

Oral Health Status and Treatment Needs among Factory Employees in Jeddah

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ABSTRACT

BACKGROUND

Expatriate workers are employed to work in various sectors in Saudi Arabia on a large scale. Even though various labour laws, schemes and policies are undertaken by the host country, oral health is not given the importance it deserves. This is reflected in factory workers having hidden adverse oral health issues which can hamper their working efficacy and, also their quality of life. In light of aforementioned we conducted this oral health status and treatment needs survey of factory workers in an industrial city of Jeddah, Saudi Arabia.

METHODS

This was a cross-sectional survey study in which 119 males in the age group 18 to 64 years were included. World Health Organization (WHO) basic oral health survey form was used to extract data regarding the oral examination. The data were analysed using Chi-square test. $P < 0.05$ was considered statistically significant.

RESULTS

A significant association was seen between different age groups and mobility of teeth ($p = 0.002$), between education status and missing teeth ($p = 0.032$), between frequency of brushing and gingivitis ($p = 0.009$), between smoking habit and gingivitis ($p = 0.000$) and between smoking habit and missing teeth ($p = 0.010$).

CONCLUSION

The results of the study showed that most of the factory workers had poor oral and dental health as a result of unawareness and lack of time to seek dental consultation. Primary oral health-care programs like dental screening and oral health education at regular intervals should be made mandatory at factory premises, which will help them maintain their oral health, thus improving their quality of life.

KEY WORDS

Factory Workers, Oral Health, Oral Health Impact Profile,

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DOI: 10.14260/jemds/2020/425

How to Cite This Article:

*Shammass M, Bokhari AA, Bukhari RH, et al.
Oral health status and treatment needs
among factory employees in Jeddah. J.
Evolution Med. Dent. Sci. 2020;9(27):1952-
1957, DOI: 10.14260/jemds/2020/425*

*Submission 24-03-2020,
Peer Review 03-06-2020,
Acceptance 10-06-2020,
Published 06-07-2020.*

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BACKGROUND

Oral health is vital to general wellbeing and oral diseases are one of the most common of non-communicable diseases affecting mankind. It is an important public health problem owing to its prevalence, socio-economical aspect, treatment cost and lack of awareness.^[1] Though oral and dental diseases are rarely life-threatening, they have been widely recognized as important cause of negative impact to workers in their daily activities and quality of life^[2,3] Regardless of the fact, dental or oral problems also lead to loss of man hours, oral health maintenance continues to be largely neglected.^[4]

Jeddah being the second largest and industrialized city of Saudi Arabia hosts a large numbers of industries that employs equally large number of (local and expatriate) workers in them. These workers could be exposed to the hazardous working conditions, which can deteriorate the general and oral health due to the long working hours, continuous day and night shifts, neglected oral hygiene, low socioeconomic status, etc.^[5,6] In addition to this, the work contracts of expatriate workers at times may get renewed multiple times, thus, prolonging their stay without annual vacation which takes a toll on their general and oral health.^[7]

Although the dental literature documents a large number of studies on oral health of factory employees, seemingly very few of them have been conducted in Asia.^[2] Despite the relevance of information to develop oral health strategies that meet the needs of this specific population needs, no studies have reported oral health status and treatment needs of factory workers in the industrial city of Jeddah. Although, prior studies by Sharifa A. M. Al-Shehri in 2012,^[8] Al-Attas et al, in 2014,^[9] A H Shah et al in 2015,^[10] reported oral health status and treatment needs in Saudi Arabia, they did not target the factory workers in particular. To address the aforementioned knowledge gap, this study was conducted with the aim to assess the oral health status and treatment needs among the factory employees in the industrial city in Jeddah, Saudi Arabia.

METHODS

Study Design, Setting, and Participants

This was a cross-sectional study conducted to assess oral health status and treatment needs among factory employees of industrial city in Jeddah, Saudi Arabia. The study was conducted as one day screening camp in the industrial city of Jeddah. The screening camp was organized by the host governmental charity organization working for the welfare of the industrial city employees'. (The host charity organization was chosen because 1) it was logistically challenging to visit all the factories in the industrial city, 2) the host charity organization was located within the industrial city of Jeddah where the industrial city's workers frequently visited). The screening camp was organized on a weekend (non-working day) of December 2018 to collect the study data, because it was convenient to gather the factory workers on the weekend through a prior announcement.

