

Assessment of Oral Health Status among Garment Industry Workers in Bangalore City: A Cross-sectional Study

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Abstract

Aim: The aim of this study was to assess oral health status among garment industry workers in Bangalore city.

Methodology: A cross-sectional study was conducted among 1022 garment industry workers, to assess the oral health status in Bangalore city. The type III clinical examination was carried out as per the American Dental Association Specification (1970), and oral health status was assessed using the WHO Oral Health Assessment Form 1997. Data were analyzed using SPSS version 15. Categorical data were analyzed using Chi-square test, and $P < 0.05$ was considered statistically significant.

Results: In the present study out of total 1022 study subjects, 21.9% of subjects were male and 78.1% of subjects were female. 0.5% had ulceration, sores, erosions, and fissures on head, neck, and limbs, all of them were female ($P = 0.235$). 4.9% of the population had ulceration (aphthous, herpetic, and traumatic) which was found to be the most common oral mucosal condition and more prevalent among males ($P < 0.001^{**}$). The most common enamel opacity was demarcated opacity, and females ($P < 0.001^{**}$) were most affected. Mild fluorosis was prevalent among females ($P < 0.001^{**}$). The prevalence of periodontitis was 33.8% and dental caries was 73.9%, of which females were more prevalent.

Conclusion: The findings of the study showed that despite the low prevalence of extraoral lesions, temporomandibular joint signs and symptoms, and intraoral lesions, the Community Periodontal Index and loss of attachment scores were found high. The mean decayed, missing, and filled teeth scores were also high, and prosthetic status was poor.

Key words: Community periodontal index, Cross-sectional study, Decayed, missing, and filled teeth, Loss of attachment, Oral health status

INTRODUCTION

Health is a fundamental right of every individual, and oral health is an integral part of general health. Various factors such as socioeconomic status, occupation, and education play a major role in maintenance of good oral health.^[1] Occupation is an important component of socioeconomic status which plays a vital role in both individual's life and a nation's progress.^[2] Health at work and healthy working

environment are among the most valuable assets for individual, community, and the country. In light of rapid economic growth and industrial progress in our country, it becomes imperative that safety and health at the workplace be given its due importance. Instead of investigating accidents after they have occurred, taking a high toll of human life, it is now felt that preventing the occurrence of industrial disasters and occupational diseases is a much better idea.^[3]

Majority of people employed in various industries are exposed to hazardous environment. This exposure deteriorates the general and oral health of people, and every occupation is associated with one or other ill effects on health. Various studies have shown the association between occupational exposure and greater incidence of oral diseases, thus occupational health is quite significant.^[3,4]

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In India, there are many industries, and recently, garment industry has been emerged in a big way competing at global level and has provided employment to lakhs of people.^[5] It employs about 40 million people in various countries of the world.^[6] The garment industry in India is among the largest in Asia and, indeed, in the world. Karnataka has a huge garment industry sector, producing finished material both for National and international markets. Officially, there are 780 garment manufacturing units in Bangalore alone with nearly 80% of the workforce comprising women.^[7]

The unhealthy and unsafe work environment in garment industries results in several health problems. Various studies have reported that many of textile workers suffered from cancer, backache, joint pains, headache, and general tiredness.^[8-10] Several previous reports indicate that damage may occur to hard oral tissues as a result of occupational hazards. The science of occupational health hazards covers a wide field, such as work physiology, occupational hygiene, occupational psychology, and occupational toxicology.^[11,12] Their effect on dental health includes notching of the enamel of tooth, sometimes dentin, and tooth abrasion in noise-exposed workers.^[2,13] Occupation stress can affect both physical and emotional well-being; eventually, it leads to gingivitis, periodontitis, and poor oral hygiene.^[14-16]

The garment industry, which has been traditionally a low-profile sector, has shown a tremendous growth over the last two decades. In Bangalore, the workforce is made up largely of female workers.^[17] There has been no study done so far regarding the oral health status and treatment needs of garment industry workers in Bangalore. Hence, the present study has been undertaken to assess oral health status so that a suitable plan for the preventive and curative treatments for them can be made.

