International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Impact of Stress Level on Oral Health Among Salt Factory Workers of Bhavnagar District, Gujarat

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OPEN ACCESS

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Received: 17-09-2025
Accepted: 05-10-2025
Available online: 26-10-2025

ABSTRACT

BACKGROUND: Stress is a feeling of pressure, worry/solicitude, or being overwhelmed. While occasional stress is normal, excessive or devilish or prolonged stress can harm health and routine life. According to Chang's Dictionary of Psychology, it's "a state of physical or internal pressure causing emotional torture or pain". Work- related stress is a major psychosocial hazard faced by workers.
AIM: To evaluate how stress affects salt workers' Dental health of Bhavnagar Salt and Industrial Works, Gujarat.
MATERIAL & METHODS: A descriptive cross–sectional survey was carried out among 400 salt pan workers to assess their stress position using Cohen's scale. The data was coded and analyzed with MS Excel and SPSS 20.0 interpretation and Chi – square test was applied for statistical analysis.
RESULT: It was assessed that maturity of salt pan workers were males 285(71.25%). Male study subjects were having increased stress as compared to womanish study subjects. Statistically, significant relation (p value = 0.030) has been set up between periodontal pocket depth and level of stress.
CONCLUSION: It was concluded that reduction in level of stress would help to enhance periodontal health. Employers must not only evaluate the working environment, recognize and address stress issues, but also encourage healthy work practices and minimize hazardous working conditions. A smart employer plans and oversees work to minimize common risk factors and assist avoid as many predictable issues as feasible.

Keywords*: Occupational stress, Oral health, Occupational groups*

INTRODUCTION

India ranks as the world's third-largest salt producer after the United States and China, contributing significantly to the global annual production of around 230 million tonnes. Stress, generally described as feeling overburdened, tense, and worried, is a normal experience but can become dangerous when dragged, leading to disturbance of routine life.[1, 2]

Stress can be acute (short- term "fight or flight" response) or chronic-habitual (long- term repeated exposure).[3] It's causes may be physiological, psychological, pathological, cultural, or resource- related, and stressors are vastly distributed as exogenous (external), endogenous (internal), or a combination of both.[4, 5] psychological stress arises when individualities perceive situations as hanging or beyond their managing capacity, constantly linked to work, connections, or financial difficulties.[6]

Perceived stress, defined by experiences of unpredictability and lack of control, can negatively affect oral hygiene.[4] Neglecting oral care due to stress promotes plaque accumulation, which is a risk factor in periodontal conditions[3]. Periodontitis, a chronic inflammatory complaint of the tooth- supporting tissues, is affected by microbial imbalance and vulnerable- inflammatory responses. Stress is shown to complicate this condition by decaying vulnerable defences and enhancing inflammation[6]. Several studies illuminate stress as a causative factor for periodontal disease, particularly among workers exposed to occupational stress and dissatisfaction[7]. Therefore, the study aims to evaluate the effect of stress levels on the oral health of salt factory workers in Bhavnagar District, Gujarat using Perceived Stress Scale by Sheldon Cohen and WHO Performa[8].

MATERIAL & METHODS:

STUDY DESIGN: Descriptive cross – sectional survey

STUDY POPULATION: Study planned among salt factory workers of Bhavnagar district, Gujarat.

Ethical clearance was obtained from the Institutional Ethics Committee under reference number NPDCH/2024/193.

SAMPLE SIZE DETERMINATION:

The following formula was used to determine the sample size:

$$n = {}^{4pq}/_{L^2}$$

Where,

Expected % frequency / Prevalence (p): 50% (to get maximum Sample size)

q = (1-p)

Allowable error (L): 5%

Sample size (n) = 400 (At Confidence Interval/level 95%).

400 study participants were randomly selected from a salt factory.

After obtaining informed consent, clinical examinations were performed at Bhavnagar Salt and Industries Pvt. Ltd.

