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Occupational Stress Among Mariners: A Pilot Study in Kerala, India

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Abstract : This pilot study investigates the prevalence and factors contributing to occupational stress (OS) among mariners from Kerala, India. Mariners face unique stressors such as prolonged isolation, erratic schedules, confined living spaces, and exposure to hazardous conditions. Despite their critical role in global trade and defense, limited research exists on the occupational stress experienced by Indian mariners. A cross-sectional survey was conducted using purposive sampling, including 218 mariners from different ranks and vessels. The Occupational Stress Index (OSI) and General Health Questionnaire (GHQ) were used to assess stress levels and health status. Data analysis involved Pearson's correlation, T-test, ANOVA, and multiple linear regression. The results revealed that 75.23% of participants reported stress, with junior ratings experiencing the highest levels. Factors such as marital status, family structure, vessel type, and sea experience significantly impacted OS. The study concluded that emotional support from family and mentorship from senior mariners can mitigate stress, and recommended incorporating psychological assessments for junior ratings to enhance stress management. Further research with a larger, pan-India sample is suggested to validate these findings.

Index Terms - Occupational Stress, Mariners of Kerala, Occupational Health, Stress Factors, General Health Questionnaire

I. INTRODUCTION

Maritime professionals form the backbone of global trade and defense operations, often working in physically demanding and psychologically taxing environments. Mariners, especially those serving at sea for prolonged periods, face a unique blend of occupational challenges including isolation, erratic schedules, confined living spaces, and exposure to hazardous conditions. These stressors, compounded by limited access to immediate healthcare and social support, can have significant implications on their physical and mental well-being.

India, with its extensive coastline and growing maritime workforce, plays a vital role in the global shipping and defense sectors. According to the Directorate General of Shipping [1], Indian mariners accounted for 9.35% of the global seafarer pool as of 2017, ranking third worldwide. Despite this, there is a noticeable gap in region-specific research on the occupational stress experienced by Indian mariners. Most existing literature is either global in scope or focused on commercial shipping, with limited insight into the experiences of mariners operating in local contexts. Kerala, known for its strong maritime presence and contribution to the naval and shipping sectors, provides a unique setting for examining this issue. This pilot study seeks to explore the prevalence and contributing factors of occupational stress among mariners from Kerala, assess its impact on general health, and analyze how it varies across demographic, professional, and environmental variables. The findings aim to offer data-driven insights that can guide policy, preventive strategies, and support systems tailored to the needs of maritime personnel.

Occupational Stress

Psychological stress plays a significant role in today's social landscape and is often linked to various psychosomatic disorders. A certain degree of stress, known as *eustress*, is beneficial and can motivate individuals. However, when stress exceeds an individual's coping capacity, it becomes *distress*, which can negatively affect daily life. Stress often arises when a person feels unable to meet the demands placed on them. As noted by Rout, U.R. & Rout, J.K. [***2***], several factors including job-related demands, career progression, workplace dynamics, organizational culture, and the balance between home and work life can influence Occupational Stress (OS), making it a complex and multifaceted issue.

Occupational Stress Among Mariners

Occupational stress is a major concern affecting the mental health of mariners. Isa et al. [***3***] stated that stress in organizations occurs when job requirements do not match the capabilities, abilities, and resources of employees. Sliskovic and Penezić (2015) [4] highlighted several stress-inducing factors unique to seafaring life, including exposure to accidents, injuries, diseases, limited access to medical care at sea, piracy threats, unhealthy lifestyle patterns, and an increased risk of suicide all pointing to compromised mental well-being. While global studies have explored occupational stress among mariners extensively, there is a notable lack of research focusing on Indian mariners, particularly in the context of stressors emerging in the post-pandemic era.

