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Prevalence of Oral Mucosal Lesions among Granite Factory Employees in Nanjangud Taluk, Mysore

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Abstract- Background: 'Occupational Environment' means the sum of external conditions and influences which prevail at work place and which have a bearing on the health of working population. A large number of labourers work in stone crushing and mining industry in India. The physically tedious work drives people consume alcohol and tobacco which deteriorates their oral health. Studies in the past among factory workers and miners have revealed the high prevalence of oral mucosal lesions which was related to their tobacco habits.

Aims: To assess prevalence of oral mucosal lesions among granite factory employees in Nanjangud Taluk with general population and to suggest possible preventive measures.

Settings and Design: A Descriptive Cross sectional survey was conducted in Nanjangud Taluk, Mysore.

Materials and methods: Study was conducted on 453 employees from granite factories in Nanjangud Taluk. Simple random sampling was used to select 450 subjects for comparison from Thandavapura village. Oral mucosal lesions were recorded according to WHO oral health assessment (1997).

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Statistical analysis used: Data was analyzed using SPSS version 17.

Results: Prevalence of oral mucosal lesions were higher among factory employees compared to general population. Prevalence of various tobacco habits were also higher among granite factory employees.

Conclusion: Our study showed that factory employees are more affected by oral mucosal lesions which might be due to high use tobacco habits and stressful work environment and poor oral health awareness.

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I. INTRODUCTION

Industrial worker is placed in complicated environment.¹ Oral health is integral part of general health playing important role in improving quality of life.² Physically tedious work, drives workers consume alcohol and tobacco deteriorating oral health.³

Factory workers constitute defined group, studies conducted on them helps planning programmes for oral disease prevention.⁴ Previous studies revealed high prevalence of oral diseases, oral mucosal lesions among workers.³⁻¹⁰ Such studies are scarce in India.

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Granite industries employs thousands of workers in India with considerable production from Mysore.¹¹ Hence this study aims to assess prevalence of oral mucosal lesions among Granite factory employees in Mysore and suggest preventive measures.

II. MATERIALS AND METHODS

A Descriptive Cross sectional study was conducted from April to July 2010. Ethical clearance was obtained from institutional ethical committee. Informed consent was obtained from all the individuals participated in the study.

Granite factory employees available at the time of the study and who agreed to participate were included in the study. Only males among general population were included as comparative group as only males were employed in the Granite factories. Participants who had not given informed consent were excluded from the study.

As per the information from Karnataka state pollution control board, Mysore, (Information on Granite quarrying and Granite factories in Mysore District, Karnataka. Karnataka state pollution control board, Mysore, India as on May, 2010) twenty six Granite factories are situated in Thandya Industrial area, Thandavapura, Nanjangud Taluk, Mysore with 492 male employees. The permission to carry out the study was obtained from the Managing Directors (MD) of the factories. There were five divisions in the Granite factories namely Administrative staff, Maintenance unit, Transportation unit, Granite Cutting unit and Granite Polishing unit. All the employees were informed in prior about the study as well as the date and time of examination. 453 subjects from the granite factories were examined based on the exclusion and inclusion criteria. The factory employees belonged to 15-54 yrs of age.

The comparative group was selected from residents of nearby village named Thandavapura in Nanjangud Taluk. As per the information obtained from Thandavapura Gram Panchayat office, the village is divided into 3 blocks. The addresses of 18-54 yrs old males were collected from the recent voters list obtained from the Gram Panchayat office. There were about 505 males in the first block, 512 in the second block and 517

in the third block. From each block 150 addresses were selected using Simple random technique (Table of random numbers method) to make a total of 450 males and the respective house was visited. If the subject was not available at the time of first visit, the family members were informed about the study and the house was revisited at a convenient date and time for the subject and the examiner.

Training and Calibration was done prior to the study. Mouth mirror, Tweezers, Cotton rolls, Kidney Trays, Sterilizing solution (Korsolex), Gloves and mask were used in the study. The entire study was carried out by a single investigator. Oral mucosal lesions were recorded according to criteria's of WHO oral health assessment (1997)¹¹ by performing American dental association (ADA) type III examination. Questionnaire was used to collect demographic data and details on work environment, oral hygiene habits, tobacco and alcohol habits etc.

III. STATISTICAL ANALYSIS

Statistical tests like Chi-square test, Contingency coefficient analysis, Independent t- test and Analysis of variance was used. The statistical significance was fixed at 0.05. Statistical package for social sciences (SPSS) version 17.0 was used for statistical analysis.