MATERIALS AND METHODS

This cross-sectional study was conducted among 1022 garment industry workers in Bangalore city. Bangalore city is divided into four zones (North, East, West and South) and for the purpose of this study a multistage random sampling method was used to select the study population from these zones. In the first stage, South zone was selected using lottery method. South zone has four major garment industries from which Aditya Birla Nuvo Ltd. was selected in the second stage, again by using lottery method. Ethical clearance was taken from the Ethical Committee, Dr. Syamala Reddy Dental College, Hospital and Research Centre, Bangalore. Informed consent was taken from study subjects before the beginning of examination. Workers present in the industry on the day of examination and those workers who were willing to give consent to participate

were included in the study. Workers with any systemic conditions and who were taking medication for any illness were excluded from the study. Demographic data, tobacco habits, and oral hygiene practices were collected from individuals, prior to the examination. Oral examination was conducted by one examiner using a plane mouth mirror and Community Periodontal Index (CPI) probe on ordinary chair under natural daylight. The WHO Oral Health Assessment Form (1997) was used to assess extraoral lesions, temporomandibular joint symptoms and signs, oral mucosal lesions, periodontal status as per CPI, loss of attachment (LOA), caries status as per decayed, missing, and filled teeth (DMFT) index, and dentofacial anomalies.

Statistical Analysis

Descriptive and inferential statistical analysis was carried out with SPSS 15 software. Results on continuous measurements were presented as mean \pm SD (min–max), and results on categorical measurements were presented in number (%). Significance was set at 5% level; Chi-square/Fisher's exact and Student's *t*-tests were used to find the significance of study parameters.

RESULTS

A total of 1022 study subjects were examined, of which 21.9% of subjects were male and 78.1% of subjects were female. In the present study 71.1% of the study subjects were literate, among which higher number of females (72.6%) than males (66.1%) were found literate. According to the occupational classification as stated by the garment industry, a number of tailors were highest among the workers, and among them, female workers were more ($P < 0.001^{**}$ [Table 1]). Majority (93.2%) of workers used toothpaste and brush to clean their teeth, in which majority of them were female. Eight-five percent of the participants had no deleterious habits. Among all deleterious habits, smoking was found to be most prevalent among males than females [Table 2]. When oral mucosa was examined, ulceration was found to be the most common oral mucosal condition affecting 4.9% of the study population, the mucosal ulcerations were more prevalent among males as compared to females ($P < 0.001^{**}$). The buccal mucosa among various oral mucosal location was found to be most commonly affected with the mucosal lesions and the occurrence of mucosal lesions on buccal mucosa was more prevalent among males than females ($P < 0.001^{**}$ [Table 3]). Among all study subjects, the most common enamel opacity was demarcated opacity followed by diffused opacity, which was more prevalent among females ($P < 0.001^{**}$); the present study showed a high prevalence of mild fluorosis, which was more prevalent among females (3.6%) as compared to males (2.2%, $P < 0.001^{**}$ [Table 4]). The

Table 1: Distribution of study population in relation to gender according to demographic characteristics, oral hygiene practice, brushing, and personal habits

Demographic details	Gender		P-value
	Male (%)	Female (%)	
Age in years			<0.001***
19–20	5 (2.2)	74 (9.3)	
21–30	131 (58.5)	364 (45.6)	
31–40	65 (29)	321 (40.2)	
41–50	23 (10.3)	23 (2.9)	
>50	0 (0)	16 (2)	
Education			0.066**
Illiterate	76 (33.9)	219 (27.4)	
Primary school certificate	21 (9.4)	58 (7.3)	
Middle school certificate	20 (8.9)	122 (15.3)	
High school certificate	85 (37.9)	318 (39.8)	
Intermediate or post-high school diploma	22 (9.8)	81 (10.2)	
Graduate or post-graduate	0 (0)	0 (0)	
Profession or honors	0 (0)	0 (0)	
Occupation			<0.001***
Tailor	134 (59.8)	668 (83.7)	
Operator	10 (4.5)	27 (3.4)	
Checker	16 (7.1)	8 (1)	
Cutters	15 (6.7)	0 (0)	
Helpers	15 (6.7)	56 (7)	
Ironer	8 (3.6)	29 (3.6)	
Mechanic	10 (4.5)	0 (0)	
Supervisor	0 (0)	10 (1.3)	
Trimmer	8 (3.6)	0 (0)	
Miscellaneous	8 (3.6)	0 (0)	

**Strongly significant (P-value: P≤0.01), *Chi-square test, †Fisher's exact test

Table 2: Distribution of study population in relation to gender according to frequency of brushing and oral hygiene practice

