



FUNCTIONAL LIMITATIONS AMONG MERCHANT NAVY PERSONNEL WITH LOW BACK PAIN : A CROSS SECTIONAL STUDY

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ABSTRACT Merchant navy personnel face unique occupational hazards such as ship vibrations, unstable surfaces and heavy lifting which increases risks of low back pain. This observational study assessed 50 males seafarers (ages 21-55) with at least one year of sailing experience. Functional disability was measured using the MODI questionnaire and BMI was calculated to assess secondary risk factors. Most participants showed "minor disability", yet specific domains were compromised; 39% faced lifting restrictions, 49% struggled with prolonged standing, and 39% had pain-related work limitations. Additionally, 65% were classier as overweight or obese. While functional independence remains, low back pain impairs lifting and standing which is critical for maritime safety. High incidence of elevated BMI suggests a need for integrated ergonomic training and preventive physiotherapy to mitigate long term disability.

KEYWORDS : Merchant Navy Personnel, Low Back Pain, Modified Oswestry Disability Index Scale, Seafarers, Musculoskeletal Disorders, Occupational Health .

INTRODUCTION

Merchant Navy is a commercial shipping industry, it is made of several companies who recruit civilians as seafarers. Their ships transport goods, oil, gas & other material across the world's ocean and waterways. There are different personnel working on the ship such as engineers, navigators, deck officers, and other crew members. There are different types of ships like cargo container ships, oil tanker and gas container ships with heavy equipment and machinery that the ship members have to work with on a daily basis. Ships operate 24 hours a day, 7 days a week, in shifts of 4 hours on and 8 hours off with crew members rotating on leave after their vessel duties are completed⁽¹⁾. According to studies, seafarers physical and mental well-being can be significantly impacted by being at sea⁽²⁾. There are numerous barriers to physical activity, including time constraints, fatigue, and ongoing responsibilities, which hinder some crew members from being able to locate time for exercise⁽³⁾.

Their musculoskeletal system is strained by ship motions and a demanding task, which can especially result in low back pain. Crew personnel who work on ships are subjected to a number of physical stressors, including heavy lifting, vibrations, repetitive motions, noise, and extended standing, all of which can lead to musculoskeletal problems⁽⁴⁾. Sailing seafarers have a higher chance of getting injured on duty on board and sometimes physical injuries can cause disability. Studies report that among all others, one of the most common causes of illness and disability on board is musculoskeletal problems occurring at 15% and low back pain occurring at 12%⁽⁵⁾.

During sea voyage, seafarers live on an unstable surface which demands unusual physical activities and strong core musculature⁽⁶⁾.

Low back pain has a high prevalence because a large number of the world's population is affected by it. Individuals who utilize their musculoskeletal system for physical activities, like marines who regularly face intense physical strain due to their occupational requirements⁽⁷⁾. Strenuous physical tasks, handling objects manually, along with bending and twisting, were identified as risk factors for back pain. Exposure to physical load is not restricted to a single specific activity that threatens the back, but includes a variety of activities, such as flexion, rotation, lifting, carrying, and pulling⁽⁸⁾.

For non-specific low back pain the source of the discomfort is unknown, and it cannot be linked to a particular event or illness. It can be acute or chronic if it lasts continuously for more than 3 months⁽⁹⁾. It can significantly impact the quality of life, disability and sleep disturbance, affecting their ability to work⁽¹⁰⁾. Severe back pain typically originates from intervertebral discs, apophyseal joints, and sacroiliac joints, and the physical disruption of these components is strongly yet variably associated with pain⁽¹¹⁾.

Individuals who experience nonspecific low back pain have also been demonstrated to show reduced whole-body balance and lumbar

position sense when compared to those without symptoms⁽¹²⁾. It has been reported that recurrent nonspecific low back pain is linked to heightened fatigability of the trunk muscles⁽¹³⁾. Obesity is also recognized as a cause of physical inability among seafarers. Findings tell us that seafarers often face challenges maintaining body weight, which could be due to unhealthy lifestyles such as an inappropriate diet, lack of fresh food in diet, and consuming excessive sugary beverages like tea or coffee. It is due to their unusual working hours, unique lifestyle, and lack of physical activity⁽¹⁴⁾.

Low back pain is to be assessed by the Oswestry disability index. It is the most commonly used outcome measure questionnaire for low back pain. It is a self-administered questionnaire divided into ten sections designed to assess limitations of various daily living activities⁽¹⁵⁾.

