"Oral Health and Hygiene Among Fishermen: Prevalence, Practices, and Awareness" - A Cross-Sectional Study

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Abstract

Background: Oral health is a crucial aspect of overall well-being but is often neglected, particularly in high-risk occupational groups like fishermen. Poor oral hygiene contributes to dental caries, periodontal diseases, and related complications. This study assesses oral hygiene awareness, practices, and the prevalence of dental issues among fishermen in Kodimunai village, Kanyakumari district, India.

Methods: A cross-sectional study was conducted among 760 adult fishermen selected through stratified random sampling. Data were collected using a semi-structured questionnaire adapted from the WHO Oral Health Questionnaire (1993) and clinical examinations employing the Gingival Index, Plaque Index, and DMFT Index.

Results: The prevalence of gingivitis, dental caries, and dental plaque was 78.7%, 60.2%, and 87.3%, respectively. Although 95.1% of participants used toothbrushes and toothpaste, 71.6% followed ineffective horizontal brushing, and only 16.4% brushed twice daily. Awareness of oral hygiene products was low, with only 6.2% familiar with dental floss and 7.5% aware of mouthwash. Additionally, 11% smoked, 15.1% chewed areca nuts, and 38% sought treatment only when experiencing pain, reflecting a lack of preventive care awareness.

Conclusion: The study highlights significant gaps in oral hygiene awareness and practices among fishermen, emphasizing the need for targeted community-based oral health education programs. Socioeconomic and occupational factors contribute to poor oral health outcomes, necessitating accessible and culturally appropriate interventions to improve oral hygiene and reduce disease prevalence in this high-risk group.

Keywords: Oral health, fishermen, dental caries, gingivitis, oral hygiene awareness, community-based education, public health intervention.

Introduction:

Health is a fundamental human right and essential for a productive life (1). Oral health, as an integral part of general well-being, plays a crucial role in maintaining overall health. Poor oral hygiene can lead to systemic health issues, as the oral cavity serves as a gateway for pathogens while also enabling essential functions like chewing and swallowing, which are vital for nutrition (2–4). Neglecting oral hygiene results in plaque buildup, increasing the risk of dental caries, periodontal diseases, and associated complications, ultimately affecting self-esteem, nutrition, and sleep patterns (5,6). Despite medical advancements, oral diseases remain a major global public health burden, affecting populations across both developed and developing nations (7). While simple behavioral changes can improve oral hygiene (8,9), limited awareness and access to dental care continue to hinder preventive efforts.

India's National Oral Health Programme (NOHP), launched in 2019, aimed to reduce oral disease prevalence through preventive strategies, promoting optimal oral health nationwide (10). Among high-risk populations, fishermen face unique challenges due to their physically demanding occupation, prolonged sea voyages, and lower literacy levels, which limit their access to dental care (11-15). Their lifestyle factors, including high tobacco and alcohol consumption, further contribute to deteriorating oral health (16-18). Studies indicate that fishermen experience a higher prevalence of dental caries and periodontal disease compared to non-fishermen, emphasizing the need for targeted interventions (17). Oral health education remains a cost-effective approach in addressing this issue by promoting dental hygiene, improving knowledge, and facilitating behavioral changes (9,17). However, limited studies in India have evaluated the effectiveness of community-based oral health education among fishermen, making this research crucial in understanding its impact.

Previous studies have demonstrated that structured oral health education significantly improves oral hygiene behaviors. A randomized controlled trial in Brazil found that motivational oral hygiene instruction effectively reduced plaque and improved periodontal health (18). Similarly, in Kenya, an educational intervention among HIV patients led to a notable

improvement in oral hygiene practices (19). Research in Italy highlighted that individuals with higher education levels had better oral hygiene habits and lower DMFT (decayed, missing, and filled teeth) scores (20). A study in Nepal among school-aged children further confirmed that structured oral health education led to improvements in knowledge, attitudes, and plaque control (21). Given the high oral disease burden among fishermen, community-based oral health education could play a pivotal role in enhancing their oral health outcomes.
This study aims to assess the effectiveness of community-based oral health education on oral hygiene practices and awareness among fishermen in Kodimunai village, Kanyakumari region. It also seeks to determine the prevalence of dental caries and gingivitis in this population, contributing valuable insights into improving oral health interventions among high-risk groups.