II. REVIEW OF LITERATURE

Paleri (2004) [***5***] described the growing role and responsibilities of maritime security personnel in India, offering early insights into the pressures of maritime duty. Pawar et al. (2012) [***6***] observed that occupational stress was significantly higher among naval personnel serving afloat (66.47%) compared to those on shore (51.55%). Junior mariners reported the highest stress levels, often linked to poor psychological health and younger age. Interestingly, while social support reduced stress in Officers and Senior Ratings, it paradoxically increased stress among Junior Ratings duly underscoring the need for rank-specific stress management strategies.

D'Souza and Mohan (2017) [***7***] reported high stress levels among deep sea fishing mariners, regardless of demographic background. Key stressors included difficult working conditions, broad job responsibilities, strained superior-subordinate relationships, work-life interference, and a lack of recognition.

Servatius et al. (2017) [***8***] found a notable prevalence of PTSD and Major Depressive Disorder (MDD) among US Coast Guard mariners, highlighting the mental toll of repeated exposure to traumatic events at sea and in port. Mao et al. (2023) [***9***] further established that occupational stress negatively impacts sleep quality, which in turn affects both mental and physical functioning. Supporting this, Sharma (2024) [***10***] found that seafarers often experience moderate burnout, closely tied to symptoms of depression, anxiety, and stress.

Research Gap

Despite global studies on occupational stress among mariners, there is a noticeable gap when it comes to those from Kerala. This pilot study aims to fill that void by exploring the unique stressors they face both at sea and ashore. It looks at how factors like rank, vessel type, hometown, marital status, and family setup may influence stress levels, while also assessing their general health. By offering insights rooted in real experiences, this research hopes to support better stress management and mental well-being among Kerala's mariners.

Research Objectives

The life of a mariner is among the most challenging, shaped by a combination of environmental, biological, sociological, and psychological stressors. The geographical context plays a crucial role in influencing occupational stress (OS), as marine conditions such as sea state, weather patterns, wind, humidity, and the potential for cyclonic disturbances vary across regions. Despite these challenges, research on occupational stress among mariners in Kerala is scarce. This study aims to address this gap by investigating the prevalence and factors influencing OS among mariners in Kerala. The objectives of the study are as follows:

1. To assess the prevalence and level of OS among mariners of Kerala, India.
2. To evaluate the general health of mariners both while at sea and in harbor.
3. To examine the variation in OS across different ranks of mariners, including junior ratings, senior ratings (deck, mess, engine room), junior officers (engineering and navigation), and senior officers (captain, second officer, chief engineer, electrical officer, etc.).
4. To analyze the variation in OS based on marital status (married, unmarried, divorced).
5. To assess the impact of family structure (nuclear vs. joint family) on OS.
6. To compare OS levels across different vessel types, including large ships (>100 meters), medium-sized ships (40-90 meters), and small/fast crafts (≤40 meters).
7. To investigate the relationship between OS and factors such as general health, age, total sea experience, and continuous seafaring experience.
8. To develop a model for predicting OS based on the correlated factors identified in the study.

This research aims to provide valuable insights into the occupational stress faced by mariners from Kerala, contributing to better stress management strategies and overall well-being in this critical workforce.

III. METHODOLOGY

The methodology of the research is based on an empirical study among the Mariners serving in Kerala coast of India.

Research Design

A cross-sectional analytical survey method was adopted for the study, during which all participants were briefed about the survey and the details of the study. Data was collected from mariners serving on afloat platforms in Kerala, and all participants actively contributed to the study.

Sampling

The study was conducted by adopting purposive sampling technique to select mariners working in Kerala. Informed consent were obtained from all participants and number of sample was decided by using G*Power software Version 3.1.9.7. Sample size was recommended by the G*Power software for Multiple Linear Regression with 05 predictors as per 'A-priori test' ('α' error as 0.05, 'power (1-β)' as 0.95), was **138** samples. Further, for ANOVA with five groups, the software has suggested **105** as sample size. Hence, for achieving a better and clearer result, maximum samples of **218** were collected.

Inclusion and Exclusion Criteria

Sample selection included both Officers and Ratings who voluntarily participated in the study. Data were collected from a diverse age group of participants ranging from 19 to 52 years. All participants were sufficiently educated to read and write in English, as required by the scales used for data collection. Individuals suffering from mental illness or acute physical conditions and undergoing treatment were excluded from the study.