SOURCE OF DATA:

Before collecting data, all participants gave written informed consent after being fully briefed on the study's objectives, methods, and confidentiality measures. To promote clarity and voluntary participation, information sheets and consent forms were made available in the local language. Data were obtained through a structured questionnaire, which started with an informed consent section followed by demographic details such as age, gender, marital status, and address. The main section of the questionnaire consisted of 10 single-choice multiple-answer questions designed to evaluate stress levels. Items assessing the effect of stress on oral health were adapted from Cohen's Perceived Stress Scale.

INCLUSION CRITERIA:

- Individualities age between 18- 70 times were included in the study.
- Employed at the current factory for ≥ 6 months (to ensure sufficient exposure to factory conditions).
- Workers who were present at the factory and available for examination during the study period.

EXCLUSION CRITERIA:

- An Individualities who declined or were unfit to give informed concurrence.
- An Individualities who were not present at the time of study were barred from the study.
- Workers who were completely edentulous (no natural teeth), as periodontal/ oral examination was not applicable.
- Workers who entered periodontal remedy, professional dental scaling, or antibiotic remedy within the formerly 3 months (it altered clinical periodontal status).
- Workers who were on medications known to affect periodontal/ oral health (e.g., anticonvulsants, immunosuppressant, calcium channel blockers) or systemic corticosteroids.
- Workers with uncontrolled systemic conditions that strongly impact periodontal health (e.g., uncontrolled diabetes mellitus, current chemotherapy/ immunosuppression, or advanced HIV infection).

STATISTICAL ANALYSIS

- Microsoft Excel Office 2013 was used to compile the participant replies, and SPSS version 20.0 was used for analysis. The Chi – square test was used where necessary, and descriptive statistics were computed. A $p \leq 0.05$ was considered statistically significant. The Mann-Whitney test was applied to examine the association

between gender and questionnaire responses.

RESULTS

Table 1: presents the distribution of study participants according to age group and stress level. Among the 400 participants, 72.3% experienced mild stress, 23.3% moderate stress, and 4.5% high stress. High stress was observed exclusively in the 18–37-year age group (10%), whereas mild stress was most prevalent among participants aged 38–57 years (87.3%), followed by those aged ≥58 years (70.2%).

Figure 2: illustrates the distribution of participants by stress level and pocket depth. The majority (70.3%) exhibited no periodontal pockets, 20.5% had pocket depths of 4–5 mm, and 9.2% had pockets measuring ≥6 mm. Mild stress predominated across all groups, while the prevalence of moderate stress increased with pocket depth.

Table 3: compares perceived stress by gender and dental caries status. Females demonstrated higher emotional reactivity to unexpected or uncontrollable events, whereas males reported greater difficulty coping with and managing irritations ($p < 0.05$). No significant gender difference was noted in handling personal problems. Mild stress predominated among participants both with and without dental caries, and no statistically significant association was found between stress level and dental caries ($p = 0.44$)

Table – 1: Distribution of study subject based on their age group and stress level

Stress level (Interpretation)	Age Group			Total	P - value
	18 – 37 Years	38 – 57 Years	Age 58 & above Years		
Mild stress	105 (58.3%)	151 (87.3%)	33 (70.2%)	289 (72.3%)	0 .001*
Moderate stress	57 (31.7%)	22 (12.7%)	14 (29.8%)	93 (23.3%)	
High perceived stress	18 (10%)	0%	0%	18 (4.5%)	
Total	180 (100%)	173 (100%)	47 (100%)	400 (100%)	

