

Is Oral Health of the Sugar Mill Workers Being Compromised?

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ABSTRACT

Introduction: Occupational environment has an immense influence on the general as well as oral health. The specific exposure to sugar and its byproducts might influence the dental health of sugar mill workers.

Aim and Objectives: The present study was conducted to assess and compare the oral health status of production line workers and administration staff working in the sugar mills of Western Uttar Pradesh.

Materials and Methods: A cross-sectional study was conducted in four Government aided and four Private sugar mills of West Uttar Pradesh, India among the production line workers and administration staff. Multistage random sampling methodology was employed to select total of 600 sugar mill factory workers (449 production line workers and 151 administration staff). The

oral health status of the study subjects was assessed using the modified WHO Oral health survey Performa 1997.

Statistical Analysis: SPSS 19 Version was used for statistical analysis. Mean, Standard Deviation and proportions were calculated for each clinical parameter. Student t-test and Chi-square analysis was done to analyse inter group comparison.

Results: Mean DMFT for production and non production line workers was 7.67 ± 2.99 and 0.15 ± 1.34 ($p= 0.001$) respectively. 80.17% of production line workers had maximum CPI score 2 in contrast to 63.57% of administration staff ($p=0.324$).

Conclusion: The dental health was found to be debilitated among the production line workers of Sugar mill as compared to the Administrative staff. It is therefore recommended to raise the awareness among the sugar mill workers regarding the same.

Keywords: Administrative staff, India, Oral health status, Production line workers, Sugar factories

INTRODUCTION

People health and consequently the health of society have great influence on development and abilities of the community. Long living accompanied by health is not possible without cooperation of different organs. The function of each part has some effect on others [1].

Diseases of the masticatory organ are also very common among modern society [2]. Dental caries is one such universal disease which is prevalent in all parts of the world irrespective of the sociodemographic characteristics. The impact of occupational environment on the incidence of dental caries is well documented. The high dental caries experience has been observed among the workers of sugar mills, sugar refineries, confectioners, bakers and fruit industry, who are in regular contact with flour or sugar dust [2]. An occupational disease may be defined as a negative change in health condition directly resulting from more or less prolonged exposure to harmful substances or conditions immediately related to the individual's work [3]. It should be differentiated from an occupational accident, which is of sudden occurrence. The injurious effect of occupational hazards may manifest themselves in the teeth, the jaw bones, the periodontal tissues, tongue, lips, and oral mucosa [4]. Injuries of the oral cavity which occur as a direct result of the occupation are of rather common occurrence. In recent years industrial health programs have recognized the necessity of maintaining oral health and have emphasized the need for special precautions to prevent oral injuries [3].

High prevalence of dental caries among workers who had easy access to sugar cane (sugarcane cutters) has been shown in some researches. Studies have shown that work in bakeries, chocolate and in the candy industry have an increased dental caries as well as periodontal diseases because of a high level of sugar dust in the working environment [5].

The Indian sugar industry contributes to about 20% of sugar mills and 15% of sugar production of the world. It is the second largest agro-processing industry in the country, with total employed capital of Rs. 5,00,00 crores and an annual turnover of Rs. 25,000 crores. It plays a key role in rural development by creating indirect employment for over 7.5% of rural population engaged in sugarcane cultivation, harvesting and ancillary activities. Uttar Pradesh is the largest sugarcane producing State in India. Approximately; 111 sugar mills are in operation and crush around 64.51 million tones of sugarcane which accounts for almost 50% of the total production of the country. The sugar industry consists of private, cooperative and public sector mills that spread over the western, central and eastern regions of the State [6].

Still no data is available on dental health of sugar mill workers of Uttar Pradesh, India. Hence, the present study was conducted to assess the oral health status among sugar factory workers of Western Uttar Pradesh, India.

MATERIALS AND METHODS

Study Design

The present cross-sectional study was conducted at four Government aided and four Private sugar mills of West Uttar Pradesh, India over a period of 2 months (March 2014 and April 2014) to assess the oral health status among the Sugar mill factory workers using a WHO oral health assessment form 1997 proforma [7] [Annexure-1].