We used the convenient sampling technique for our study because it was difficult to forecast the number of factory employees that would visit the community hall of the host charity organization on the day of screening. Our study participants comprised of all factory workers present in the community hall on the day of screening; who willingly signed an informed consent to be part of the study. Additionally, the following inclusion and exclusion criteria was considered;

Inclusion Criteria

1. Factory workers who were present at the time of screening.
2. Workers must have worked for at least for six months.
3. Factory workers willing to participate in the study.

Exclusion Criteria

1. Factory workers who were not able to communicate or cooperate.
2. Factory workers who were below 18 years and above 65 years of age.

Approvals and Ethical Concerns

Approval to conduct the study was obtained from the host governmental charity organization (looking after the general welfare of factory employees) located in the industrial city. Following the approval of the host charity organization to screen the factory workers for oral health and treatment needs, a formal ethical committee approval was obtained from institutional research ethics review committee (No. H-18-06112016).

Training and Calibrating the Examiners

The examiners participating in the study first were trained and calibrated by experienced staff members to use the modified WHO oral health assessment form (2013). The Kappa value of 0.90 was achieved for intra examiners' reliability.

Data Collection

The examiners arrived at the predetermined site and day to collect the study data. The trained and calibrated examiners performed Type III oral examination^[11] using a standard mouth mirror, probe and adequate ordinary torch light on a comfortable chair with backrest. Demographic details, oral hygiene practices and habits, oral health status and treatment needs was collected through face-to-face interviews and clinical examination respectively. The data was recorded with the help of a trained recording assistant (intern).

Modified WHO Oral Health Assessment Form Included

1. General information: The demographic data which included the age, gender, education and the marital status.
2. Information about the oral hygiene practices and adverse habits.
3. The oral health status and treatment needs: dental caries, gingivitis, periodontitis, missing teeth, mobility, and teeth that need extraction.

While screening the study subjects the following variables were measured: number of teeth present; DMFT index; presence and type of removable dentures; and need for immediate care. On an average, examination of each study participant took approximately 15-20 minutes per person. By the end of the day's screening camp we were able to interview and conduct oral examination of 119 subjects.

Following the screening examination, all study participants were provided with dental outpatient visit cards of our institution which gave them access to free dental treatment.

Statistical Methods

Data of 119 study subjects was analyzed using SPSS (v25.0; IBM, Chicago, IL, USA). Descriptive analysis was carried first, then Chi-square test was used to find an association of dental caries status, mobility, extraction required, missing teeth, gingivitis and periodontitis with age, education, frequency of brushing and smoking habits. P < 0.05 was considered statistically significant.

RESULTS

Independent variables included were age, education, brushing habits, smoking, work experience, etc. and dependent variables of interest were dental caries, missing teeth, mobility, teeth that needed an extraction and oral hygiene status. The study sample included 119 males; the mean age of subjects was 38.00 years (SD=11.55), mean number of decayed teeth were 4.49 (SD =3.48), missing teeth were 3.43 (SD =3.94), mobile teeth were 3.92 (SD=3.90), and extracted teeth were 3.23 (SD=4.41).

Table 1 shows the demographic characteristics of factory workers. There were overall 119 male workers who participated; of them 17 (14.3%) were in the age group of 18-25 years, 41 (34.5%) were in the age group of 26-35 years, 31 (26.1%) were in the age group of 36-45 years, 19 (16.0%) were in the age group of 46-55, and 11(9.2) the >55 years of age group. Regarding the education status among these factory workers, 39 (32.8%) did not completed their high school, 63 (52.9%) completed their high school and 17 (14.3%) completed their diploma. Total 25 (21.0%) cleaned their teeth twice a day, 56 (47.1%) cleaned their teeth only once and 38 (31.9%) cleaned their teeth sometimes. In the study subjects, 44 (37.0%) were smokers and 75 (63.0%) were non-smokers.