Even while the oswestry disability index is still a great instrument for assessing backache-related impairment and the effectiveness of treatment, some of its elements might not be useful for assessing disability. Numerous research have shown that the majority of people did not respond to the oswestry disability index's sexual activity domain, even from the Indian perspective. The purpose of this research was to determine which domains are pertinent to Indian patients and then adjust the oswestry disability index to make it usable for Indian patients⁽¹⁶⁾.

AIM & OBJECTIVE:

To use the Modified Oswestry Disability index questionnaire to determine the levels of disability in merchant navy personnel having low back pain.

METHODS:

- > Research approach: Survey based study
- > Study design: Observational study
- > Study Subjects: Merchant navy personnel between the age of 21 to 55 years having low back pain
- > Duration of study: 6 months
- > Sample size : 100 participants

Inclusion criteria:

1. Merchant navy personnel from all cadres between 21 to 55 years of age.
2. Gender: male.
3. Minimum 1 year of sailing.

Exclusion criteria:

1. Individuals having acute musculoskeletal injuries.
2. Individuals with significant spinal disorders.
3. Individuals who do not give consent.

METHODOLOGY:

After obtaining the approval from the ethics committee. The participants were recruited based on the inclusion and exclusion

criteria and informed consent was taken from the participant. The sampling was done using conventional methods. Demographic details were recorded such as name, age, gender, dominance, years of experience, designation, weight and height.

After demographics were noted, participants were explained the nature of the questionnaire and significance of each domain. The questionnaire used in this study was Modified Oswestry disability index questionnaire. The scale is divided into 10 sections which take up to 3.5-5 mins to fill and approximately 1 min to score. Individuals have to mark whichever symptoms they experience.

Materials used for study :

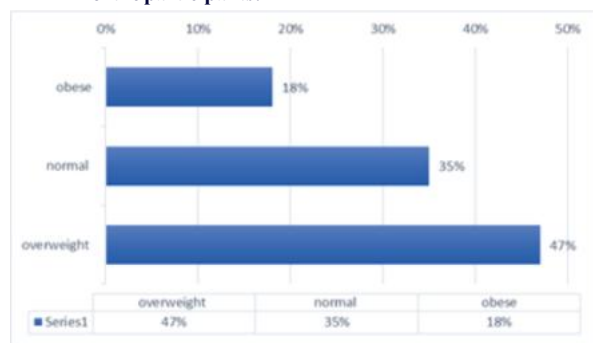
TABLE I. Modified Oswestry disability index : questionnaire PDF (<https://pmc.ncbi.nlm.nih.gov/articles/instance/6284133/bin/asj-2018-12-6-1106-app1.pdf>)

Modified Oswestry disability index questionnaire, it is a commonly used outcome-measures for low back pain as a self-administered questionnaire. It is divided into 10 sections designed to assess limitations of various activities of daily living. Each section is scored on a 0-5 scale where 5 represents greatest disability. The score is calculated by dividing the summed score by the total possible score, which is then multiplied by 100 and expressed as percentage. For every question not answered the denominator is reduced by 5, if a patient marks more than one statement it is indicated to be as a true disability. The questionnaire takes about 3.5-5 mins to complete and approximately 1 mins to score⁽¹⁵⁾

Upon collecting the data, it was administered in any excel spreadsheet and was analysed by making bar diagrams and noting down the interpretation analysed after the sample collection.

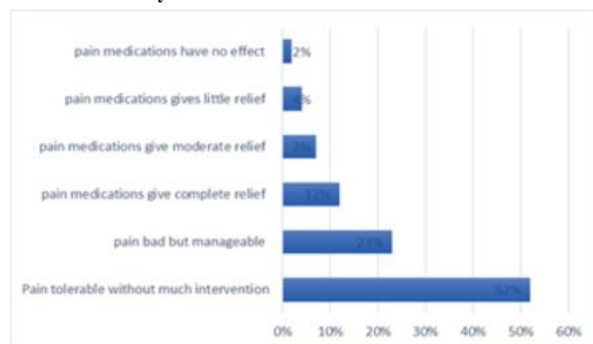
RESULTS AND ANALYSIS :

• BMI of the participants:



- > The majority of individuals fall in the overweight category (47%)
- > Moderate portion of individuals are in the normal BMI range, making them the second largest group (35%)
- > A smaller but notable portion belongs to the obese category (18%)

• Pain intensity:



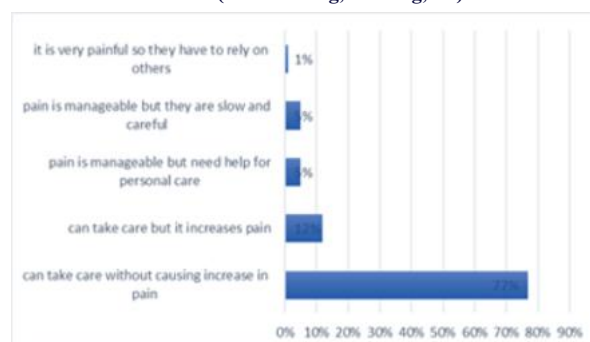
- > Majority of the participants report that their pain is manageable without causing interruptions (52%)
- > Nearly a quarter feel that the pain is bad but can still manage it (23%)
- > Moderate portion of participants experience enough discomfort that they rely on pain medications and get complete relief upon taking them (12%)

> A smaller portion of the participants relied on medications but only got moderate relief (7%)

> An even smaller portion of the participants got very little relief even after taking medications (4%)

> A tiny portion of participants take medications but do not feel any relief (2%)

• Personal Activities (like dressing, washing, etc) :



> Majority of participants reported that they can take care of themselves normally without increase in pain (77%)

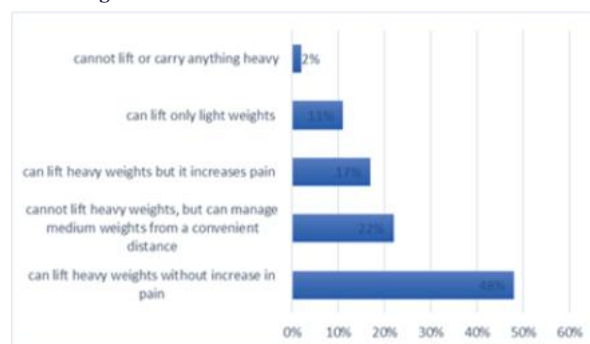
> Moderate portion of participants can take care of themselves but those activities increase their pain (12%)

> Mild portion reported that Pain is manageable but still needs help for personal care (5%)

> Smaller portion of Participants could manage the pain but their activity speed had reduced which created limitations (5%)

> Tiny portion reported that It is painful so they have to rely on others for help (1%)

• Lifting :



> majority portion of Participants do not experience pain while lifting heavy weights (48%)

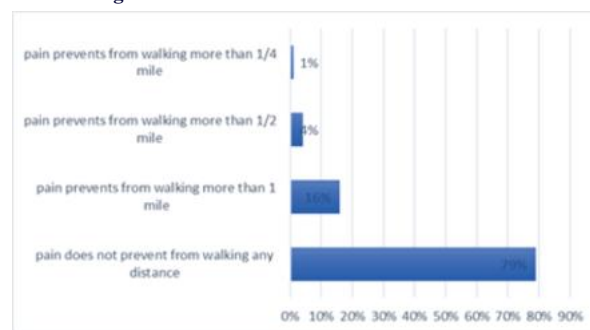
> Moderate portion of participants cannot lift heavy weights off the ground but can manage medium weight that is kept at a convenient distance/height such as tables etc. (22%)

> Mild portion of participants can lift heavy weights but increases pain (17%)

> Small portion of participants can lift only light weights (11%)

> Tiny portion of participants cannot lift or carry anything heavy (2%)

• Walking :



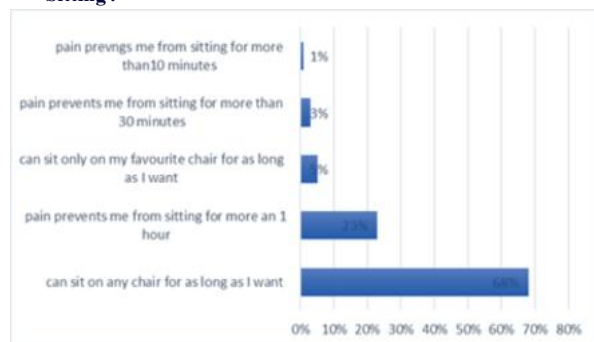
> Majority portion of the participants reported that pain does not prevent them from walking any distance (79%)