Oral hygiene and personal habits	Gender		P-value
	Male (%)	Female (%)	
Frequency of brushing			0.119*
Lesser than once daily	3 (1.3)	2 (0.3)	
Once daily	214 (95.5)	771 (96.6)	
Twice daily	7 (3.1)	25 (3.1)	
Oral hygiene practices			<0.001***
Toothpaste and toothbrush	200 (89.3)	752 (94.2)	
Tooth powder with brush	3 (1.3)	5 (0.6)	
Toothpaste with hand	2 (0.9)	13 (1.6)	
Tooth powder with hand	17 (7.6)	23 (2.9)	
Neem stick	2 (0.9)	0 (0)	
Charcoal	0 (0)	5 (0.6)	
Personal habits			<0.001***
No habits	94 (42)	775 (97.1)	
Smoking	82 (36.6)	2 (0.3)	
Pan chewing	36 (16.1)	2 (0.3)	
Tobacco chewing	0 (0)	18 (2.3)	
Smoking and Pan	12 (5.4)	1 (0.1)	

**Strongly significant (P-value: P≤0.01), *Chi-square test, †Fisher's exact test

study suggests that the participants had a high prevalence of calculus, which was more prevalent among females (52%) as compared to males (67.9%) (P < 0.001**), 74.6% of males had 0–3 mm of LOA, 18.8% had 4–5 mm of LOA, and

Table 3: Distribution of study population in relation to gender according to oral mucosal conditions and its location

Oral Mucosa	Gender		P-value
	Male (%)	Female (%)	
Oral mucosa			0.01***
Condition			
No abnormal condition	192 (85.7)	762 (95.5)	
Malignant tumor (oral cancer)	0 (0)	0 (0)	
Leukoplakia	0 (0)	0 (0)	
Lichen planus	0 (0)	0 (0)	
Ulceration (aphthous, herpetic, and traumatic)	32 (14.3)	18 (2.3)	
Acute necrotizing gingivitis	0 (0)	8 (1)	
Candidiasis	0 (0)	0 (0)	
Abscess	0 (0)	10 (1.3)	
Other conditions	0 (0)	0 (0)	
Not recorded	0 (0)	0 (0)	
Location			<0.001***
Normal	192 (85.7)	762 (95.5)	
Vermillion border	0 (0)	0 (0)	
Commissure	0 (0)	0 (0)	
Lips	0 (0)	0 (0)	
Sulci	0 (0)	10 (1.3)	
Buccal mucosa	32 (14.3)	23 (2.9)	
Floor of mouth	0 (0)	0 (0)	
Tongue	0 (0)	0 (0)	
Hard and/or soft tissue	0 (0)	0 (0)	
Alveolar ridges/gingival	0 (0)	8 (1)	
Not recorded	0 (0)	0 (0)	

**Strongly significant (P-value: P≤0.01), *Chi-square test

Table 4: Distribution of study population in relation to gender according to enamel opacities or hypoplasia and dental fluorosis

Dental defects	Gender		P-value
	Male (%)	Female (%)	
Enamel opacity/hypoplasia			<0.001***
Normal	189 (84.4)	698 (87.5)	
Demarcated opacity	0 (0)	52 (6.5)	
Diffuse opacity	6 (2.7)	30 (3.8)	
Hypoplasia	12 (5.4)	5 (0.6)	
Other defects	0 (0)	0 (0)	
Demarcated and diffuse opacities	5 (2.2)	0 (0)	
Demarcated opacity and hypoplasia	12 (5.4)	8 (1)	
Diffuse opacity and hypoplasia	0 (0)	0 (0)	
All three conditions	0 (0)	5 (0.6)	
Not recorded	0 (0)	0 (0)	
Dental fluorosis			<0.001***
Normal	212 (94.6)	725 (90.9)	
Questionable	0 (0)	10 (1.3)	
Very mild	7 (3.1)	2 (0.3)	
Mild	5 (2.2)	29 (3.6)	
Moderate	0 (0)	27 (3.4)	
Severe	0 (0)	5 (0.6)	
Excluded	0 (0)	0 (0)	
Not recorded	0 (0)	0 (0)	

**Strongly significant (P-value: P≤0.01), *Chi-square test

4.5% of them had 6–8 mm of LOA. Among all the study subjects, majority (66.1%) of them had 0–3 mm of LOA,

which was more prevalent among females ($P < 0.001^{**}$ [Table 5]). There was a statistically significant association between gender and LOA, whereas an association between gender and CPI was not significant (CPI: $P = 0.518$ and LOA: $P = 0.016^{*}$ [Table 5]). In the present study, DMFT and gender showed a statistically significant association with greater number of females having a DMFT score of 3–5 ($P < 0.001^{**}$ [Table 6]). This study suggested that females had significantly higher mean DMFT (3.53 ± 2.85) as compared to males (2.28 ± 2.28 [Table 7]).