Demographics	N (%)
Age in years	
18-25	17 (14.3)
26-35	41 (34.5)
36-45	31 (26.1)
46-55	19 (16.0)
>55	11 (9.2)
Education	
< high school	39 (32.8)
High school	63 (52.9)
Diploma	17 (14.3)
Frequency of brushing	
Twice	25 (21.0)
Once	56 (47.1)
Sometimes	38(31.9)
Smoking habits	
Smoking	44 (37.0)
Non-smoking	75 (63.0)

Table 1. Demographic Characteristics of the Study Population

Age Groups In Years (N=119)	Age Groups in Years 18-25 (17) 14.3%	Age Groups in Years 26-35 (41) 34.45%	Age Groups in Years 36-45 (31) 26%	Age Groups in Years 46-55 (19) 16%	Age Groups in Years >55 (11) 9.25%	χ ² value	p-value
Dental caries status							
Present (70) 58.8%	(12) 10.1%	(23) 19.3%	(18) 15.1%	(12) 10.1%	(5) 4.2%	2.064	0.724
Absent (49) 41.2%	(5) 4.2%	(13) 15.1%	(13) 10.9%	(7) 5.9%	(6) 5.0%		
Mobility							
Present (13) 10.9%	(1) 0.8%	(1) 0.8%	(3) 2.5%	(3) 2.5%	(5) 4.2%	17.468	0.002*
Absent (106) 89.1%	(16) 13.4%	(40) 33.6%	(28) 16.8%	(16) 13.4%	(6) 5.0%		
Missing Teeth							
Present (37) 31.1%	(4) 3.4%	(9) 7.6%	(11) 9.2%	(8) 6.7%	(5) 4.2%	4.467	0.347
Absent (82) 68.9%	(13) 10.9%	(32) 26.9%	(20) 16.8%	(11) 9.2%	(6) 5.0%		
Extraction							
Present (44) 37.0%	(8) 6.7%	(15) 12.6%	(11) 9.2%	(6) 5.0%	(4) 3.4%	1.013	0.908
Absent (75) 63.0%	(9) 7.6%	(26) 21.8%	(20) 16.8%	(13) 10.9%	(7) 5.9%		
Gingivitis							
Present (70) 58.8%	(12) 10.1%	(23) 19.3%	(18) 15.1%	(12) 10.1%	(5) 4.2%	2.064	0.724
Absent (49) 41.2%	(5) 4.2%	(18) 15.1%	(13) 10.9%	(7) 5.9%	(6) 5.0%		
Periodontitis							
Present (24) 20.2%	(6) 5.0%	(10) 8.4%	(7) 5.9%	(1) 0.8%	(0) 0.0%	8.382	0.079
Absent (95) 79.8%	(11) 9.2%	(31) 26.1%	(24) 20.2%	(18) 15.1%	(11) 9.2%		

*: Statistically Significant

Mobility: χ²value (17.468), p-value (0.002) – statistically significant
Test applied- chi square test

Table 2. Association of Dental Caries Status, Mobility, Extraction, Missing Teeth, Gingivitis and Periodontitis with Age

Education Status (N=119)	< High School 39 (32.8%)	High School 63 (52.9%)	Diploma 17 (14.3%)	χ ² value	p-value
Dental caries status					
Present (70) 58.8%	(25)21.0%	(38)31.9%	(7) 5.9%	2.692	0.260
Absent (49) 41.2%	(14)11.8%	(25)21.0%	(10) 8.4%		
Mobility					
Present (13) 10.9%	(5)4.2%	(5)4.2%	(3) 2.5%	1.512	0.470
Absent (106) 89.1%	(34)28.6%	(58)48.7%	(14)11.8%		
Missing Teeth					
Present (37) 31.1%	(17)14.3%	(13) 10.9%	(7) 5.9%	6.866	0.032*
Absent (82) 68.9%	(22)18.5%	(50) 42.0%	(10) 8.4%		
Extraction					
Present (44) 37.0%	(18)15.1%	(21) 17.6%	(5) 4.2%	2.186	0.335
Absent (75) 63.0%	(21)17.6%	(42) 35.3%	(12) 10.1%		
Gingivitis					
Present (70) 58.8%	(25)21.0%	(38) 31.9%	(7) 5.9%	2.692	0.260
Absent (49) 41.2%	(14)11.8%	(25) 21.0%	(10) 8.4%		
Periodontitis					
Present (24) 20.2%	(7)5.9%	(10) 8.4%	(7) 5.9%	5.501	0.064
Absent (95) 79.8%	(32)26.9%	(53) 44.5%	(10) 20.2%		