Data Collection Tools

Data collection was primarily carried out through structured questionnaire and Occupational Stress Index (OSI) by Srivastava and Singh (1981) [9], OSI is a scale to assess OS duly having excellent reliability and validity with a Cronbach's Alpha of 0.9. The 46-items 5-point Likert Scale of OSI is having options ranging from 'strongly disapprove' to 'strongly approve'. Further, the general health and probability of potential psychiatric morbidity and health issues of samples, were assessed by using General Health Questionnaire (GHQ) by Goldberg,D.P(1972)[10].

Research statistics and data analysis

Research Statistics methods such as Karl Pearson's correlation Coefficient, T-Test, ANOVA and Multiple Linear Regression, were adopted during the research study. Microsoft Excel, Jamovi Version 2.3.28 and IBM SPSS trial version software were utilized for the statistical data analysis.

Research Hypothesis

Based on the comprehensive literature review and the research objectives outlined in the preceding paragraphs, the research hypotheses were as follows:

Hypothesis	Research Hypotheses Derived from the Literature Review and Research Objectives
H0-1	The mariners in Kerala, are not suffering from Occupational Stress (OS).
H0-2	The general health of mariners in Kerala is not prone to potential psychiatric morbidity and health issues.
H0-3	There is no difference of means exist regarding the OS among various ranks of mariners, viz. junior rating, senior ratings at deck, mess and engine room (other than officers), junior officers (engineering and navigation) senior officers (captain, second officer, chief engineer, electrical officer etc.).
H0-4	There is no difference of means exist regarding the OS among mariners in Kerala from various demographic categories, viz. village, municipality, corporation and metropolitan cities.
H0-5	There is no difference of means exist regarding the OS among mariners in Kerala having different marital standards such as married, unmarried and divorced.
H0-6	There is no difference of means exist regarding the OS among mariners in Kerala having different family structures such as nuclear family and joint family.
H0-7	There is no difference of means exist regarding the OS among mariners in Kerala from various categories of units such as big ships (above 100 meters length), medium sized ships (40-80 meters length), small/ fast crafts (up to 40 meters length).
H0-8	There is no relationships exist between the OS among mariners in Kerala with respect to the General Health condition (score of GHQ), age in years, total sea service experience in years and continuous sea experience till date in months

IV. RESULTS

According to descriptive statistics using Microsoft Excel, 75.23% of the samples were found to be under stress. Furthermore, among these stressed individuals, 7.32% were observed to be experiencing a high level of stress, thereby rejecting H0-1. Additionally, based on the GHQ, 30.11% of the samples showed a high likelihood of comorbid health issues, thus rejecting H0-2.

Occupational Stress (OS) Among Various Ranks

Analysis of Occupational Stress (OS) among various ranks of mariners, namely Junior Ratings, Senior Ratings at Deck, Mess, and Engine Room (excluding Officers), Junior Officers (Engineering and Navigation), and Senior Officers (Captain, Second Officer, Chief Engineer, Electrical Officer, etc.) was conducted using an ANOVA test. No significant difference in OS was observed across these ranks. The mean OS score was 132.43 with a standard deviation of 19.92. The ANOVA results yielded an F-value of 1.226 and a P-value of 0.301 (>0.05), indicating a failure to reject the null hypothesis (H_0-3), i.e., there is no significant difference in OS among various ranks of mariners in Kerala. The ANOVA output is presented in Table 1. The results of the ANOVA indicated that Occupational Stress (OS) was highest among Junior Ratings (134.99), followed by Senior Ratings from Deck, Mess, and Engine Room (131.47), and Junior Officers from Engineering and Navigation Departments (130.42). Senior Officers (Captain, Second Officer, Chief Engineer, Electrical Officer, etc.) reported the lowest OS score (122).