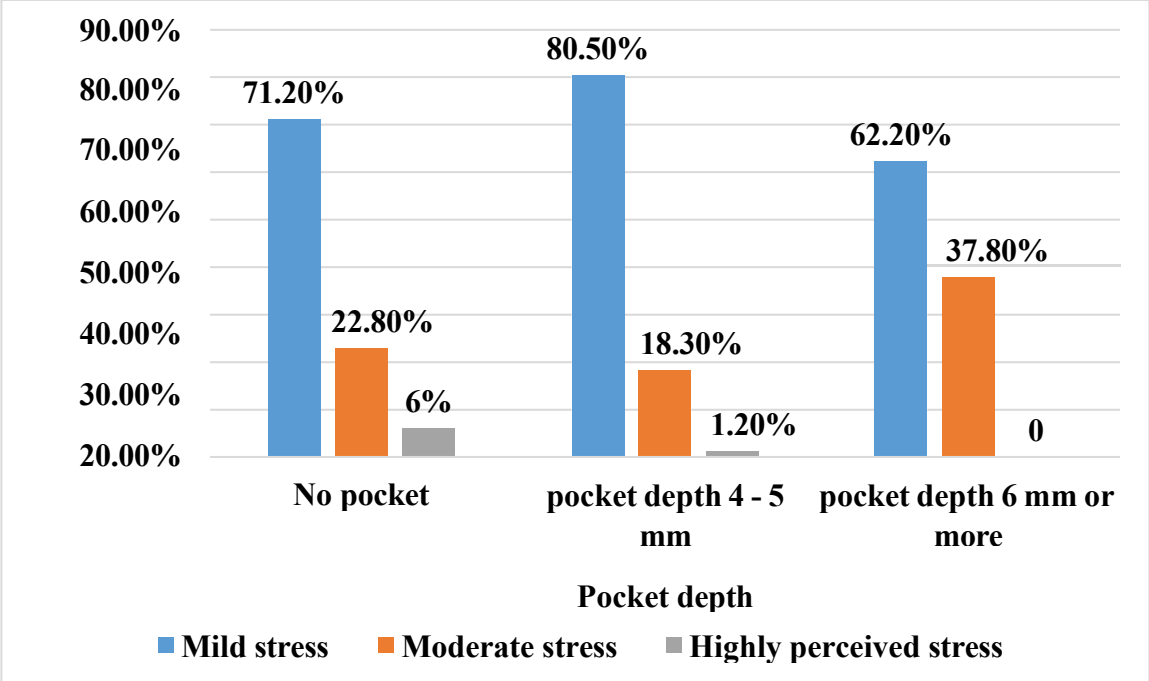

Figure – 2: Distribution of study subject based on stress level (Interpretation) & pocket-depth

Table – 3: Distribution & association of study subject based on all questions and Gender

Questions	Gender	Mean rank	P - value
1. In the last month, how often have you been upset because of something that happened unexpectedly?	Male	190.65	0.005*
	Female	224.90	
2. In the last month, how often have you felt that you were unable to control the important things in your life?	Male	191.64	0.01*
	Female	222.45	
3. In the last month, how often have you felt nervous and stressed?	Male	193.57	0.049*
	Female	217.67	
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	Male	201.73	0.702**
	Female	197.45	
5. In the last month, how often have you felt that things were going your way ?	Male	203.09	0.435**
	Female	194.07	
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	Male	213.50	0.00*
	Female	168.27	
7. In the last month, how often have you been able to control irritations in your life?	Male	223.22	0.00*
	Female	144.20	
8. In the last month, how often have you felt that you were on top of the things?	Male	208.37	0.00*
	Female	181.00	
9. In the last month, how often have you been angered because of things that were outside of your control?	Male	223.09	0.00*
	Female	144.51	
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	Male	217.13	0.00*
	Female	159.29	

DISCUSSION

Dental professionals have been arguing for a link between periodontitis and psychosocial stress for the past few years. Gingivitis and periodontitis are among the many illnesses whose etiology has been demonstrated to be significantly influenced by clinical psychological variables and stress. [9] Existing research in dentistry, including systematic reviews, has explored the association between psychological stress and periodontitis, identifying stress as a potential risk factor for periodontal diseases [10].

In our present study, mild stress is seen topmost (87.3%) among age group between 38–57 years, while moderate (31.7%) and high perceived stress (10%) is seen mainly among age group between 18–37 years. These findings in contrast with those of Varma *et al.* (2021) [11], Whereas, 77% of participants indicated moderate to severe levels of stress, and 35% of respondents had substantial depression symptoms, mostly in the mild to moderate range.