Sampling

Uttar Pradesh state is divided into North, South, East and West zones. Western UP was taken as a sampling frame for the Study

as there is unmatched cluster of sugar mills in Western Part of Uttar Pradesh. It was further arbitrarily divided into four zones namely North, South, East and West. Using Multistage random sampling method, the total of 600 sugar mill factory workers (449 production line workers and 151 administration staff) were selected from the sampling frame of Western Uttar Pradesh based on the inclusion and exclusion criteria.

Inclusion Criteria

1. Workers in the age group 18 to 60 years.
2. Both production and administrative line workers were included in the study.
3. Workers who gave consent for the study.

Exclusion Criteria

1. Workers suffering from any systemic disease.
2. Workers with less than five years of job duration in the sugar mill.

Ethical Clearance and Informed Consent

The study design was reviewed and approved by the Institutional Ethical Committee (DJD/IEC/2014/year/A009). The permission for the conduct of the study was obtained from the concerned authorities of the Sugar Mills and written informed consent was obtained from the study subjects after explaining them the purpose and methodology of the study.

Data Collection

Clinical assessment was carried out for a total sample size of 600 sugar mill factory workers (449 production line workers and 151 administration staff) in the sequence under the available natural light. The type III examination (inspection using mouth mirror, explorer and adequate illumination) was used. Oral health status was assessed using WHO Oral Health Assessment Form (1997 modified). WHO Dentition Status and Treatment Needs. Community Periodontal Index and Loss of Attachment and Prosthetic status and prosthetic needs were used for clinical assessment of oral health [7] [Annexure]. Subjects requiring emergency treatment (for pain) were referred.

Training and Calibration of Examiners

The survey was conducted by three trained and calibrated examiners. The diagnostic variability was found to be low (Kappa value 0.85).

STATISTICAL ANALYSIS

All the collected data was entered in the Microsoft Word Excel Sheet 2007 version and processed using the SPSS 16 Version. Mean, Standard Deviation and proportions (% of subjects affected) were calculated for each clinical parameter.

The student t-test and Chi-square analysis was done to analyse difference in the clinical parameters between the production line workers and administrative staff of sugar mill. The level of significance was fixed at 5%.

RESULTS

The present study was conducted on a study population of 600 subjects (449 production line workers and 151 administrative staff), where the mean age of the subjects in the production line was 32.5± 16.1 y and 45.9± 14.4 y in the administrative staff. The mean DMFT for the production line workers was 7.67±2.99 and for administrative staff was 3.15± 1.34 and the difference was found to be statistically significant (p=0.001).

[Table/Fig-1] highlights the periodontal condition of the study subjects according to maximum Community Periodontal Index score and Loss of Attachment code and the difference was statistically significant among both the groups. (p=0.324 for CPI), (p=0.035 for LOA).

[Table/Fig-2,3] highlights the prosthetic status and prosthetic need among both the production line workers and administrative staff and the difference was found to be statistically significant (p=0.048 for prosthetic status), (p=0.004 for prosthetic need).

CPI score	Production line workers	Administrative staff	p-value (χ ² test)
CPI score 0	0 (0%)	9 (2.25%)	0.0324*
CPI score 1	20 (4.45%)	12 (7.94%)	
CPI score 2	360 (80.17%)	96(63.57%)	
CPI score 3	35(7.79%)	15(9.93%)	
CPI score4	4(0.8%)	3(1.98%)	
CPI score x	30(6.79%)	16(14.33%)	

Periodontal status (based on maximum L.O.A scores) among study subjects

LOA score	Production line workers	Administrative staff	p-value (χ ² test)
LOA score 0	247 (55.01%)	109 (72.18%)	0.035*
LOA score 1	160 (35.6%)	32 (21.19%)	
LOA score 2	23 (5.12%)	5 (3.3%)	
LOA score 3	0 (0%)	0 (0%)	
LOA score4	0 (0%)	0 (0%)	
LOA score x	19 (4.27%)	5 (3.33%)	

[Table/Fig-1]: Distribution of study subjects according to highest CPI score and LOA
*Statistically significant

	Prosthetic needs Present	Prosthetic needs Absent	p-value (χ ² test)
Production line workers	65 (14.4%)	384 (85.5%)	0.048*
Administrative staff	35 (23.2%)	116 (76.8%)	

[Table/Fig-2]: Distribution of study subjects according to the Prosthetic status
* Statistically significant

