Oral Health Status and Treatment Needs among Factory Employees in Jeddah

Mohammed Shammas1, Asmaa Abdullah Bokhari2, Rawan Hassan Bukhari3, Noof Nawaf AlShareef4, Leyana Assem Alradi5, Fazeena Karimalakuzhiyil AliKutty6, Irfan Adil Majid7

1Department of Prosthodontics, Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia. 2Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia. 3AlFarabi Private Colleges, Jeddah, Saudi Arabia. 4Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia. 6Department of Public Health Dentistry, Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia. 7Department of Oral Medicine and Radiology, Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia.

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,
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-economic aspect, treatment cost and lack of awareness.[5] Though oral and dental diseases are rarely life-threatening, they have been widely recognized as an 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.

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.

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.
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.

Table 2 shows the association of dental caries status, gingivitis and periodontitis with age, education status and missing teeth. A significant association was seen between different age groups and mobility (χ² = 17.468, p = 0.002), education status and missing teeth (χ² = 6.866, p = 0.032) - statistically significant. 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

### Table 1. Demographic Characteristics of the Study Population

<table>
<thead>
<tr>
<th>Demographics</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>17 (14.3)</td>
</tr>
<tr>
<td>26-35</td>
<td>41 (34.5)</td>
</tr>
<tr>
<td>36-45</td>
<td>31 (26.3)</td>
</tr>
<tr>
<td>46-55</td>
<td>19 (16.0)</td>
</tr>
<tr>
<td>&gt;55</td>
<td>11 (9.2)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>&lt; high school</td>
<td>39 (32.8)</td>
</tr>
<tr>
<td>High school</td>
<td>63 (52.9)</td>
</tr>
<tr>
<td>Diploma</td>
<td>17 (14.3)</td>
</tr>
<tr>
<td>Frequency of brushing</td>
<td></td>
</tr>
<tr>
<td>Twice</td>
<td>25 (21.0)</td>
</tr>
<tr>
<td>Once</td>
<td>56 (47.1)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>30 (25.9)</td>
</tr>
<tr>
<td>Smoking habits</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>44 (37.0)</td>
</tr>
<tr>
<td>Non-smoking</td>
<td>75 (63.0)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Education Status</th>
<th>&lt; High School (39 (32.8%))</th>
<th>High School (63 (52.9%))</th>
<th>Diploma (17 (14.3%))</th>
<th>χ² Value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental caries status</td>
<td>(70) 58.8%</td>
<td>(44) 37.0%</td>
<td>(6) 5.0%</td>
<td>17.468</td>
<td>0.002*</td>
</tr>
<tr>
<td>Mobility</td>
<td>(25) 21.0%</td>
<td>(26) 21.0%</td>
<td>(6) 5.0%</td>
<td>2.692</td>
<td>0.260</td>
</tr>
<tr>
<td>Extraction</td>
<td>(25) 21.0%</td>
<td>(26) 21.0%</td>
<td>(6) 5.0%</td>
<td>2.064</td>
<td>0.724</td>
</tr>
<tr>
<td>Gingivitis</td>
<td>(25) 21.0%</td>
<td>(26) 21.0%</td>
<td>(6) 5.0%</td>
<td>2.064</td>
<td>0.724</td>
</tr>
<tr>
<td>Periodontitis</td>
<td>(25) 21.0%</td>
<td>(26) 21.0%</td>
<td>(6) 5.0%</td>
<td>2.064</td>
<td>0.724</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Education Status</th>
<th>χ² Value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental caries status</td>
<td>17.468</td>
<td>0.002*</td>
</tr>
<tr>
<td>Mobility</td>
<td>2.692</td>
<td>0.260</td>
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<tr>
<td>Extraction</td>
<td>2.064</td>
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<tr>
<td>Gingivitis</td>
<td>2.064</td>
<td>0.724</td>
</tr>
<tr>
<td>Periodontitis</td>
<td>2.064</td>
<td>0.724</td>
</tr>
</tbody>
</table>
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 ($\chi^2=6.866, p=0.032$).

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 constitutes 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 lack of a medical and dental health care facilities in the factory premises.

This 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 Veeresha,[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 Eldarbat 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 Sanadhyia 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 Veeresh[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 Macedo 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 Srikanth and Clarke,[26] our study reported less amount of periodontal disease. Therefore, our findings were in agreement with that of Bansal and Veeresh.[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 lifetime. 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 like to thank Dr. Saravanan R, Dr. Sheetal Kumar, Dr. Maher Babaei, Dr. Mohammed Zabed, and Dr. Venugopal Seenakurthi, interns of 2017-18 batch for their help in screening the patients.

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