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ORIGINAL ARTICLE

Assessment of Periodontal Status Among Automobile Industrial Population of Gurgaon, India

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ABSTRACT
To determine the level of periodontal status among Gurgaon's working population and to supply initial data for the design of initiatives to promote oral health. A cross-sectional descriptive survey was conducted among 420 (350 males and 70 females) industrial workers of Gurgaon aged between 21 to 60 years. Clinical examination included the recording of the Community Periodontal Index (CPI). Chi- square, Student's t-test, One-way Analysis of Variance (ANOVA), and Multiple Logistic Regression were used for statistical analyses with the level of significance set at p<0.05. One-third (32.9%) of the subjects showed bleeding on probing. The prevalence of shallow and deep pockets was 27.9% and 19.5% respectively. Age, education, oral hygiene practices, and bad habits all showed statistically significant differences in the periodontal status (p 0.05). The majority 277 (66%), were having a 4.5mm of loss of attachment. Males [OR=1.313] and multiple forms of tobacco users [OR=3.994] were significantly at higher risk of developing periodontal disease (p=0.001). Oral hygiene practices, adverse oral habits, age, education, and sex were identified as the best predictors for CPI. Periodontal disease is more common in significant percentages of industrial workers, which necessitates a implementation of preventive care by reorienting oral health services.
Keywords— *Community Periodontal Index, Industrial Workers, Periodontal disease.*

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INTRODUCTION

Advancements in different fields, for example, technological, industrial, political, scientific, and social fields have induced different occupational and environmental diseases [1]. The rise of industrial activity and the subsequent increase in the number of available occupations have both had an impact on the way people live their lives and the degree to which they experience personal fulfillment. Nevertheless, in light of the quickening pace of economic development and technological progress, it is absolutely necessary to guarantee the safety and wellbeing of workers at the locations where they are employed. This is as a result of the fact that the advancement of technology and industry is directly responsible for the emergence of a number of new hazards in the workplace [2].

Each working environment is a workplace where individuals and physical and chemical demands engaged with executing the job [2]. Oral health status directly influences general health, and on the contrary, general health impacts oral health. Oral diseases are quite possibly the most widely recognized non-communicable diseases affecting diverse populations. It is a significant public health problem owing to its prevalence, severity, socio- economical impact, costly therapy, and lack of awareness [3].

Due to the fact that periodontal disease is one of the two oral diseases that contribute the most to the overall burden of chronic disease around the world, it is considered to be a significant global public health problem [4]. Trends in periodontal diseases have seen rapid changes throughout the world [5, 6]. It has been demonstrated that people of different ages experience periodontal disease to varying degrees and in varying degrees of severity [7]. When compared to the rest of the world, India's working population typically falls into a lower socioeconomic bracket than the rest of the country's population does. In addition, the workers are known to engage in risky behaviors such as smoking, chewing tobacco, and

drinking, all of which increase the likelihood that they will develop oral diseases, particularly those associated with the gums [8].

Today laborers globally are confronting huge changes in work organization and work relations; they are under enormous strain to satisfy the needs of present-day working life. With the speed of work directed by instant communications and elevated degrees of the worldwide contest, the lines isolating work from life are turning out to be increasingly difficult to recognize [9].

When workers are faced with work demands and pressures that are not proportionate to their skills, experience, or knowledge and that test their capacity for adaptation, the well-being of those workers may be negatively impacted. Stress can be caused by a wide range of different aspects of the workplace, but it is frequently made worse when employees believe that their superiors and coworkers are not willing or able to assist them, that they have little control over their work, and that they are unable to adjust to the demands and pressures of their jobs.9 Employees are working for longer hours, complying with time constraints, and cutting back on costs. Combined with this, the double-income family requests of monthly debts, childcare issues, and aging guardians bring about anxiety, sleeplessness, irritability, and physical and mental deterioration for some [10].

Disorders encompass various conditions, including mental issues, maladaptive ways of behaving, and mental impedance. There have been a lot of studies done on the oral health of workers in different parts of the country.