*: Statistically Significant

Missing Teeth: χ²value (6.866), p-value (0.032) – statistically significant
Test applied- chi square test

Table 3. Association of Dental Caries Status, Mobility, Extraction, Missing Teeth, Gingivitis and Periodontitis with Education Status

Table 2 shows the association of dental caries, gingivitis, periodontitis, missing teeth, mobility, and extraction with age. A significant association was seen between different age groups and mobility teeth (χ² = 17.468, p = 0.002), whereas no significant association was found among different age groups with dental caries (χ² = 2.064, p = 0.724), gingivitis (χ² = 8.382, p = 0.079), periodontitis (χ² = 2.064, P = 0.002), extraction (χ² = 1.013, p = 0.908) and, missing teeth (χ² = 4.467, p = 0.347).

Table 3 shows the association of dental caries, gingivitis, periodontitis, missing teeth, mobility, and extraction with education status. A significant association was seen between education status and missing teeth (χ²=6.866, p=0.032), whereas no significant association was found among different

age groups with dental caries ($\chi^2=2.692$, $p = 0.260$), gingivitis ($\chi^2=5.501$, $p=0.064$), periodontitis ($\chi^2=2.692$, $p=0.260$), extraction ($\chi^2=2.186$, $p=0.335$) and, missing teeth ($\chi^2= 6.866$, $p=0.032$).

Frequency of Brushing (N=119)	Twice (25) 21%	Once (56) 47%	Sometimes (38) 32%	χ^2 value	p-value
Dental caries status					
Present (70) 58.8%	(16) 13.4%	(33) 27.7%	(21) 17.6%	0.476	0.788
Absent (49) 41.2%	(9) 7.6%	(23) 19.3%	(17) 14.3%		
Mobility					
Present (13) 10.9%	(3) 2.5%	(6) 5.0%	(4) 3.4%	0.038	0.981
Absent (106) 89.1%	(22) 18.5%	(50) 42.0%	(34) 28.6%		
Missing Teeth					
Present (37) 31.1%	(9) 7.6%	(16) 13.4%	(12) 10.1%	0.451	0.798
Absent (82) 68.9%	(16) 13.4%	(40) 33.6%	(26) 21.8%		
Extraction					
Present (44) 37.0%	(12) 10.1%	(17) 14.3%	(15) 12.6%	2.458	0.293
Absent (75) 63.0%	(13) 10.9%	(39) 32.8%	(23) 19.3%		
Gingivitis					
Present (70) 58.8%	(16) 13.4%	(33) 27.7%	(21) 17.6%	0.476	0.788
Absent (49) 41.2%	(9) 7.6%	(23) 19.3%	(17) 14.3%		
Periodontitis					
Present (24) 20.2%	(2) 1.7%	(18) 15.1%	(4) 3.4%	9.481	0.009*
Absent (95) 79.8%	(23) 19.3%	(38) 31.9%	(34) 28.6%		

*: Statistically Significant
 Gingivitis: χ^2 -value (9.481), p-value (0.009) – statistically significant
 Test applied- chi square test

Table 4. Association of Dental Caries Status, Mobility, Extraction, Missing Teeth, Gingivitis and Periodontitis with Frequency of Brushing

Smoking Habits (N=119)	Smoking (44) 37%	Non-Smoking (75) 63%	χ^2 value	p-value
Dental caries status				
Present (70) 58.8%	(25) 21.0%	(45) 37.8%	0.116	0.734
Absent (49) 41.2%	(19) 16.0%	(30) 25.2%		
Mobility				
Present (13) 10.9%	(5) 4.2%	(8) 6.7%	0.014	0.906
Absent (106) 89.1%	(39) 32.8%	(67) 56.3%		
Missing Teeth				
Present (37) 31.1%	(20) 16.8%	(17) 14.3%	6.721	0.010*
Absent (82) 68.9%	(24) 20.2%	(58) 48.7%		
Extraction				
Present (44) 37.0%	(20) 16.8%	(24) 20.2%	2.154	0.142
Absent (75) 63.0%	(24) 20.2%	(51) 42.9%		
Gingivitis				
Present (70) 58.8%	(25) 21.0%	(45) 37.8%	0.116	0.734
Absent (49) 41.2%	(19) 16.0%	(30) 25.2%		
Periodontitis				
Present (24) 20.2%	(1) 0.8%	(23) 19.3%	13.886	0.000*
Absent (95) 79.8%	(43) 36.1%	(52) 43.7%		