DISCUSSION

Various studies have been conducted among garment industry workers to assess the general health, but there is no study done so far regarding the oral health status and treatment needs of garment industry workers. Hence, the present study results have been discussed along with general health of garment industry workers and oral health status and treatment needs of other factory workers. Demographic data of the respondents in the present study had more number of females (78%) when compared to males (22%). This difference is similar to the findings of study done by Joseph and Kiran, where women were the major workforce in garment industry.^[7] Majority (39.4%) had just the higher school education, and among them, females were more. This is in equivalence with the study by Tirth *et al.* in that educational qualification of the workers was low.^[18] In the present study, smoking (8.2%) was found to be more prevalent among all the deleterious habits and

it was more prevalent in males. The overall prevalence of tobacco (15%) was less than the study reported by Sudhanshu *et al.* among salt industry workers (49.4%).^[19] Most of the health problems that the garment workers suffered are from the occupational hazards including long working hours, absence of leave facilities, congested and over-crowded working conditions, absence of health facilities and safety measures, absence of staff amenities, and lack of safe drinking water.^[11] In the present study, ulceration, i.e., aphthous, herpetic, and traumatic (4.9%), was found to be the most common oral mucosal condition among males. The most common location involved was buccal mucosa (5.4%). It was comparable to the study

Table 5: Distribution of study population according to community periodontal index (CPI) and loss of attachment (LOA), in relation to gender

Periodontal status	Gender		P-value
	Male (%)	Female (%)	
CPI			
A. Healthy	5 (2.2)	66 (8.3)	<0.001***
B. Bleeding	5 (2.2)	18 (2.3)	
C. Calculus	152 (67.9)	415 (52)	
D. Pocket	47 (21)	233 (29.2)	
E. Pocket 6 mm or more (black band on probe not visible)	15 (6.7)	54 (6.8)	
F. Excluded sextant	0 (0)	0 (0)	
G. Not recorded	0 (0)	12 (1.5)	
LOA			
0–3 mm	167 (74.6)	509 (63.8)	<0.001***
4–5 mm (CEJ within black band)	42 (18.8)	222 (27.8)	
6–8 mm (CEJ between upper limit of black band and 8–5 mm ring)	10 (4.5)	49 (6.1)	
9–11 mm (CEJ between 8.5 mm and 11.5 mm rings)	0 (0)	0 (0)	
12 mm or more (CEJ beyond 11.5 mm ring)	5 (2.2)	0 (0)	
Excluded sextant	0 (0)	12 (1.5)	
Not recorded	0 (0)	6 (0.8)	

*Chi-square test

Table 6: Distribution of study population according to decayed, missing, and filled teeth scores in relation to gender

Dental caries status	Gender		Total (n=1022)	P-value
	Male (n=224) (%)	Female (n=798) (%)		
Decay				
0	96 (42.9)	170 (21.3)	266 (26)	<0.001***
1–2	61 (27.2)	236 (29.6)	297 (29.1)	
3–5	54 (24.1)	258 (32.3)	312 (30.5)	
5–10	13 (5.8)	134 (16.8)	147 (14.4)	
11–20	0 (0)	0 (0)	0 (0)	
>20	0 (0)	0 (0)	0 (0)	
Missing				
0	154 (68.8)	606 (75.9)	760 (74.4)	0.014*
1–2	65 (29)	162 (20.3)	227 (22.2)	
3–5	5 (2.2)	18 (2.3)	23 (2.3)	
5–10	0 (0)	12 (1.5)	12 (1.2)	
11–20	0 (0)	0 (0)	0 (0)	
>20	0 (0)	0 (0)	0 (0)	
Filled				
0	207 (92.4)	719 (90.1)	926 (90.6)	0.570*
1–2	12 (5.4)	54 (6.8)	66 (6.5)	
3–5	5 (2.2)	25 (3.1)	30 (2.9)	
5–10	0 (0)	0 (0)	0 (0)	
11–20	0 (0)	0 (0)	0 (0)	
>20	0 (0)	0 (0)	0 (0)	
DMFT				
0	71 (31.7)	144 (18)	215 (21)	<0.001***
1–2	61 (27.2)	184 (23.1)	245 (24)	
3–5	67 (29.9)	269 (33.7)	336 (32.9)	
5–10	25 (11.2)	189 (23.7)	214 (20.9)	
11–20	0 (0)	12 (1.5)	12 (1.2)	
>20	0 (0)	0 (0)	0 (0)	