55.6 percent of the Indian workers who were employed in coal mineshafts had previous experience with caries [11]. Another study with Brazilian workers in the textile industry found that orofacial pain had a significant impact on the performance of labor activities in 28.5 percent of cases, with toothache affecting 25 percent of people and leading to absenteeism in 11.6 percent of workers [12]. Although there have been a few predominance studies [13-15]carried out in India to assess the region-wise explicit burden of periodontal disease, not a single one of these studies exclusively represents employees of the automobile industrial sector.

As factory laborers comprise a distinct population group, information on factors influencing their oral health in a work environment permits oral health promotion measures to be appropriately targeted. Preventive projects can be effectively planned to prevent oral diseases and promote oral health in the industrial health care system. In order to determine the prevalence of periodontal disease among Gurgaon's population of auto workers, the current study was conducted.

MATERIAL AND METHODS

A cross-sectional descriptive survey was conducted from April to December 2018 to assess the periodontal status among 420 industrial workers in Gurgaon, India. One of Delhi's major satellite cities, Gurgaon (officially known as Gurugram), is a part of India's National Capital Region. Gurgaon is the third-largest financial and banking hub in India and the country's second-largest information technology hub. 16 The city also benefits from its proximity to Delhi in a number of different ways. In the 1970s, Maruti Suzuki Private Limited was the first company in the city to establish a manufacturing unit for the production of automobiles there [17]. At some point in time, the real estate company DLF Limited was able to purchase extensive tracts of land within the city. In 1997, General Electric was the first major American company to establish a presence in Gurgaon by establishing an office there. The structure that General Electric had set up in Gurgaon inspired a number of other organizations, both domestic and international, to adopt the same approach [18]. offering outsourcing solutions in the areas of software, information technology, administration, and sales by means of delivery facilities and call centers. The Gurgaon municipal corporation area has an estimated population of 15,14,432, of which males and females are 8,16,690 and 6,97,742 respectively, and an average literacy rate of 84.7% according to the 2011 Census of India [19].

Ethical considerations

The ethical clearance was granted after the Institutional Ethical Committee conducted a thorough review of the study protocol. Prior to conducting the study, official permission was solicited from the relevant authorities within the selected automobile industries. Participants who met the eligibility criteria of working in industries, having systemic health, not taking any medications, and having teeth in their oral cavity gave their informed consent to take part in the study.

Training and calibration of the examiner

Before the study began, the Department of Public Health Dentistry trained and calibrated examiners on group of subjects with advanced level of periodontal conditions (kappa = 82%).

Sample Size and Sampling Design

The sample size was determined using the Epi tools sample size calculator. The prevalence of deep periodontal pockets estimated from the pilot study among 25 automobile industry workers was 16%. At a confidence level of 95%, design effect of 2, and absolute precision of 5%, the sample size estimated was 414.

An official roster of the employees had been obtained from the administrative personnel of the Gurgaon Industrial area in advance of the launch of the research project. As a consequence of this, the total number of workers in theautomotive industry was 872. Only those subjects who met the criteria for qualification were included in the random selection and analysis of the others' data.

The Proforma Details

General data: Consisted of demographic variables and oral hygiene practices, bad habits Clinical parameter: The Community Periodontal Index.

Clinical Examination

The examiner visited Gurgaon's auto factories on the scheduled dates. There was a total of 420 people who wereexamined for this study and all of them were older than 20 years old. Of the 420 people, 83.3% were males and 16.7% were females. The evaluation of the periodontal condition was carried out in accordance with the Community Periodontal Index (CPI), which was described in the WHO oral health survey- basic Methods (1997) 4th edition. The evaluation was carried out with the help of community periodontal index probe 20. This index takes into account the examination of index teeth in each sextant for three periodontal status indicators, namely gingival bleeding, calculus, and periodontal pockets. The periodontal status was recorded with a possible score range that went from 0 to 4: healthy (0), bleeding on probing (1), calculus (2), shallow periodontal pockets (3), and deep periodontal pockets (4).