> Moderate portion of participants reported that Pain prevents from walking more than 1 mile (16%)

> Small portion of participants reported that Pain prevents from walking more than ½ mile (4%)

> Tiny portion of participants reported that Pain prevents from walking for more than ¼ mile (1%)

• Sitting :



> Majority portion of participants Can sit on any chair as long as they like (68%)

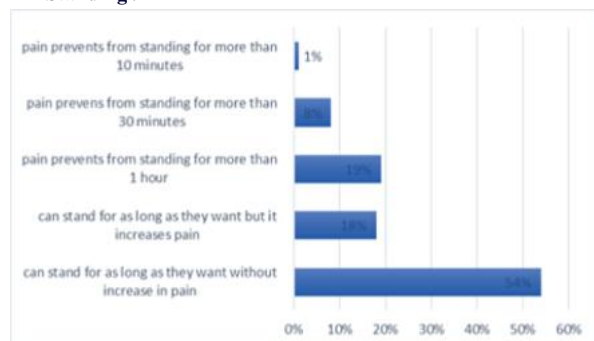
> Moderate portion Pain prevents me from sitting for more than 1 hour (23%)

> Mild portion Can only sit on my favourite chair as long as I like (5%)

> Small portion of participants reported that pain prevents me from sitting for more than 30 minutes (3%)

> Tiny portion reported that pain prevents them from sitting for more than 10 minutes (1%)

• Standing :



> Majority portion Can stand as long as they want without increase in pain (54%)

> Moderate portion of participants can stand as long as they want but it increases pain (18%)

> Mild portion reported that pain prevents from standing for more than 1 hour (19%)

> Small portion of participants reported that pain prevents them from standing for more than 30 minutes (8%)

> Tiny portion reported that Pain prevents from standing for more than 10 minutes (1%)

> For the majority portion, Pain does not prevent from sleeping well (83%)

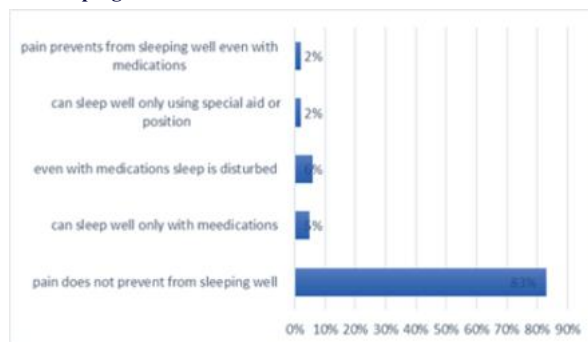
> Moderate portion reported that they can sleep well only with medications (5%)

> Mild portion reported that even with medications sleep is disturbed (6%)

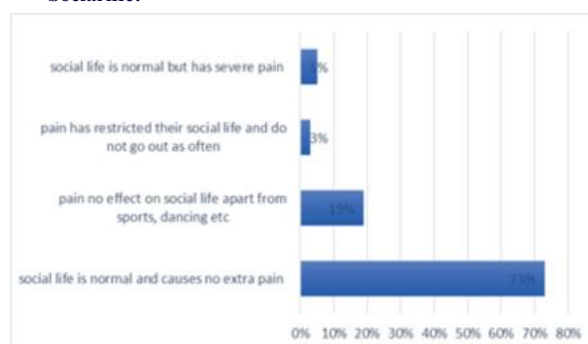
> Small portion Can sleep well only using special aids or positioning (2%)

> Tiny portion reported that pain prevents them from sleeping even with medications (2%)

• Sleeping:



• Social life:



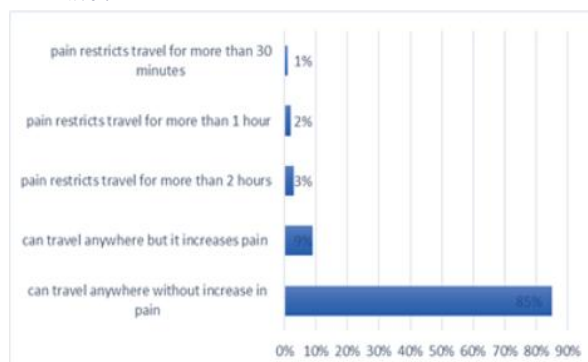
> The Majority portion of participants reported that their Social life is normal and causes no extra pain (73%)