IV. RESULTS

Out of 453 granite factory employees 8.4% were administrative staff(A), 7.7% were maintenance staff (M), 28.5% belong to transportation unit (T), 28.7% were cutting unit workers(C) and 26.7% were polishing unit workers(P). The overall mean age and standard deviation (S.D) of the granite factory employees was 31.93 ± 7.10 yrs and general population was $30.90 \pm$

6.07 yrs. The study population was categorized in to four age groups ranging from 15-24 yrs, 25-34 yrs, 35-44 yrs and 45-54 yrs. The results revealed that a majority of the factory employees (54.3%) and general population (48.2%) were between 25-34 yrs when compared to other age groups. There was no statistically significant difference in the distribution of different age groups between factory employees (F.E) and general population (G.P) ($P=0.81$).

According to Modified Kuppaswamy's socio-economic status (SES) classification¹², the study population was sorted in to five SES classes namely Upper, Upper middle, Middle, Upper lower and Lower. There was no statistically significant difference between factory employees and general population in regard to SES ($P=0.092$). A majority of study population belonged to middle class. Within factory units a majority of administrative staff (63.2%) belonged upper middle class. While major portion of transportation unit workers (70.5%) belonged to lower class. The differences in SES between factory units revealed statistical significance ($P<0.001$).

V. STUDY POPULATION ACCORDING TO USE OF TOBACCO PRODUCTS

74.8% (339) and 67.3% (303) of granite factory employees and general population respectively were found to be tobacco users. The difference in prevalence of tobacco habit between factory employees and general population was found to be statistically significant ($P=0.013$).

Within factory employees highest prevalence of tobacco habit was found in transportation unit workers (84.5%) (109) compared to other units which was found to be statistically significant ($P=0.025$). (Table 1)

Table 1 : Distribution Of Study Population According To Use Of Tobacco Products

Tobacco use		Factory employees(F.E)					F.E -Total	G.P	Total
		A	M	T	C	P			
User	No	28	27	109	87	88	339	303	642
	%	73.7	77.1	84.5	66.9	72.7	74.8	67.3	71.1
Non-user	No	10	8	20	43	33	114	147	261
	%	26.3	22.9	15.5	33.1	27.3	25.2	32.7	28.9
Total	No	38	35	129	130	121	453	450	903
	%	100	100	100	100	100	100	100	100
Contingency Co – efficient = 0.155; $P=0.025$ (S) (Intra group - F.E)									
Contingency Co – efficient =0.082; $P=0.013$ (S) (Inter group - F.E & G.P)									

*A - Administrative; M-Maintenance unit; T-Transportation unit; C-Cutting unit; P-Polishing unit; F.E -Factory employees; G.P-General Population

The results revealed that the commonly used tobacco products among the study population were cigarette, bidi, tobacco leaf, pan, and gutkha.

Among factory employees a majority were using gutkha (56.5%) followed by tobacco chewing (30.7%) and bidi smoking (28.9%). Whereas among general population a majority were bidi smokers (44%) followed by tobacco chewing (23.8%) and gutkha chewing (15.1%). Comparison of prevalence of various tobacco habits between factory employees and general population yielded statistically significant differences in

the prevalence of bidi smoking ($P < 0.001$), tobacco chewing ($P < 0.001$) and gutkha chewing ($P < 0.001$).

Within factory employees highest prevalence of gutkha (81.4%) and tobacco chewing (42.6%) was seen among of transportation unit workers. While highest prevalence of bidi smoking was seen among polishing unit workers (47.9%) compared to other units. Whereas prevalence of cigarette smoking and pan chewing was highest among administrative unit. The differences in use of tobacco products among factory employees were statistically significant for all the tobacco products ($P < 0.001$). (Table 2)