Methods:
A cross-sectional study was conducted to estimate the prevalence of dental problems and oral hygiene status among adults in the fishing community of Kodimunai village, Kanyakumari district, Tamil Nadu. The sample size for the prevalence study was 760, calculated based on an expected prevalence of 55% (Saravanan et al., 2011) with a 5% margin of error. A stratified random sampling technique with proportional probability sampling was employed to ensure a representative sample. Kodimunai village was divided into four regions: North (8 anbiyums), South (8 anbiyums), East (10 anbiyums), and West (9 anbiyums), where "anbiyums" are community-based clusters comprising a minimum of 20 to a maximum of 50 households, each led by a community leader. The selection of participants was done randomly using the voter identification list.

A semi-structured questionnaire adapted from the WHO Oral Health Questionnaire (1993) was used to collect information on demographic details, oral hygiene awareness, dietary habits, and oral hygiene practices. The oral health status of participants was assessed using standardized clinical indices. The Gingival Index (Löe & Silness, 1963) was employed to evaluate gingival health, while the Plaque Index (Silness & Löe, 1964) was used to measure plaque accumulation. Additionally, the DMFT Index was applied to assess dental caries. Clinical examinations were conducted under natural light, with participants seated in an upright position. Ice-cream sticks were used for cheek and tongue retraction, and a disposable curved explorer was utilized to record gingival and plaque indices.

Results:
The result section outlines the key findings from the study, including the socio-demographic profile, oral hygiene practices, and awareness levels of the fishermen population. Additionally, it presents the clinical prevalence of dental caries, gingivitis, and dental plaque, offering a comprehensive overview of the oral health status within this high-risk occupational group.

The table 1 depicts, socio-demographic profile of the study population (n=708) reveals that the majority of participants were young adults, with 37.8% falling within the 18–29-year age group, followed by 30.6% aged 30–39 years. Participants aged 40–49, 50–59, and those above 60 years constituted 16.6%, 9.4%, and 5.6% of the sample, respectively. Females made up a larger proportion (57.4%) of the respondents compared to males (42.6%). In terms of educational attainment, a substantial segment (36.5%) had completed undergraduate studies or a diploma, while 23.2% had attained higher secondary education. Secondary education was reported by 15.7% of participants, primary schooling by 17.4%, and a small fraction (4.9%) were illiterate. Only 2.3% had completed postgraduate studies. The marital status distribution showed that 68.9% of the participants were married, while 22.3% were unmarried. Individuals who were divorced/separated and widowed represented 2% and 6.8% of the population, respectively. With regard to annual household income, over half of the participants (55.2%) reported earning between ₹2,00,000 and ₹3,00,000. In contrast, 16.2% earned between ₹1,00,000 and ₹2,00,000, while 18.5% reported income in the range of ₹3,00,000 to ₹4,00,000. A smaller percentage earned more than ₹5,00,000 (6.7%) or less than ₹1,00,000 annually (3.4%). Out of the 708 individuals surveyed, 78 (11%) reported smoking, 107 (15.1%) reported chewing betel leaves with areca nuts, and 23 (3.2%) consumed gutka or paan regularly. The remaining 500 participants (70.6%) reported no such habitual practices. These findings emphasize that nearly one-third of the study population engages in behaviors associated with increased risk for oral health issues.

Table 1: Distribution of annual income, religion and marital status among study population (n=708)

	variables	n	%
Age	18-29 years	268	37.8
	30-39 years	217	30.6
	40-49 years	117	16.6
	50-59 years	66	9.4
	60 above	40	5.6
Gender	Male	301	42.6
	Female	406	57.4
Education status	Illiterate	35	4.9
	Primary school	124	17.4
	Secondary school	111	15.7
	Higher secondary	164	23.2
	UG/ Diploma	258	36.5
	PG degree	16	2.3
Religion	Christian	706	99.7
	Hindu	2	.3
Marital status	Married	488	68.9
	Unmarried	158	22.3
	Divorced/separated	14	2
	Widow	48	6.8
Annual income	< 1 lakhs	24	3.4
	1-2 lakhs	113	16.2
	2-3 lakhs	391	55.2
	3-4 lakhs	133	18.5
	>5 lakhs	47	6.7
Habitual practices	Smoking	78	11
	Chewing betel leaves/areca nut	107	15.1
	Chewing gutka/paan	23	3.2
	Nil	500	70.6