Statistical analysis

Information collected was entered into an MS excel sheet, coded, and ultimately transferred to SPSS (Statistical Package for Social Sciences) software, version 20 (SPSS Inc., Chicago, IL, USA). Descriptive statistics included the computation of percentages, means, and standard deviations. In order to determine whether or not the variables were normally distributed, the Kolmogorov-Smirnov test was carried out. Chi square was used to analyse CPI scores and the loss of attachment among socio-demographic factors. ANOVA and t-tests was used for understanding the difference in score between sextants. It was determined, through the use of multiple logistic regressions, which factors significantly contributed to periodontal disease. P-value was considered significant when < 0.05.

RESULTS

Table 1 presents an illustration of the distribution of the study population according to the demographic variables that were considered. There was a total of 420 people employed in industrial settings who took part in the survey; 350 (83.3%) of those participants were male, and 70 (16.7%) of those participants were female. The population that was being studied had a mean age of 35.25 years, plus or minus 4.21 years. The participants' ages ranged from 31 to 40 years old, which made up a larger proportion than any other group (33.8 percent). Only 7.1% of the subjects had completed some level of education beyond the tenth grade. A greater proportion (n = 346; 82.4 percent) of the people who participated in the research cleaned their teeth with a toothbrush and toothpaste. There were 199 people who used smokeless tobacco, which is a prevalence rate of 47.4 percent. This was followed by 102 people who had a combination of poor oral habits (24.3 percent).

Table 1. Distribution of the study population according to demographic characteristics.

Characteristics	n	%
Age groups (in years)		
21-30	137	32.6
31-40	142	33.8
41-50	76	18.1
51-60	65	15.5
Sex		
Males	350	83.3
Females	70	16.7
Education		
Illiterate	185	44
Upto 10th class	205	48.8
> 10th class	30	7.1
Oral hygiene practices		
Irregular cleaning	36	8.6

Toothpaste+Toothbrush	346	82.4
Finger+Toothpowder	30	7.1
Neemstick	8	1.9
Adverse Habits		
None	24	5.7
Smoked tobacco	61	14.5
Smokeless tobacco	199	47.4
Alcohol	34	8.1
Both	102	24.3
Total	**420**	**100**

Table 2 addresses the distribution of CPI scores among the study population based on the socio-demographic variables that were examined. Thirty-two-point nine percent of the people examined had bleeding when they were probed. The prevalence of shallow pockets was found to be 27.9 percent, and the prevalence of deep pockets was found to be 19.5 percent. Differences in the periodontal status that were statistically significant were found to exist according to factors such as education level, age group, oral hygiene practices, and bad habits. The higher destructive periodontitis was noted among the elderly individual (p=0.034) than any other age group. Increasing levels of education were found to be associated with a statistically significant reduction in the prevalence of severe periodontal disease (p = 0.001). Concerning the oral hygiene practices, shallow pocket of 30% was observed among the participants who were using finger and toothpowder while neem sticks group had 37.5 shallow pockets (p=0.001) showed a greater prevalence of the periodontal pockets than those who did not. The smokers had a higher prevalence of shallow pockets (44,3 percent), whereas the subjects who had multiple habits depicted the highest prevalence of deep pockets (25.5 percent). Alcohol users had a prevalence rate of bleeding gums that was nearly 90 percent higher than the general population. There was no discernible difference between the sexes in terms of the periodontal status.

Table 2: Periodontal evaluation based on CPI scores, taking into account a variety of socio-demographic factors.