*: Statistically Significant
 Missing Teeth: χ^2 value (6.721), p-value (0.010) – statistically significant
 Gingivitis: χ^2 value (13.886), p-value (0.000) – statistically significant
 Test applied- chi square test

Table 5. Association of Dental Caries Status, Mobility, Extraction, Missing Teeth, Gingivitis and Periodontitis with Smoking Habits

Type of Intervention	Number of Factory Workers	Percentage of Factory Workers
No treatment needed	3	5.04%
Preventive/routine treatment needed	70	58.8%
Prompt treatment needed	30	25.15%
Immediate treatment needed due to pain or infection of dental and/or oral origin	13	10.9%
Referred for comprehensive evaluation or medical treatment (systemic condition)	0	0
Total	119	100%

Table 6. Treatment Need Distribution

Table 4 shows the association of dental caries, gingivitis, periodontitis, missing teeth, mobility, and extraction with frequency of brushing. A significant association was seen between frequency of brushing and gingivitis ($\chi^2=9.481$, $p= 0.009$), whereas no significant association was found among different age groups with dental caries ($\chi^2= 0.476$, $p=0.788$), mobility ($\chi^2=0.038$, $p=0.981$), periodontitis ($\chi^2= 0.476$, $p= 0.788$), extraction ($\chi^2=2.458$, $p=0.293$) and, missing teeth ($\chi^2= 0.451$, $p=0.798$).

Table 5 shows the association of dental caries, gingivitis, periodontitis, missing teeth, mobility, and extraction with smoking habit. A significant association was seen between smoking habit and gingivitis ($\chi^2=13.886$, $p=0.000$) and missing teeth ($\chi^2=6.721$, $p = 0.010$), whereas no significant association was found among different age groups with dental caries ($\chi^2=0.116$, $p = 0.734$), mobility ($\chi^2=0.014$, $p=0.906$), periodontitis ($\chi^2 0.116$, $p = 0.734$), and extraction ($\chi^2=2.154$, $p=0.734$).

Table 6 shows the treatment needs of the study subjects we screened. More than half (58.8%) of the study subjects needed some form of preventive/routine treatment. Only 5.04% of the study subjects did not need any treatment. Whereas, no one among the study subjects needed referral for any form of comprehensive evaluation or medical treatment (systemic condition).

DISCUSSION

The extent of industrial growth reflects the growth of a nation, the workers in the industries constitute a significant proportion of the total population who work and live in a highly complicated environment. Therefore, the health of this population reflects the health of the society in the given area.^[12] The factors affecting the oral health of an individual could be various including environmental, occupational, dietary and pathologic factors, and the oral hygiene practices of an individual. The factory employees' poor oral health condition could be because of a lack of medical and dental health care facilities in the factory premises.

The present study was conducted to assess the oral health status and treatment needs among factory employees in Jeddah, Saudi Arabia. The study subjects were all permanent employees of the various factories, and all were males. The association of dental caries status, mobility, extraction, missing teeth, gingivitis and periodontitis with age, education status, frequency of brushing, and the smoking habit were assessed.

In this study majority (41%) of industrial workers were in the age group of 26-35, which is similar to other study reported by Bansal and Veerasha,^[2] followed by 31% in the age group of 36-45 which was similar to other studies by Tomita et al^[13] and Umoh and Azodo.^[14]

Almost all subjects in our study brushed their teeth at least once in a day, which was similar to the results of a study by Patil et al^[6] and Eldarrat et al.^[15] However, in the present study, a higher number of smokers used to brush their teeth. This study revealed that more than 80% of the study subjects used toothbrushes to brush their teeth; this is in agreement with findings of a study conducted by Patil et al.^[6]

A majority of the factory workers in the present study did not use any form of tobacco or related products, which was contrary to the findings of a study reported by Sood et al^[4] and Sanadhya et al.^[16] the only other study that reported similar results was Patil et al (31.4% study subjects used tobacco).^[6] However, many other studies have reported higher rate of smoking among the employees.^[17-19]