Among the participants, only 8.9% were aware that oral health can affect general health. Regarding treatment preferences, 19% believed in filling a decayed tooth at an early stage, 38% preferred treatment only after experiencing pain, and 37% were unsure, as shown in table 2

In terms of sugar intake, 36.5% consumed sugary foods once a week, 19.6% consumed them daily, and 14.9% consumed them several times a day. The majority (95.1%) used a toothbrush with paste, while a few used a finger with tooth powder (3.3%) or sand (1.6%). Only 14.4% were aware of fluoride in toothpaste.

Brushing frequency was predominantly once daily (69.4%), with 16.4% brushing twice daily. Regarding toothbrush replacement, 26.8% replaced it every three months, while 25.7% did so only when bristles wore out. Awareness of bristle type was low; 39.3% did not know the type used.

Awareness of dental floss (6.2%) and mouthwash (7.5%) was very low. Almost all participants never used dental floss (98.4%) or mouthwash (93.8%). Only 42.8% reported gargling after meals, and 27.4% used a tongue scraper. Most participants (50.1%) brushed for more than 3 minutes, and 27.8% brushed for more than 10 minutes. Horizontal brushing was the most common technique (71.6%).

Table 2: Distribution of oral hygiene practices among the study population (n=708)

Oral hygiene practices	Variables	n	%
Oral health can affect general health	Yes	63	8.9
	No	644	91.0
Opinion on treatment for decayed tooth	Filling the tooth at initial stage	130	19
	Treatment only after pain	270	38
	Decayed tooth need not be filled	45	6.4
	Don't know	263	37
Sugar consumption	Several times a day	106	14.9
	Everyday	134	19.6
	Several times a week	47	6.4
	Once a week	259	36.5
	Several times a month	116	16.3
	Seldom	46	6.5
Brushing aids used	Toothbrush with paste	673	95.1
	Finger with tooth powder	23	3.3

	Sand	12	1.6
Aware of fluoride in toothpaste	Yes	102	14.4
	No	606	85.6
Frequency of brushing teeth	Once a day regularly	494	69.4
	Once a day but irregularly	98	14.2
	Twice a day	116	16.4
Frequency in changing toothbrush	Less than 2 months	184	26
	Once in 3 months	190	26.8
	Once in 6 months/ year	152	21.5
	Only after bristle wears off	182	25.7
Bristle type	Soft	108	15.2
	Medium	166	23.4
	Hard	156	22.1
	Don't know	278	39.3
Aware of dental floss	Yes	44	6.2
	No	664	93.8
How often do you use dental floss	Once-daily	0	0
	Seldom	11	1.6
	Never	697	98.4
Aware of mouth wash	Yes	53	7.5
	No	655	92.5
How often do use mouth wash	Once-daily	12	1.7
	Seldom	32	4.5
	Never	664	93.8
Do you have the habit of gargling your mouth after meals	Yes	302	42.8
	No	172	24.3
	Sometimes	234	32.9
Do you use a tongue scraper to clean the tongue	Yes	193	27.4
	No	515	72.6
Time taken to brush the teeth	Less than a minute	65	9.2
	Two minutes	90	12.7
	more than 3 minutes	355	50.1
	more than 10 minutes	198	27.8
Brushing technique	Vertical	23	3.2
	Horizontal	507	71.6
	Vertical and horizontal	59	8.3
	Circular	94	13.3
	Don't know	25	3.5

Figure.1: Knowledge and Awareness of oral health and hygiene practices (n=708)