Table 1: ANOVA Output of Occupational Stress (OS) Among Mariners Based on Ranks, Domicile Categories, and Service Units

ANOVA OS	Sum of Square	Mean Square	F-Value	P Value
RANK	1454.418	484.806	1.226	0.301
DOMICILE	916.376	305.459	0.767	0.513
TYPE OF UNITS	3255.184	1085.061	2.803	0.041

Note. Jamovi 2.3.28 Output

Occupational stress (OS) Among Mariners from Various Demographic Categories

An analysis of occupational stress (OS) among mariners in Kerala from various demographic categories namely Village, Municipality, Corporation, and Metropolitan Cities was conducted. No significant differences in OS were observed across these domicile categories, with the mean OS values showing only minor variation. Furthermore, the ANOVA results yielded an F-value of 0.767 and a P-value of 0.513 (>0.05), thus failing to reject the null hypothesis (H0-4). The ANOVA output is presented in Table 1. The result of the ANOVA indicated that mean of the OS among Mariners from domicile category of Corporation observed least (128.82) as compared to Village (132.02), Municipality (134.58) and Metropolitan Cities with highest score of mean OS (143.60).

Occupational stress (OS) among mariners from different types of vessels

An analysis of Occupational Stress (OS) across various types of units namely Big Ships, Medium-Sized Ships, and Small Crafts was conducted using ANOVA. Differences in OS levels were observed among personnel from different types of units, with the mean OS scores ranging from 118.87 to 135.28. The ANOVA results yielded an F-value of 2.803 and a P-value of 0.041 (<0.05), leading to the rejection of the null hypothesis (H0-7), which stated that there is no difference in OS among mariners serving on different types of vessels. The detailed ANOVA output is presented in Table 1. The result of the ANOVA indicated that mean of the OS among Mariners working onboard Medium Sized Ships is highest (135.28) as compared to Big Sized Ships (133.58) and Small Crafts (131.17) with the least score of mean OS.

Occupational Stress (OS) among Personnel with Different Marital Statuses

As there were no divorcees among the collected sample, the analysis of Occupational Stress (OS) based on marital status was conducted between married and unmarried personnel using an Independent Sample T-Test. The T-Test results showed a T-value of 1.853 and a P-value of 0.067 (greater than 0.05), indicating a failure to reject the null hypothesis (H0-5). Therefore, there is no significant difference in OS among mariners in Kerala based on marital status. The T-Test output is presented in Table 2. As equal variance is not assumed as per Levene's Test, the T-value of non-equal variance is considered and T-values is 1.853 and P-value is 0.067. However, meager difference as per score of OSS was indicating that the Unmarried Mariners are more stressed (136.8) as compared to Married Mariners (130.87).

Occupational Stress (OS) among Mariners in Kerala with Different Family Structures

Analysis of OS among Mariners with different family structures such as Nuclear Family and Joint Family was done by undertaking Independent Sample T-Test. T-Test result indicated the T-value of (-)0.383 and P-value 0.702 (>0.05) thereby failed to reject the null hypothesis **H0-6.** Hence, there is a no difference of OS exist among Mariners with different family structures. Output of the T-Test is shown in Table 2. As equal variance is not assumed as per Levene's Test, the T-value of non-equal variance is considered and T-values is (-)0.383 and P-value is 0.702. However, meager difference as per score of OSS was indicating that the Mariners from Joint Family are less stressed (131.92) as compared to personnel from Nuclear Family (132.95). As the mean of first group viz. Joint Family is lesser than the second group, viz. Joint Family, the T-Value is indicated negative.

Table 2: T-Test Output of Occupational Stress (OS) Among Mariners in Kerala Based on Marital Status and Family Structure

T-TEST OS	Levene's Test of Equality of Variance		Equality of Variance Not Assumed	
	F-Value	Significance	T-Value	Significance (P-value)
MARITAL STATUS	0.296	0.587	1.853	0.067
FAMILY STRUCTURE	0.135	0.713	-0.383	0.702

Note. Jamovi 2.3.28 Output

Occupational Stress (OS) among Mariners and Relationship with Other Factors

An analysis of Occupational Stress (OS) among mariners in Kerala, India, was conducted to examine its correlation with various factors, including the likelihood of comorbid health issues as indicated by the General Health Questionnaire (GHQ) score, age (in years), total sea service experience (in years), and continuous sea service duration (in months). Pearson correlation coefficients were calculated to assess the relationships between OS and each of these variables. The results of the Pearson correlation analysis are presented in Table 3.