> Moderate portion reported that pain has no effect on social life apart from sports, dancing etc. (19%)

> Mild portion reported that pain has restricted their social life and do not go out as often (3%)

> Small portion of participants reported that their social life is normal but experience more severe pain (5%)

• Travel:



> Majority portion of participants can travel anywhere without increase in pain (85%)

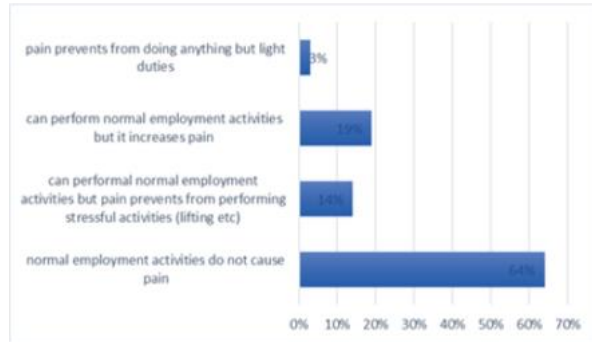
> Moderate portion of participants can travel anywhere but it increases pain (9%)

> Mild portion of participants reported that pain restricts travel for more than 2 hours (3%)

> Small portion of participants reported that pain restricts travel for more than 1 hour (2%)

> Tiny portion reported that pain restricts travel for more than 30 minutes (1%)

• Employment:



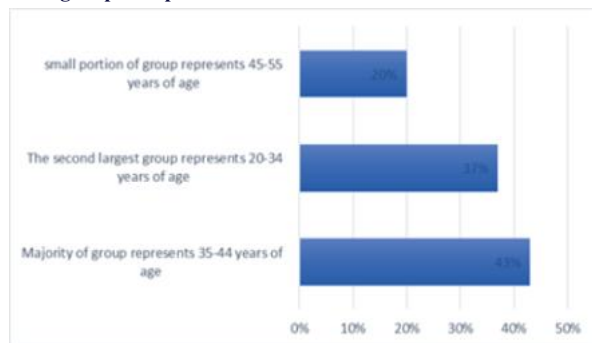
> Majority portion reported that normal employment activities do not cause pain (64%)

> Moderate portion of participants can perform normal employment activities but pain prevents from performing stressful activities (lifting etc) (14%)

> Mild portion of participants can perform normal employment activities but it increases pain (19%)

> Small portion reported that pain prevents from doing anything but light duties (3%)

• Age of participants:



- > Majority of group represents 35-44 years of age (43%)
- > The second largest group represents 20-34 years of age (37%)
- > small portion of group represents 45-55 years of age (20%)

DISCUSSION :

This study found that most merchant navy personnel experience mild disability due to low back pain, though it still impacts their work and daily activities. While pain was generally manageable, a small proportion reported inadequate relief, which may affect productivity. Basic self-care and mobility were largely preserved, but activities such as lifting, prolonged standing, and physically demanding tasks were notably affected, reflecting the occupational demands of maritime work. Sitting tolerance was high, whereas standing caused more discomfort, likely due to ergonomic stressors. Sleep, social life, and travel were mostly unaffected, though minor limitations existed in some individuals. Given how crucial enough sleep is for vigilance, sustained attention, productivity, and even general health and well being(17). Despite overall good work performance, certain participants reported increased pain or reduced capacity for strenuous tasks. Additionally, a high prevalence of overweight and obesity was observed, the excess fat in the belly area results in weakened core muscles, which hinders the spines support function (18). It is due to their unusual working hours, unique lifestyle, and lack of physical activity(19). Overall, low back pain in seafarers leads to mild disability but significantly affects specific functional and occupational domains, highlighting the need to address both work-related and lifestyle factors for effective management.

CONCLUSION :

In summary, this study revealed that the majority of merchant navy personnel with low back pain experience minor impairment and are

able to continue living independently, in social life, work, and personal care. But activities like lifting, standing, and work-related duties are more likely to be impacted, which could endanger work productivity and safety at sea. This group's risk profile is further increased by the high incidence of overweight and obesity. These findings highlight the importance of early screening, ergonomic adjustments, physiotherapy-led preventative programs, and lifestyle modifications to lessen the impact of low back-related disability and encourage seafarers' long-term occupational health.

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