Characteristics	Score 0 n (%)	Score 1 n (%)	Score 2 n (%)	Score 3 n (%)	Score 4 n (%)	Total n (%)	P value
Age group (in years)							
21-30	7(5.1)	43(31.4)	28(20.4)	35(25.5)	24(17.5)	137(32.6)	
31-40	0	47(33.1)	31(21.8)	34(23.9)	30(21.1)	142(33.8)	0.034*
41-50	0	30(39.5)	9(11.8)	24(31.6)	13(17.1)	76(18.1)	
51-60	0	18(27.7)	8(12.3)	24(36.9)	15(23.1)	65(15.5)	
Sex							
Males	1(0.3)	121(34.6)	68(19.4)	93(26.6)	67(19.1)	350(83.3)	0.714
Females	6(8.6)	17(24.3)	8(11.4)	24(34.3)	15(21.4)	70(16.7)	
Education							
Illiterate	0	39(21.1)	28(15.1)	58(31.4)	60(32.4)	185(44)	
Upto 10th class	1(0.5)	80(39)	46(22.4)	58(28.3)	20(9.8)	205(48.8)	0.001*
> 10th class	6(20)	19(63.3)	2(6.7)	1(3.3)	2(6.7)	30(7.1)	
Oral Hygiene Practices							
No cleaning	7(19.4)	21(58.3)	3(8.3)	2(5.6)	3(8.3)	36(8.6)	
Tooth brush+Toothpaste	0	110(31.8)	64(18.5)	103(29.8)	69(19.9)	346(82.4)	0.001*
Finger+Tooth powder	0	6(20)	7(23.3)	9(30)	8(26.7)	30(7.1)	
Neem stick	0	1(12.5)	2(25)	3(37.5)	2(25)	08(1.9)	
Adverse Oral Habits							
None	5(20.8)	14(58.3)	5(20.8)	0	0	24(5.7)	
Smoked tobacco	0	12(19.7)	12(19.7)	27(44.3)	10(16.4)	61(14.5)	
Smokeless tobacco	0	54(27.1)	39(19.6)	65(32.7)	41(20.6)	199(47.4)	0.001*
Alcohol	2(5.9)	16(47)	4(11.8)	7(20.6)	5(14.7)	34(8.1)	
Both	0	42(41.2)	16(15.7)	18(17.6)	26(25.5)	102(24.3)	
Total	7(1.7)	138(32.9)	76(18.1)	117(27.9)	82(19.5)	420(100)	

*P≤0.05 statistically significant.

The significant differences in the degree of loss of attachment experienced by the study population are detailed inTable 3. The majority of the study population, 277, had a loss of attachment measuring between

4-5 millimeters (66 percent), while only eight people (1.9 percent) had a loss of attachment measuring between 9-11 millimeters (comparatively less prevalent). The group that used neem sticks (100 percent) and those who were older than 51years old had the highest loss of attachment measuring 4-5 millimeters. This was obvious (72.3 percent). Males (70%) depicted a greater preponderance than females (45.7%) corresponding to the 4-5 mm LOA scores. which was statistically significant (p=0.001). Subjects who were illiterate (70.8%), irregular cleaners (66.7%), and smokeless tobacco chewers (75.9%) also showed 4-5mm LOA scores which were statistically significant (p=0.001).

Table 3. Loss of attachment scores according to various socio-demographic characteristics.

Characteristics	0-3 mm n (%)	4-5 mm n (%)	6-8 mm n (%)	9-11 mm n (%)	Total n (%)	P value
Age group (in years)						
21-30	16 (11.7)	91 (66.4)	28 (20.4)	2 (1.5)	137 (32.6)	
31-40	25 (17.6)	96 (67.6)	19 (13.4)	2 (1.4)	142 (33.8)	0.133
41-50	10 (13.2)	43 (56.6)	19 (25)	4 (5.3)	76 (18.1)	
51-60	8 (12.3)	47 (72.3)	10 (15.4)	0	65 (15.5)	
Sex						
Males	41 (11.7)	245 (70)	60 (17.1)	4 (1.1)	350 (83.3)	0.001*
Females	18 (25.7)	32 (45.7)	16 (22.9)	4 (5.7)	70 (16.7)	
Education						
Illiterate	30 (16.2)	131 (70.8)	24 (13)	0	185 (44)	
Upto 10th class	21 (10.2)	132 (64.4)	44 (21.5)	8 (3.9)	205 (48.8)	0.001*
Above 10th class	8 (26.7)	14 (46.7)	8 (26.7)	0	30 (7.1)	
Oral Hygiene Practices						
No cleaning	0	24 (66.7)	12 (33.3)	0	36 (8.6)	
Tooth brush+Tooth paste	51 (14.7)	227 (65.6)	60 (17.3)	8 (2.3)	346 (82.4)	0.010*
Finger+Tooth powder	8 (26.7)	18 (60)	4 (13.3)	0	30 (7.1)	
Neem stick	0	8 (100)	0	0	8 (1.9)	
Adverse Oral Habits						
None	0	12 (50)	12 (50)	0	24 (5.7)	
Smoked tobacco	18 (29.5)	20 (32.8)	21 (34.4)	2 (3.3)	61 (14.5)	
Smokeless tobacco	11 (5.5)	151 (75.9)	34 (17.1)	3 (1.5)	199 (47.4)	0.001*
Alcohol	9 (26.5)	22 (64.7)	3 (8.8)	0	34 (8.1)	
Both	21 (20.6)	72 (70.6)	6 (5.9)	3 (2.9)	102 (24.3)	
Total	59 (14)	277 (66)	76 (18.1)	8 (1.9)	420 (100)	