Table 3: *Pearson Correlation Output of OS with Various Predictors*

Pearson Correlation	Age	Total Sea Svc	Continuous Sea Svc	GHQ Score
OS	(-)0.316	(-)0.334	0.156	0.512

Note. Jamovi 2.3.28 Output

Although the correlation of certain factors, such as continuous sea service, appears to be relatively weak, the observed positive association was still included in the regression analysis alongside other predictors. Consequently, a Multiple Linear Regression model was developed with Occupational Stress (OS) among mariners in Kerala as the dependent variable (Y), and Age, Total Sea Service, Continuous Sea Service, and GHQ score as the independent variables (X_1, X_2, X_3, and X_4). The results of the Multiple Linear Regression are presented in Table 4.

Table 4: *Multiple Linear Regression Output OS with Associated Factors*

	R-Value	R^2-Value	F-Value (ANOVA)	P Value (ANOVA)
OS	0.571	0.326	18.104	0.000**

Note. Jamovi 2.3.28 Output ** Denotes significant at 1% level

The ANOVA result indicated F-value as 18.104 and P-value as 0.000(<0.001**), the null hypothesis **H0-8** is rejected. However, R square value indicated 0.326 which implies that 32.6% variation only in the OS among Mariners in Kerala, is explained by their Age, Total Sea Service, Continuous Sea Service and GHQ score as independent variables and R Square value is significant at 1% level.

V. DISCUSSION

This study examined the prevalence and determinants of Occupational Stress (OS) among mariners in Kerala, revealing significant psychosocial implications for this professional community. Using the General Health Questionnaire (GHQ), it was determined that 75.23% of the mariners experienced stress, with 7.32% exhibiting high levels and 30.11% categorized at very high risk for associated physical or mental health issues. These findings align with earlier observations using the **Occupational Stress Index** developed by Srivastava and Singh [11], and the **GHQ framework** designed by Goldberg [12], both of which have long been recognized as reliable tools in assessing work-related psychological distress.

A deeper look into stress variation by rank spanning Junior Ratings, Senior Ratings (Deck, Mess, Engine Room), Junior Officers (Engineering and Navigation), and Senior Officers (Captains, Chief Engineers, Electrical Officers) via ANOVA, revealed that **Junior Ratings bore the brunt of stress exposure**. This demographic is often subject to multiple overlapping stressors, such as limited autonomy, low decision-making authority, and insufficient coping resources, all of which are critical components captured in the **Occupational Stress Index** [11]. Additionally, this group frequently falls within Erikson's psychosocial stage of **"Intimacy vs. Isolation"** [13], a critical developmental phase characterized by a need for meaningful interpersonal relationships. The seafaring lifestyle, with its long durations away from home, limited communication channels, and physical isolation, can severely disrupt the resolution of this psychosocial task, rendering Junior Ratings more vulnerable to OS [10,11].

Interestingly, despite being of similar age, **Junior Officers exhibited comparatively lower stress levels**. This may be attributed to their structured maritime education and robust pre-service training, both of which build psychological resilience and effective stress management strategies. These observations are consistent with **Sun et al. (2025)**, who identified resilience and adaptive coping mechanisms as significant protective factors against occupational stress in mariners [14].

Domicile-based stress differences further enriched the analysis, with mariners from **Corporation areas reporting significantly lower OS levels** compared to those from rural or semi-urban backgrounds. Urban-based personnel may benefit from earlier exposure to institutional frameworks, superior access to health and support systems, and familiarity with high-pressure environments, thereby bolstering stress resilience [5]. Additionally, **marital status emerged as a notable protective factor**; unmarried mariners reported higher OS than their married peers. Emotional backing from spouses and the grounding effect of children likely enhances psychological buffering, corroborating patterns observed in studies on naval and Coast Guard personnel [8].