Table 2 : Distribution of Study Population According to Type of Tobacco Products

Tobacco use		Factory employees					F.E – Total	G.P	Total
		A	M	T	C	P			
Cigarette	No	10	4	0	0	0	14	22	36
	%	26.3	11.4	0	0	0	3.1	4.9	4
Bidi	No	1	9	28	35	58	131	198	329
	%	2.6	25.7	21.7	26.9	47.9	28.9	44	36.4
Tobacco leaf	No	15	13	55	21	35	139	107	246
	%	39.5	37.1	42.6	16.2	28.9	30.7	23.8	27.2
Pan	No	4	0	1	5	4	14	9	23
	%	11.1	0	0.8	3.8	3.3	3.1	2	2.6
Gutkha	No	19	17	105	67	48	256	68	324
	%	50	48.6	81.4	51.5	39.7	56.5	15.1	35.9
Within Factory Employees: Cigarette – Contingency Coefficient = 0.405; $P < 0.001$(VHS) Bidi – Contingency Coefficient = 0.277; $P < 0.001$(VHS) Tobacco leaf – Contingency Coefficient = 0.223; $P < 0.001$(VHS) Pan– Contingency Coefficient = 0.157; $P = 0.023$(S) Gutkha– Contingency Coefficient = 0.313; $P < 0.001$(VHS) Between Factory Employees and General Population: Cigarette – Contingency Coefficient = 0.046; $P < 0.167$(NS) Bidi – Contingency Coefficient = 0.155; $P < 0.001$(VHS) Tobacco leaf– Contingency Coefficient = 0.077; $P = 0.020$(S) Pan– Contingency Coefficient = 0.035; $P = 0.293$(NS) Gutkha– Contingency Coefficient = 0.396; $P < 0.001$(VHS)									

*A - Administrative unit; M-Maintenance unit; T-Transportation unit; C-Cutting unit; P-Polishing unit; F.E –Factory employees; G.P-General Population

Among factory employees the prevalence of oral mucosal lesions was 25.8% and among general population it was 11.6%. The differences were statistically significant ($P < 0.001$).

Out of the various oral mucosal lesions among factory employees, leukoplakia had the highest prevalence of about 13.2% against only 6% of general

population with leukoplakia. The differences were statistically significant ($P < 0.001$).

The prevalence of ulcer among factory employees was 5.7% followed by abscess (3.3%) and oral submucous fibrosis (OSMF) (3.3%). Whereas among general population the prevalence of ulcers was 3.8% followed by oral submucous fibrosis (1.3%) and abscess (0.4%).

Within factory units highest prevalence of oral mucosal lesions was seen among maintenance staff (34.3%) followed by transportation staff (28.7%). The least affected was the administrative staff (18.4%) The differences were statistically significant ($P = 0.039$) (Table 3)

Table 3 : Distribution of Study Population According to Oral Mucosal Lesions (Oml)

Oral mucosal lesions		Factory employees					F.E - Total	G.P	Total
		A	M	T	C	P			
No OML	No	31	23	92	100	90	336	398	734
	%	81.6	65.7	71.3	76.9	74.4	74.2	88.4	81.3
Leukoplakia	No	4	7	23	17	9	60	27	87
	%	10.5	20	17.8	13.1	7.4	13.2	6	9.6
Lichen Planus	No	0	0	0	0	1	1	0	18
	%	0	0	0	0	0.8	0.2	0	2
Ulcer	No	1	0	3	8	14	26	17	26
	%	2.6	0	2.3	6.2	11.6	5.7	3.8	2.9
Abscess	No	0	3	7	1	4	15	2	2
	%	0	8.6	5.4	0.8	3.3	3.3	0.4	0.2
OSMF	No	2	2	4	4	3	15	6	21
	%	5.3	5.7	3.1	3.1	2.5	3.3	1.3	2.3
Contingency Coefficient = 0.259; $P = 0.039$ (S) (Intra group - F.E)									
Contingency Coefficient = 0.283; $P < 0.001$ (VHS) (Inter group - F.E & G.P)									

*A - Administrative unit; M-Maintenance unit; T-Transportation unit; C-Cutting unit; P-Polishing unit; F.E -Factory employees; G.P-General Population

Among granite factory employees 16.8% of all the lesions appeared in buccal mucosa followed by 3.3% in commissures and 2.4% in alveolar ridges. Among general population, 6.2% of lesions were seen in

buccal mucosa and 1.3 % occurred in alveolar ridges. The difference in the site wise prevalence of oral mucosal lesions was statistically significant ($P < 0.001$). (Table 4)

Table 4 : Distribution of Oral Mucosal Lesions According to Location in Oral Cavity among Study Population

Oral mucosal lesions		Factory employees					F.E - Total	G.P	Total
		A	M	T	C	P			
Commissures	No	1	3	6	4	1	15	3	18
	%	2.6	8.6	4.7	3.1	0.8	3.3	0.7	2
Lips	No	0	0	0	1	0	1	0	1
	%	0	0	0	0.8	0	0.2	0	0.1
Sulci	No	0	0	0	0	5	5	2	7
	%	0	0	0	0	4.1	1.1	0.4	0.8
Buccal mucosa	No	5	7	20	24	20	76	28	104
	%	13.2	20	15.5	18.5	16.5	16.8	6.2	11.5
Tongue	No	0	0	0	0	4	4	8	12
	%	0	0	0	0	3.3	0.9	1.8	1.3
Palate	No	0	0	0	0	0	0	3	3
	%	0	0	0	0	0	0	0.7	0.3
Alveolar ridges	No	0	3	7	1	0	11	6	17
	%	0	8.6	5.4	0.8	0	2.4	1.3	1.9