Caries frequency in our study was similar to that reported by Ahlberg et al.^[20] which was less in comparison with Bachanek et al findings^[21] and the percentage of subjects,

which were caries free were remarkably higher than reported by Duraiswamy et al.^[22] Bansal and Veerasha^[2] and Hayashi^[23] reported much higher frequency of missing teeth than our study, likewise the age group with higher frequency of missing teeth was in the range of 36-45 years which is in contrast to the aforementioned studies. The number of missing teeth were significantly less in subjects who were educated (high school and diploma) and were non-smokers.^[22]

The frequency of gingivitis in our study was similar to the findings of Cristina Gomes De Mcedo et al.^[3] and Khurana et al.^[24] these finding were in contrast with the finding of Singh et al.^[25] In contrast to the reports of Srikandi and Clarke,^[26] our study reported less amount of periodontal disease. Therefore, our findings were in agreement with that of Bansal and Veerasha.^[2] The frequency of periodontitis was significantly less in subjects who brushed their teeth at least once daily and did not smoke.

The most predominant treatment need in our study was restoration of decayed teeth followed by oral prophylaxis similar to the report of Roman and Pop.^[27]

From 119 factory workers, only 5.04% did not need any treatment, while the remaining 94.96% needed some form of treatment. About 58.8% of the study population needed preventive or routine treatment, nearly 25.15% required prompt treatment and 10.9% needed immediate treatment these findings were in contrast with other studies by Sandhaya et al which reported that, only 3.5% subjects required preventive care and 27.4% required immediate treatment,^[16] while Singh M et al reported only 22.4% required preventive or routine treatment, while 62.4% required prompt treatment.^[17]

Limitations

The conclusions of the current study should be interpreted bearing in mind the following limitations;

1. The study sample: the sampling (convenient) technique and the sample size was small, as only those who were present in the community hall of the hosting charity organization on the day of screening and gave the informed consent were considered as study subjects.
2. Information on tobacco was collected based on the participant's self-reported information. This probably could have caused a memory bias.
3. The duration of working in the factory was also not documented, which plays a vital role in assessing the occupational effects on oral health.
4. Type of work involved in the factory was not documented, as it may play a role in the exposure to hazardous work environment leading to general and oral diseases.

CONCLUSIONS

Industrial development plays a key role in a nation's development, and the factory employees are its lifeline. These employees' work in unique, testing, and sometimes compromising work conditions. Although the factory workers form the lifeline of an industry, they get neglected at times. Our study revealed a high prevalence of dental caries and periodontal diseases, hence a high percentage of treatment-

need in the factory employees we screened. Prior studies worldwide have revealed that oral disease and occupational hazards are omnipresent; therefore, a comprehensive preventive program overarching the general and oral wellbeing of this risk group should be in place that underpins the special emphasis on preventing factors that contribute to their occurrence. On campus, access to medical and dental screening and regular health education/promotion programs could prevent the build-up of healthcare needs of factory workers.

The authors would like to thank the community service center of Ibn Sina National College for Medical Studies for extending their help and support in organizing and conducting the screening program on our request. We would like to thank the host charity organization located in the industrial city of Jeddah for their logistic support in organizing the screening camp. We would to thank Dr. Saravanan R, Dr. Sheetal Kumar, Dr. Maher Babsail, Dr. Mohammed Zabedi, and Dr. Venugopal Seemakurthi, interns of 2017-18 batch for their help in screening the patients.