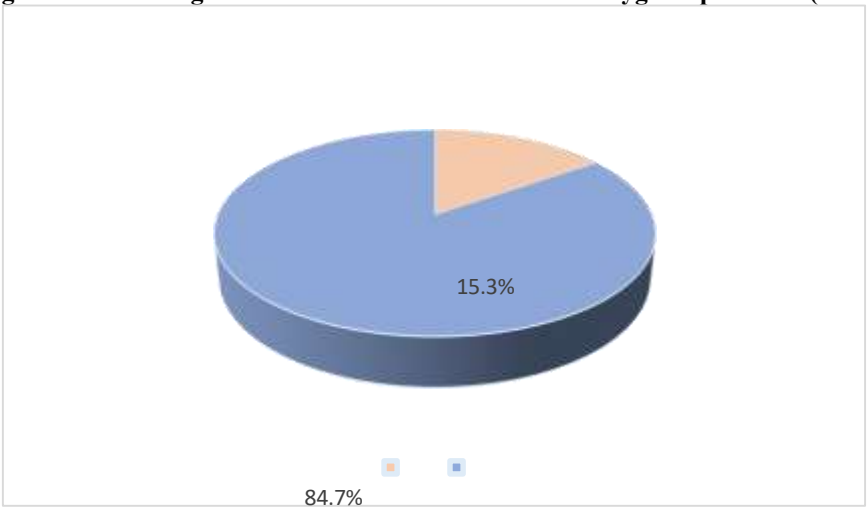

Figure.1 shows, that majority of the participants about 84.7% were unaware of proper oral hygiene practices and do not have the correct knowledge of oral hygiene practices.

In the study population, 33.5% had mild gingival inflammation, 32.2% had moderate, and 12.6% had severe inflammation,

while only 21.7% had normal gingiva. Regarding dental plaque, 36.8% had thin plaque, 32.8% had moderate plaque, and 17.5% had severe plaque, with only 12.9% showing excellent oral hygiene. A majority (60.2%) had decayed teeth, 51.8% had missing teeth, and 30% had filled teeth. These findings highlight a significant burden of oral disease in the population.

Table.3 Frequency distribution for DMFT index, gingival index score and plaque index score

Variables		n	%
Gingivitis	Normal gingiva	154	21.7
	Mild inflammation	237	33.5
	Moderate inflammation	228	32.2
	Severe inflammation	89	12.6
Dental Plaque	Excellent	90	12.9
	Thin plaque	261	36.8
	Moderate plaque	233	32.8
	Severe plaque	124	17.5
DMFT	Decayed teeth	426	60.2
	Filled teeth	213	30
	Missing teeth	367	51.8

Table.4 Prevalence of Dental caries, Gingivitis, and Dental plaque

	n	%	Confidence limit	
			Lower	upper
Gingivitis	554	78.7	75	81.1
Dental caries	426	60.2	56.5	63.7
Dental plaque	618	87.3	84.6	89.5

The study revealed that 78.7% of the population exhibited signs of gingivitis, with a 95% confidence interval ranging from 75% to 81.1%. Dental caries was present in 60.2% of participants (CI: 56.5%–63.7%), indicating a high prevalence of untreated decay. Additionally, 87.3% showed evidence of dental plaque, with confidence limits between 84.6% and 89.5%, underscoring widespread poor oral hygiene among the population.

Discussion:

Oral health is an integral component of overall well-being, yet it remains a neglected aspect of healthcare in many communities. This study highlights critical aspects of oral health status, hygiene practices, and the prevalence of dental diseases in the study population. A detailed assessment of dental caries, gingivitis, and plaque, along with oral hygiene behaviors, reveals patterns that offer valuable insights into the factors influencing oral health. When compared with findings from previous research by Lodagala et al., Varkey N.S., and Singh et al., distinct disparities emerge, underscoring the role of socioeconomic, occupational, and lifestyle factors in shaping oral health outcomes.

The prevalence of dental caries in this study was 60.2%, higher than the 41.43% reported among tobacco users by Lodagala et al (22). but lower than the 82% found among fishermen in Singh et al.'s study. The dmft index further revealed a significant burden of untreated dental diseases, with 60.2% of participants having decayed teeth, 30% having filled teeth, and 51.8% having missing teeth (23). These findings underscore the long-standing impact of poor oral hygiene and limited access to dental care. Similarly, gingivitis affected 78.7% of participants, with varying degrees of severity, while dental plaque was present in 87.3% of the population. These results align with Singh et al., who also found poor periodontal health among fishermen due to inadequate oral hygiene practices and a lack of awareness about preventive care.