**Strongly significant (P-value: $P \leq 0.01$), *Chi-square test, DMFT: Decayed, missing, and filled teeth

Table 7: Distribution of mean number of decay, missing, and filled DMFT according to gender

Gender	Decayed	Missing	Filled	DMFT
Male	1.71±2.11	0.42±0.72	0.14±0.63	2.28±2.28
Female	2.9±2.51	0.43±1.07	0.2±0.73	3.53±2.85
Total	2.64±2.48	0.43±1	0.19±0.71	3.26±2.78
P-value	<0.001** [€]	0.979 [€]	0.253 [€]	<0.001** [€]

**Strongly significant (P-value: $P \leq 0.01$), [€]Student's t-test, DMFT: Decayed, missing, and filled teeth

done by Pinkerton *et al.*, in which results suggest that persons exposed to higher levels of formaldehyde over a longer period of time may be at an increased risk for myeloid leukemia and for cancer of the buccal cavity.^[20] This was supported by the study by Li *et al.*, in which female workers in the Shanghai textile industry were found to be at increased risks of nasopharyngeal cancer associated with cotton dust, exposure to endotoxin, and dyes.^[10] The most common enamel opacity was demarcated opacity 5.1%, followed by diffused opacity 3.5%, which was more prevalent among females. The reason for the present finding could be due to differences in prevalence and frequency of occurrence in different arches, study suggest the need for further research into the occurrence of this condition in particular the causal factors for the occurrence of enamel defects need to be researched. The study showed that the age group > 50 years had the highest mean CPI value (3.5 ± 0.52) and LOA (1.61 \pm 1.160) was found to be highest among 41–50 years of age. The prevalence of periodontitis in the present study was 33.8%, which is less when compared to the study done by Sudhanshu *et al.*, in which the prevalence was 96.4%.^[19] The study suggests that the study population had a high prevalence of calculus 55.5% and majority 66.1% of them had 0–3 mm of LOA, which was more prevalent among females. The results of the present study are in accordance with the studies done on factory workers in China and in Brazil which observed that calculus was the most common finding among industrial workers.^[10,21] Furthermore, it was observed that the prevalence of periodontal pockets was more among the industrial workers than the general population. The reason for the present finding could be due to the presence of metallic dust in the plaque and calculus of industrial workers which can act as an irritating factor causing periodontal disease and pathogenesis.^[22] Overall, the present study shows that the prevalence of dental caries was 73.9%, and females (61.44%) were affected more. This is in support with the study done by Sudhanshu *et al.*, in which the prevalence of dental caries was higher among the construction workers of Chennai, India.^[19] However, it was lower than those which were obtained among the textile industry and sweet industry workers of Israel.^[4] This might be due to the poor oral health knowledge and practices among the study population, as the subjects belonged to the rural communities of the third-world countries. It is verified that caries history most deeply involves some kind of manual workers, such as construction foremen and carpenters than those dealing with administrative functions, although no statistical differences were observed.^[23] The workplace environment of the individuals has an influence on their oral health status through the behavior and habits which are exerted by their personal and work characteristics. The nature of this study was cross-sectional study, which thus precluded the ability in drawing inferences about causal

relationships. Second, socioeconomic status, the duration of the exposure of the adverse habits, and the duration of the working years were not assessed in the present study. Since it was a baseline study, more research is required, which involves a longitudinal study on the same target population, which impinges on the risk factors which are involved in the causation of oral disease.

CONCLUSION

The findings of the study showed that despite the low prevalence of intraoral lesions, the enamel hypoplasia, dental fluorosis, CPI, and LOA scores were found high. The mean DMFT scores were also high indicating the urgent need of oral health care. It is seen that occupation plays an important role by providing an environment which could be health deleterious if proper awareness is not present about its effect on individual's life, further a person's occupation also influences the behavior which can incorporate some harmful habits in peoples lifestyle, as seen in the present study that majority of people were using the tobacco. It can be concluded that the garment industry workers are a part of very important economic sector of India and their overall health should be given the due consideration. Further studies assessing the treatment need and studies to establish the causative factors for the health problems are recommended.

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