestry Disability Index (ODI), version 2.1a and the 12-Item Short Form Health Survey version 2 (SF-12 v2). The mean age of the participants was 38.68 ± 6.36 years and all participants were actively engaged in fishing at the time of the study.

Most participants had 11–20 years of fishing experience (58.4%), followed by 21–30 years (27.4%), up to 10 years (13.3%), and more than 30 years (0.9%). The occupational demands reported by the participants indicated considerable physical and environmental exposure. In the strength domain, lifting was reported by 40% of participants, followed by carrying (36%), pulling (32%), fine finger work (32%), gripping (18%), handling (10%) and pushing (4%). In the mobility domain, balancing was the most frequently reported demand (85%), followed by neck movement (78%), bending (50%), throwing (33%), twisting (30%), standing (25%) and sitting (16%). All participants reported hearing and vision as important sensory-perceptual demands. Similarly, outdoor work, noise, vibration, travelling conditions and irregular working hours were reported by 100% of participants. Congested worksites (96%), slippery surfaces (53%), humid conditions (25%), vapour or fumes (11%) and cold exposure (3%) were also reported.

The high prevalence of physically demanding tasks in this study is consistent with the occupational characteristics of fishing. Repetitive lifting and carrying, pulling nets, trunk bending and twisting,

balancing on unstable boat surfaces, and exposure to vibration may increase mechanical loading on the lumbar spine. [15,16,17] Previous research among fishing industry workers in India reported that the lower back was the most commonly affected body region, with a prevalence of 92.4%. [2] Similarly, a study among artisanal fishermen and shellfish gatherers in Brazil reported a high prevalence of musculoskeletal disorders involving the lower back, including a prevalence of 86.4% among shellfish gatherers. [18] These findings support the view that fishing-related tasks may place substantial physical stress on the lumbar spine.

In the present study, 50% of the participants had minimal LBP-related disability, 42% had moderate disability and 8% had severe disability according to ODI categories. None of the participants were classified as having crippled or completely disabling symptoms. The relatively low level of disability observed in most participants may be related to continued occupational activity, an active lifestyle and the ability to adapt to physically demanding work. Some fishermen may also use a cloth or belt around the waist during activities such as lifting, pulling and carrying. Such supports may provide a subjective feeling of lumbar stability and reduce discomfort during specific tasks but it was not assessed in this study.

A previous study examining long-term corset use in individuals with chronic LBP reported improvements in pain and certain functional outcomes over a limited period. [19] Nevertheless, the possible protective effect of lumbar belts in fishermen cannot be confirmed from the present cross-sectional data. Further studies should specifically evaluate the type, duration and frequency of belt use and its relationship with lumbar disability.

Balancing was the most frequently reported mobility-related job demand, with 85% of participants identifying it as a major requirement of their work. Fishing on unstable boat surfaces requires continuous

postural adjustments and trunk control. It is possible that repeated exposure to such activities contributes to the development of postural control and trunk endurance in some fishermen, which may partly explain the predominance of minimal disability in this sample. However, this interpretation remains speculative because trunk muscle strength, endurance and balance performance were not directly measured. Furthermore, the same unstable working conditions may increase the risk of fatigue and injury, particularly when combined with lifting, twisting and vibration.

The present study also examined the physical and mental components of QoL using the SF-12. Approximately 49% of the participants had affected physical health, whereas 51% did not show affected physical health according to the study criteria. In contrast, 95% did not demonstrate affected mental health and approximately 5% had scores suggestive of clinically relevant mental health concerns. The latter finding should not be interpreted as a diagnosis of clinical depression because the SF-12 is a screening and health-status measure rather than a diagnostic instrument. Formal psychological assessment would be necessary to confirm depression or any other mental health condition.

The relatively greater effect on the physical component of QoL may be explained by the physically demanding nature of fishing. Lifting, carrying, pulling, balancing, prolonged outdoor work and exposure to vibration may directly influence mobility, physical functioning and work capacity. In addition, irregular work schedules, night work and prolonged periods at sea may disturb sleep and recovery. Separation from family and financial dependence on fishing may further increase occupational and psychological stress. Research among fishermen has reported that harsh working conditions, social circumstances and limited resources may contribute to reduced QoL and work capacity. [20]

Spearman's rank correlation analysis demonstrated a significant, moderate-to-

strong negative correlation between ODI and PCS-12 scores ($\rho = -0.506$, $p < 0.001$). This indicates that greater LBP-related disability was associated with poorer physical health-related QoL. The relationship was clinically meaningful and stronger than the association observed with the mental health component. A significant weak-to-moderate negative correlation was also identified between ODI and MCS-12 scores ($\rho = -0.350$, $p < 0.001$), indicating that higher LBP-related disability was associated with poorer mental health-related QoL.

The association between LBP disability and physical QoL is expected because pain and functional restriction may interfere with lifting, standing, walking, sleeping, work performance and other activities of daily living. [21,22,23] The negative association with mental QoL may be influenced by the interaction between pain, fatigue, reduced work capacity, financial concerns, disturbed sleep and work-family interference. [24] However, because this was a cross-sectional study, the direction of the relationship cannot be established. It is possible that greater disability reduces QoL, while poor sleep, psychological stress and reduced QoL may also contribute to increased pain perception and disability.

The findings are broadly comparable with those of a study among healthcare workers in Saudi Arabia, which reported a significant negative association between LBP-related disability and QoL ($\rho = -0.652$, $p < 0.001$). [23] Although the occupational groups differed, both studies indicate that increasing disability is associated with poorer health-related QoL. [24,25] Research involving fishermen has also suggested that work-related stress can interfere between occupational and personal life which may contribute to adverse physical and mental health outcomes. [24] These factors may partly explain the significant negative associations observed in the present study.

The findings have important implications for physiotherapy and occupational health

practice. Physiotherapists working with fishing communities should consider ergonomic assessment of fishing tasks, education regarding safe lifting and load handling, activity pacing, spinal mobility, trunk endurance and task-specific strengthening. Preventive programs should be adapted to the working environment and should address the combined effects of awkward postures, vibration, unstable surfaces, irregular working hours and inadequate recovery. Community-based education may help fishermen recognize early symptoms and seek care before disability becomes severe.

Future scope

Future studies should use larger probability-based samples and longitudinal or intervention-based designs to examine the effects of ergonomic education, exercise programs and psychosocial support on LBP disability and QoL.

CONCLUSION

In this cross-sectional study of male fishermen with existing low back pain, LBP-related disability measured by the ODI was predominantly minimal to moderate. A considerable proportion had below-average physical health and a smaller proportion showed scores suggestive of impaired mental health according to SF-12. Greater LBP disability was significantly associated with poorer physical and mental health-related quality of life, with a stronger relationship in the physical domain. Given the cross-sectional design and purposive sampling of symptomatic fishermen, causal inferences cannot be made and findings may not generalize to all fishermen. These results highlight the potential value of integrating ergonomic risk management and physiotherapy-based interventions into occupational health strategies for fishing communities to reduce LBP disability and improve quality of life.

Declaration by Authors

Ethical Approval: Approved

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