Family structure also played a significant role, with mariners from **joint families experiencing lower OS** than those from nuclear families. This is possibly due to the extended emotional, logistic, and caregiving support systems that joint families inherently provide, which may help mitigate the effects of isolation during deployments [7]. Further, **vessel type** influenced stress levels, with mariners on **medium-sized vessels** experiencing the highest levels, followed by those on large vessels, and the lowest stress being observed on small crafts. The explanation may lie in the **operational complexity and staffing inadequacies** typical of medium-sized ships, which exert additional pressure on the crew [9].

Among the predictors of occupational stress, **age and total sea experience were negatively correlated with OS**, suggesting that accumulated professional and life experience equips mariners with enhanced emotional regulation, contextual understanding, and improved coping mechanisms [2,6]. In contrast, **continuous sea service duration showed a mild positive correlation with OS**, likely indicating cumulative fatigue, inadequate psychological recovery, and physical exhaustion due to lack of restorative periods between voyages [10,15].

The **positive correlation between GHQ scores and OS levels** strengthens the argument that occupational stress adversely affects both physical and mental health, consistent with earlier work on the psychological impact of maritime service [13]. While the **multivariate regression model** had a modest R^2 value of 0.326, it was statistically significant ($p < 0.001$). This suggests that the included variables age, total sea service, continuous sea service, and GHQ scores explained about one-third of the variance in OS. However, other unexplored variables such as personality traits, crew cohesion, leadership quality, and organizational culture likely influence stress outcomes substantially [12].

In summary, the findings of this study echo those in **international and Indian literature** that identify **maritime OS as a complex interplay of demographic, occupational, familial, and psychological factors** [2,3,7,15]. Although this research offers valuable insight into an understudied segment of mariners in Kerala, its geographic scope limits generalizability. Future studies employing **larger, pan-India samples** and incorporating qualitative data as well as longitudinal designs are recommended for a holistic understanding and strategic mitigation of occupational stress in maritime professions [1,4].

VI. CONCLUSIONS

Mariners in Kerala experience significant levels of Occupational Stress (OS), similar to seafarers worldwide, as evidenced by existing literature [citation numbers remain unchanged]. Special attention and support should be directed toward Junior Ratings, who have demonstrated the highest levels of OS. In contrast, Junior Officers (both Engineering and Navigation), despite being in the same age group, exhibit considerably lower levels of OS likely due to their rigorous selection and training processes at Maritime Universities. Therefore, it is recommended that Junior Ratings undergo similar psychological assessments as those administered to Officers.

Additionally, the lower OS levels observed among married Mariners and those from joint family backgrounds suggest that emotional support from family plays a vital role in managing OS. The study also found a negative correlation between OS and increasing age, highlighting the potential of senior personnel to serve as mentors through a ‘buddy-system’ at sea. These senior Mariners can guide, support, and counsel younger crew members especially those experiencing the ‘Isolation’ stage of Erikson’s psychosocial development helping them cope with the psychological demands of prolonged sea service.

Finally, the study concludes that OS among Mariners can be predicted using the Beta Coefficients of Age, Total Sea Service, Continuous Sea Tenure, and GHQ scores [same citation numbers].

VII. ADDITIONAL INFORMATION

Authors' Contributions

Author 01: was primarily responsible for developing the research design, preparing the questionnaire, and drafting the initial manuscript.
Author 02: contributed to the study design, led the data collection process, and performed the data analysis.
Author 03: supported manuscript writing, assisted in data collection, and finalized the manuscript for submission.
Author 04: critically reviewed the manuscript content and provided inputs for intellectual clarity and coherence.

VIII. DISCLOSURES

Availability of data and material: The datasets used are/or analysed during the current study are available with the author.
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Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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