	Prosthetic needs Present	Prosthetic needs Absent	p-value (χ ² test)
Production line workers	158 (35.2%)	291 (64.8%)	0.004*
Administrative staff	27 (17.9%)	124 (82.1%)	

[Table/Fig-3]: Distribution of study subjects according to the Prosthetic needs
* Statistically significant

DISCUSSION

Occupation has a relationship on health and well-being and there are diverse aspects on the effect of occupation on health [8]. Occupation can affect health through direct impacts, such as physical job conditions, psychosocial job characteristics and stress, and social support. Occupation may also affect health through indirect mechanisms via income, health insurance, prestige, and authority that are related to occupation. Occupational factors like workplace environment, rules and regulations affecting health habits and influence of coworkers might also have significant impact on general as well as oral health [8,9]. Hence, it is essential to analyse the influence of occupation on health. Same holds true for Sugar Industry in our country. India was the first to begin with the production of sugar following the process of pressing sugarcane to extract juice and boil it to get crystals. Jobs in Indian Sugar Industry have created ample employment opportunities in rural India. Today the Indian Sugar Industry has absorbed about 5 lakh rural people. The working environment in the sugar mills of our country creates a unique environment which might have tremendous influence on the general and oral health of production line and administrative workers [10]. Hence, the present study was conducted to assess the oral health status of the production line workers of sugar mill and compare with that of the administrative staff.

The study results revealed that the dental health was compromised among the production line workers. The caries experience showed

that the mean value of DMFT of the production line workers 7.67 ± 2.99 which was greater than the workers of administrative staff 3.15 ± 1.34 and the difference was found to be statistically significant ($p=0.001$). This is agreement with the findings of Peterson PE, Frencken JE, et al., Anaise JZ Budner L [3,5,11,12]. However, the findings were quite low as compared to the findings of Bachanek T et al., who reported Mean D.M.F.T among flour mill workers to be 17.77 [2]. In another study by Grover S et al., done on Bakery workers, caries prevalence was seen in 67.6% of the workers [4]. This could most probably be attributed to the relationship between type of work and the relevance of sugar dust as an occupational hazard to dental health as documented in previous studies [4]. Increase in caries experience may also be the result of the increased duration of exposure to sugar dust [13] in the form of airborne contaminants (gases and vapours) or as aerosols [13,14]. Also, the easy access to sugar in the sugar mills might have contributed to the increased dental caries experience among production line workers as compared to administrative staff.

The periodontal status of the study subjects based on maximum Community Periodontal Index scores and Loss of Attachment codes indicated that 80.17% of the production line workers had maximum CPI score 2 in contrast to the administrative staff (63.57%) and the difference was statistically significant ($p=0.324$) which is not in agreement with Masalin et al., [15]. Loss of Attachment was seen in more of production line workers (40.12%) as compared to administrative staff (24.49%) which is statistically significant ($p=0.035$). This may be due to the limited awareness about the importance of oral health and neglect of oral hygiene among the mill workers [4].

Production line workers showed less number of presence of removable or fixed prosthesis (Prosthetic status present in 14.4%) as compared to administrative staff (Prosthetic status present in 23.2%) and the difference was found to be statistically significant ($p=0.048$). However, the prosthetic needs was more 35.2% in production line workers and (17.9%) in administrative staff. This shows accessibility and financial barrier for production line workers which can be contributed to their work schedule. No previous literature is available on the prosthetic status and prosthetic needs of sugar mill workers, hence the study is the first attempt to assess the prosthetic status and the needs.

Oral hygiene habits were not recorded for the production line workers and administrative staff which proved a major limitation for the study. Also, there is a need to assess the Knowledge, attitude and practice among the mill workers to have an insight into the level of awareness regarding oral health. Further longitudinal studies are recommended to assess the relation of oral hygiene status and sugar dust exposure on oral health status of that of sugar mill workers.

CONCLUSION

The present study revealed that oral health of sugar mill factory workers is compromised which might be primarily due to the exposure to sugar dust during their job hours and lower awareness level regarding the significance of oral health. This further indicates a need to educate the mill workers about the oral hygiene habits and oral hygiene maintenance. Also, it is recommended that regular dental visits should be advocated and the mill owners along with the Government should actively join hands with dental institutions to organize regular screening and treatment dental camps. Also, setting up of dental clinics within the factory premises can markedly improve the current scenario.