The present study found an association between chronic stress and poor oral health. Similar findings were reported by Finlayson *et al.* (2010) [12], who observed social gradients or social slants in self-assessed oral health according to education and income, with those from lower-income categories more likely to report having poor oral health. Akcali *et al.* (2012)[13], Also suggested that psychological stress may adversely affect periodontal treatment outcomes. The blood and saliva of patients with periodontal disease have been found to include a variety of stress-related indicators, which may impact the course of the illness through a number of processes, such as modifications to the inflammatory response and changes in the makeup of the dental biofilm.

Our study found that there is no significant association between chronic - habitual stress and DMFT scores. Comparable findings were reported by Armfield *et al.* (2013) [14], who identified behavioural factors such as dental visitation patterns and tooth-brushing habits, along with socioeconomic conditions, as significant predictors of self-rated oral health, untreated caries, and DMFT in their adjusted analyses. In contrast, Raghad *et al.* (2020) [5] reported differing results, suggesting that elevated cortisol levels during stress may enhance acid production, creating an environment favourable for bacterial activity. Stress can also lead to unhealthy dietary habits such as frequent snacking and increased consumption of sugar-rich foods, and may reduce adherence to oral hygiene practices like brushing and flossing. These factors collectively contribute to diminished oral cleanliness and lower salivary flow, thereby promoting the accumulation of cariogenic bacteria.

In the current study, an increase in stress levels was found to be associated with greater periodontal pocket depth. Among participants with mild stress, 80.5% exhibited pocket depths of 4–5 mm, whereas 37.8% of those with moderate stress had pocket depths exceeding 6 mm. These findings align with those of Peruzzo *et al.* (2007) [15], who reported a significant correlation between psychological stress and the severity of periodontal disease. Similarly, Rosania *et al.* (2009) [16] observed that individuals under chronic stress showed elevated concentrations of inflammatory biomarkers—such as interleukin-6 and tumour necrosis factor-alpha—which contribute to the destruction of periodontal tissues.

In the present study, females exhibited greater emotional reactivity to unexpected or uncontrollable situations, whereas males reported more challenges in coping/managing with, regulating irritations, and managing overwhelming stress. Overall, females demonstrated higher mean ranks compared to males, suggesting that they were more likely to feel upset by unforeseen events, experience a perceived lack of control over important aspects of life, and report feelings of nervousness and tension.

Similar results were reported by Kelly et al. (2007) [17], who discovered that women responded to social stress challenges with higher levels of dread and irritation. Their findings are consistent with earlier studies showing that when faced with interpersonal pressures, women report and experience more negative affect than men. Additionally, the higher prevalence of mood and anxiety disorders in women may be attributed to variations in emotion regulation techniques used during and after acute stress episodes, such as rumination, reappraisal, and suppression. Interestingly, ruminating is more common among women than males when they are feeling bad.

LIMITATION OF THE STUDY

The assessment of stress levels in this study was based on the self-reported Perceived Stress Scale (PSS), which may be subject to individual bias, mood fluctuations, or misinterpretation of the questionnaire items.

RECOMMENDATION OF THE STUDY

Future studies should consider including participants from diverse occupational settings to determine whether the observed findings are unique to salt factory workers or can be generalized to industrial workers as a whole.

CONCLUSION

The results of this study showed a strong correlation between periodontal health and stress among Bhavnagar salt factory workers. Stress levels were influenced by both age and gender, with females exhibiting higher levels of mild stress and younger adults showing greater emotional reactivity. Participants aged 18–37 years displayed stronger responses to unexpected situations compared to middle-aged and older individuals, indicating that age may affect stress perception and coping abilities. These results emphasize the importance of implementing workplace-based stress reduction programs, wellness initiatives, and supportive organizational policies aimed at lowering stress levels and promoting better oral as well as overall health among industrial workers.

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