Contingency Coefficient = 0.317; $P < 0.001$ (VHS) (Intra group F.E)
 Contingency Coefficient = 0.213; $P < 0.001$ (VHS) (Inter group F.E & G.P)

*A - Administrative unit; M-Maintenance unit; T-Transportation unit; C-Cutting unit; P-Polishing unit; F.E -Factory employees; G.P-General Population

Within factory employees leukoplakia had the highest prevalence compared to other lesions among all the units and it was highest among maintenance staff (20.0%) followed by transportation unit workers (17.8%)

and cutting unit workers (13.1%) than compared to administrative unit (10.5%) and polishing unit (7.4%) though the differences were not statistically significant. ($P=0.110$). (Table 5)

Table 5 : Prevalence of Leukoplakia among Factory Employees and General Population

Leukoplakia		Factory employees					F.E -Total	G.P	Total
		A	M	T	C	P			
Absent	No	34	28	106	113	112	393	423	816
	%	89.5	80	82.2	86.9	92.6	86.8	94	90.4
Present	No	4	7	23	17	9	60	27	87
	%	10.5	20	17.8	13.1	7.4	13.2	6	9.6
Total	No	38	35	129	130	121	453	450	903
	%	100	100	100	100	100	100	100	100
Contingency Coefficient = 0.128; $P = 0.110$ (NS) (Intra group - F.E)									
Contingency Coefficient = 0.122; $P < 0.001$ (VHS) (Inter group - F.E & G.P)									

*A - Administrative unit; M-Maintenance unit; T-Transportation unit; C-Cutting unit; P-Polishing unit; F.E -Factory employees; G.P-General Population

VI. DISCUSSION

In the present study a significant difference was observed in the prevalence of oral mucosal lesions between factory employees (25.8%) and general population (11.6%). Among factory employees 13.2% had leukoplakia and 3.3% had OSMF, whereas among general population the prevalence was only 6% and 1.3% respectively.

A similar result was obtained in a study in Rajasthan among green marble mine labourers where almost 33.3% of workers had leukoplakia which was related to high use of tobacco, stress and malnutrition that was prevalent in the population. It was also postulated in their study that stresses in their work environment drives the workers to use tobacco.¹⁰

The findings of the present study can be attributed to the high prevalence of chewing tobacco habits like tobacco leaf chewing, pan chewing and gutkha chewing (30.7%, 3.1%, 56.5% respectively) among factory employees compared to general population (23.8%, 2%, 15% respectively) which was statistically significant.

In this study regarding the location of the oral mucosal lesions, Buccal mucosa was found as the commonest site affected in both factory employees (16.8%) & general population (6.2%) compared to other sites.

Our results are in agreement with the previous study conducted among Iranian textile factory workers that showed a statistically significant positive correlation between tobacco use and oral pre cancerous lesion.¹³

Similar to our study, previous study reported that in rural inhabitants of Maharashtra state the prevalence of leukoplakic lesions was highest among people with mixed tobacco habits.¹⁴

It was also found in our study that OSMF was exclusively seen in pan chewers in both factory employees and general population which contains slices of areca nut with slaked lime.

Our present study is also in agreement with a previous study conducted in Xiangatan city, China where the prevalence rate of OSMF was 3.03%, which was due to heavy use of areca nut chewing along with hot pepper among them. Areca nut chewing has been suggested to be involved in the pathogenesis of this condition.¹⁵

Within factory units Transportation (20%), maintenance (17.8%) and cutting units (13.1%) had higher prevalence of leukoplakia compared to other

units which was statistically significant. This can be due to high tobacco use like gutkha and tobacco chewing among transportation unit (81.4%, 42.6%) compared to other units.

The prevalence of oral mucosal lesions in particular precancerous lesion like leukoplakia was significantly higher among transportation unit workers compared to employees in other units and general population which should be recognised by the factory authorities to initiate 'Tobacco cessation programmes' at the work environment for the factory workers for which help can be sought from the local dental colleges and dentists. Use and sales of tobacco products can be banned in and around the factory campuses. Oral cancer screening programmes should be instilled periodically in the industrial areas. Because of the time and economic constraints all kind of factory workers covering a wide geographical area could not be performed in our study. Further studies assessing oral health status among factory workers in various states of the country can be done and effectiveness of work environment based tobacco cessation programmes can be performed.

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