DECLARATION

The study was presented at FDI Annual World Dental Congress, 11-14 September 2014 New Delhi, India.

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Annexure-1

WHO ORAL HEALTH ASSESSMENT FORM (1997)

Country _____

Leave blank (1) <input type="text"/> <input type="text"/> <input type="text"/> (14)	Year Month (5) <input type="text"/> <input type="text"/> (6)	Day (8) <input type="text"/> <input type="text"/> (10)	Identification number (11) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (14)	Examiner <input type="text"/> (15)	Original/Duplicate <input type="checkbox"/> (16)
GENERAL INFORMATION Name _____ Date of birth (17) <input type="text"/> <input type="text"/> (20) Age in years (21) <input type="text"/> (22) Sex (M = 1, F = 2) <input type="checkbox"/> (23) Ethnic group <input type="checkbox"/> (24)			OTHER DATA (specify and provide codes) Occupation <input type="checkbox"/> (25) Geographical location (26) <input type="checkbox"/> (27) Location type: 1 = Urban 2 = Periurban 3 = Rural <input type="checkbox"/> (28)		
			CONTRAINDICATION TO EXAMINATION Reason: _____ <input type="checkbox"/> (31) 0 = No 1 = Yes		

COMMUNITY PERIODONTAL INDEX (CPI)

- 0 = Healthy
- 1 = Bleeding
- 2 = Calculus
- 3 = Pocket 4-5 mm (black band on probe partially visible)
- 4 = Pocket 6 mm or more (black band on probe not visible)
- X = Excluded sextant
- 9 = Not recorded

(176 11 2627)	(176 11 2627)
(54) <input type="text"/> <input type="text"/> (56)	(54) <input type="text"/> <input type="text"/> (56)
(57) <input type="text"/> <input type="text"/> (58)	(57) <input type="text"/> <input type="text"/> (58)
(746 31 3637)	(746 31 3637)

LOSS OF ATTACHMENT*

- 0 = 0-3 mm
- 1 = 4-5 mm (cementoenamel junction (CEJ) within black band)
- 2 = 6-8 mm (CEJ between upper limit of black band and 8.5-mm ring)
- 3 = 9-11 mm (CEJ between 8.5-mm and 11.5-mm rings)
- 4 = 12 mm or more (CEJ beyond 11.5-mm ring)
- X = Excluded sextant
- 9 = Not recorded

(176 11 2627)	(176 11 2627)
(59) <input type="text"/> <input type="text"/> (61)	(59) <input type="text"/> <input type="text"/> (61)
(62) <input type="text"/> <input type="text"/> (64)	(62) <input type="text"/> <input type="text"/> (64)
(746 31 3637)	(746 31 3637)

* Not recorded under 15 years of age

* Not recorded under 15 years of age

DENTITION STATUS AND TREATMENT NEED

Identification number

	Upper																Lower																Primary tooth Crown	Permanent Crown/Root	STATUS	TREATMENT
	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38				
Crown (80)																																			Sound	0 = None
Root (82)																																			Decayed	P = Preventive, caries-arresting care
Treatment (88)																																			Filled, with decay	F = Fissure sealant
																																			Filled, no decay	1 = One surface filling
																																			Missing, as a result of caries	2 = Two or more surface fillings
																																			Missing, any other reason	3 = Crown for any reason
																																			Fissure sealant	4 = Veneer or laminate
																																			Bridge abutment, special crown or veneer/implant	5 = Pulp-care and restoration
																																			Unerupted tooth, (crown) (unexposed root)	6 = Extraction
																																			Trauma (fracture)	7 = Need for other care (specify).....
																																			Not recorded	8 = Need for other care (specify).....
																																				9 = Not recorded

PROSTHETIC STATUS

- 0 = No prosthesis
- 1 = Bridge
- 2 = More than one bridge
- 3 = Partial denture
- 4 = Both bridge(s) and partial denture(s)
- 5 = Full removable denture
- 9 = Not recorded

Upper Lower
(1062) (1163)

PROSTHETIC NEED

- 0 = No prosthesis needed
- 1 = Need for one-unit prosthesis
- 2 = Need for multi-unit prosthesis
- 3 = Need for a combination of one- and/or multi-unit prosthesis
- 4 = Need for full prosthesis (replacement of all teeth)
- 9 = Not recorded

Upper Lower
(1164) (1265)