REFERENCES

- [1] Petersen PE. Dental visits, dental health status and need for dental treatment in a Danish industrial population. *Scand J Soc Med* 1983;11(2):59-64.
- [2] Bansal M, Veerasha KL. Oral health status and treatment needs among factory employees in Baddi-Barotiwala-Nalagarh Industrial hub, Himachal Pradesh, India. *Indian J Oral Sci* 2013;4(3):105-9.
- [3] De Macedo CG, de Paula QD. Quality of life and self-perceived oral health among workers from a furniture industry. *Braz J Oral Sci* 2011;10(4):226-32.
- [4] Sood M, Baggana A, Vohra P, et al. Periodontal status of smoker and non-smoker ceramic factory workers. *J Innov Dent* 2011;11(3):1-6.
- [5] Sudhanshu S, Pankaj A, Sorabh J, et al. Dental diseases of acid factory workers globally-narrative review article. *Iran J Public Health* 2014;43(1):1-5.
- [6] Patil VV, Shigli K, Hebbal M, et al. Tooth loss, prosthetic status and treatment needs among industrial workers in Belgaum, Karnataka, India. *J Oral Sci* 2012;54(4):285-92.
- [7] Naithani P, Jha AN. Challenges faced by expatriate workers in the Gulf Cooperation Council countries. *Int J Bus Manag* 2009;5(1):98-104.
- [8] Al-Shehri SA. Oral health status of older people in residential homes in Saudi Arabia. *Open Journal of Stomatology* 2012;2(4):307-13.
- [9] Al-Attas SA, Ibrahim SS, Amer HA, et al. Prevalence of potentially malignant oral mucosal lesions among tobacco users in Jeddah, Saudi Arabia. *Asian Pac J Cancer Prev* 2014;15(2):757-62.
- [10] Shah AH, Bindaayel NA, AlOlaywi FM, et al. Oral health status of a group at a special needs centre in AlKharij, Saudi Arabia. *J Disabil Oral Health* 2015;16(3):79-85.
- [11] Thompson NJ, Boyer EM. Validity of oral health screening in field conditions: pilot study. *J Dent Hyg* 2006;80(2):9.
- [12] Khalil L, Khanam S. Health conditions of lock industry workers: a case study of Aligarh City. *Iran J Basic Med Sci* 2012;1:1-7.

- [13] Tomita NE, Chinellato LEM, Lauris JRP, et al. Oral health of building construction workers: an epidemiological approach. *J Appl Oral Sci* 2005;13(1):24-7.
- [14] Umoh AO, Azodo CC. Association between periodontal status, oral hygiene status and tooth wear among adult male population in Benin City, Nigeria. *Ann Med Health Sci Res* 2013;3(2):149-54.
- [15] Eldarrat A, Alkhabuli J, Malik A. The prevalence of self-reported halitosis and oral hygiene practices among Libyan students and office workers. *Libyan J Med* 2008;3(4):170-6.
- [16] Sanadhya S, Nagarajappa R, Sharda AJ, et al. The oral health status and the treatment needs of salt workers at Sambhar lake, Jaipur, India. *J Clin Diagn Res* 2013;7(8):1782-6.
- [17] Gazdek D, Samardžić S. Croatian smoke-free law and smoking habits among employees of health care facilities in Koprivnica-Križevci County. *Croat Med J* 2013;54(4):407-10.
- [18] Stojanović M, Mušović D, Petrović B, et al. Smoking habits, knowledge about and attitudes toward smoking among employees in health institutions in Serbia. *Vojnosanit Pregl* 2013;70(5):493-500.
- [19] Choi SH, Pohl JM, Terrell JE, et al. Factors associated with smoking among operating engineers. *Workplace Health Saf* 2013;61(9):385-92.
- [20] Ahlberg J, Ahlberg J, Tuominen R, et al. Subsidized dental care improves caries status in male industrial workers. *Community Dent Oral Epidemiol* 1996;24(4):249-52.
- [21] Bachanek T, Pawłowicz A, Tarczydło B, et al. Evaluation of dental health in mill workers. Part I. The state of dentition. *Ann Agric Environ Med AAEM* 2001;8(1):103-5.
- [22] Duraiswamy P, Kumar TS, Dagli RJ, et al. Dental caries experience and treatment needs of green marble mine laborers in Udaipur district, Rajasthan, India. *Indian J Dent Res* 2008;19(4):331-4.
- [23] Hayashi N, Tamagawa H, Tanaka M, et al. Association of tooth loss with psychosocial factors in male Japanese employees. *J Occup Health* 2001;43(6):351-5.
- [24] Khurana S, Jyothi C, Dileep CL, et al. Oral health status of battery factory workers in Kanpur city: a cross-sectional study. *J Indian Assoc Public Health Dent* 2014;12(2):80-7.
- [25] Singh M, Ingle NA, Kaur N, et al. Oral health status and treatment needs of lock factory workers in Aligarh city. *J Adv Oral Res* 2015;6(2):28-32.
- [26] Srikandi TW, Clsrke NG. Periodontal status in a South Australian industrial population. *Community Dent Oral Epidemiol* 1982;10(5):272-5.
- [27] Roman A, Pop A. Community periodontal index and treatment needs values (CPITN) in a factory worker group in Cluj-Napoca, Romania. *Int Dent J* 1998;48(2):123-5.