Despite a high percentage (95.1%) of participants using a toothbrush and toothpaste, oral hygiene practices were far from optimal. The majority (71.6%) relied on horizontal brushing, which is less effective for plaque removal, and only 16.4% brushed twice daily. Awareness of essential oral hygiene products was also low, with only 6.2% knowing about dental floss and 7.5% about mouthwash. This lack of awareness was reflected in usage patterns, as 98.4% had never used floss, and 93.8% never used mouthwash. In comparison, Singh et al. found similar gaps in oral hygiene awareness among fishermen, where limited knowledge contributed to poor oral health outcomes.

Dietary habits played a key role in oral health, with 14.9% of participants consuming sugar several times a day and 19.6% consuming it daily. Varkey N.S. also reported a significant link between frequent consumption of sweetened beverages and poor oral health (24). Interestingly, fishermen in Singh et al.'s study, who spent extended periods at sea, also showed a high prevalence of caries, suggesting that occupation-driven dietary patterns contribute to dental disease.

Socioeconomic factors further influenced oral health outcomes. In this study, 36.5% of participants had a university degree or diploma, while 15.7% had only secondary education. Varkey N.S. noted that individuals with lower education levels had poorer oral health, indicating that awareness and literacy play a crucial role in preventive care. Income levels varied, with 55.2% earning between 2-3 lakhs annually. While this income level is higher than that reported among fishermen in Singh et al.'s study, poor oral hygiene practices persisted, suggesting that financial status alone does not determine oral health outcomes. Rather, it is a combination of awareness, accessibility, and behavioral factors.

Tobacco and betel nut use emerged as common habits, with 11% of participants smoking, 15.1% chewing areca nuts and betel leaves, and 3.2% consuming gutka or pan regularly. Lodagala et al. reported that tobacco users had significantly poorer oral hygiene scores compared to nonusers, though their study also noted an unexpected finding—lower dental caries prevalence among tobacco users, possibly due to tobacco's antibacterial properties. This contradiction underscores the complex relationship between tobacco use and oral health, where while it may reduce caries risk, it significantly contributes to periodontal disease and overall poor oral hygiene.

A delayed approach to seeking dental treatment was another striking finding, as 38% of participants believed treatment was necessary only after experiencing pain, while 37% were unaware of treatment options altogether. This trend mirrors Singh et al.'s findings, where individuals with lower income and education levels often sought dental care only in advanced disease stages, leading to higher rates of extractions and missing teeth. Additionally, preventive behaviors such as toothbrush replacement were inadequate, with only 26.8% changing their toothbrush every three months, while 25.7% did so only when the bristles wore out.

These findings collectively emphasize the significant burden of oral diseases and the urgent need for interventions focused on improving awareness, promoting preventive care, and addressing high-risk behaviors. The interplay of socioeconomic status, dietary habits, occupational factors, and tobacco use plays a crucial role in determining oral health outcomes, making targeted public health efforts essential in addressing these challenges.

Conclusion

This study reveals a substantial oral health burden among the fishermen of Kodimunai village, with a high prevalence of dental caries, gingivitis, and plaque accumulation. Despite regular use of toothbrushes and toothpaste, improper brushing techniques, lack of awareness about preventive dental care, and unhealthy habits such as tobacco use contribute to poor oral health. Additionally, socioeconomic challenges, occupational hardships, and limited access to dental services further worsen the situation.

To address these issues, community-based oral health education programs are essential. Increasing awareness, promoting preventive dental care, and encouraging regular dental visits can significantly improve oral hygiene practices. Tailored health interventions that consider the unique lifestyle and occupational factors of fishermen can help reduce the prevalence of oral diseases and enhance their overall well-being. Strengthening public health initiatives and improving accessibility to dental care will be key steps in fostering better oral health outcomes for this vulnerable group

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Ethics Statement: This study received ethical approval from The Tamil Nadu Dr. M.G.R Medical University (ECMGR0309188) after review by the Scientific Research Committee. Confidentiality was maintained, and participation was voluntary, with the right to withdraw at any time. The study adhered to ethical guidelines, ensuring respect and autonomy for all individuals involved.

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