*P≤0.05 statistically significant

Table 4 shows the average number of affected sextants, broken down by age and gender. The individuals of 21 to 30 years had the highest mean number of healthy sextants (0.710.06), while the age group of 31 to 40 years had the lowest mean number of healthy sextants (0.080.03). There was no discernible correlation between age and the mean number of sextants with bleeding, calculus, shallow pockets, or deep pockets.

Only for the deep pockets didwe find that there was a gender difference that was statistically significant (p = 0.039). Calculus demonstrated a higher mean number of participants (2.980.04 total), as indicated by the sextants counted in the study population.

Table 4. Distribution of the mean number of sextants affected by periodontal disease in the study population.

Variables	Community Periodontal Index (Mean ± SD)				
	Healthy	Bleeding	Calculus	Pocket (4-5mm)	Pocket (>6mm)
Age groups (in years)					
21-30 (n=137)	0.71±0.06	1.73±0.44	2.71±0.64	0.77±0.05	0.07±0.04
31-40 (n=142)	0.08±0.03	1.33±0.32	3.32±0.53	1.12±0.08	0.15±0.06
41-50 (n=76)	0.22±0.07	1.38±0.29	3.17±0.46	1.06±0.69	0.17±0.05
51-60 (n=65)	0.55±0.03	1.77±0.54	2.64±0.51	0.89±0.54	0.15±0.06
Total (n=420)	0.44±0.02	1.6±0.04	2.89±0.55	0.93±0.63	0.13±0.05
F value	5.096	0.905	1.702	0.918	0.618
P value	0.061	0.439	0.166	0.432	0.604
Gender					
Males (n=350)	0.45±0.03	1.58±0.04	2.86±0.54	0.94±0.06	0.16±0.06
Females (n=70)	0.39±0.04	1.71±0.03	3.02±0.58	0.88±0.07	0.00±0.00
Total (n=420)	0.41±0.05	1.64±0.72	2.98±0.04	0.91±0.09	0.08±0.02
t- value	0.343	0.4	0.441	0.296	2.075
p-value	0.732	0.689	0.659	0.767	0.039*

Test applied: One way ANOVA, t- test; *Significant difference = $p<0.05$

The odds ratios are depicted in Table 5. Individuals between the ages of 41 and 60 were found to be at a higher risk of developing periodontal disease. OR=0.548, were male OR=1.313, used multiple types of tobacco OR=3.994,and used other oral hygiene practices OR=0.774.

Table 5. The odds ratio and 95% confidence interval for various study variables associated with periodontal status.

Characteristics	Odds ratio	95% Confidence interval	P value
Age			
21-40 years	0.548	(0.420-5.565)	0.011*
41-60 years	-		
Gender			
Males	1.313	(0.030-0.326)	0.001*
Females	-		
Education			
Upto 10th class	1.476	(0.406-6.059)	0.671
Above 10th class	-		
Oral Hygiene Practices			
Others	1.774	(0.771-5.811)	0.045*
Toothbrush+Toothpaste	-		
Adverse oral habits			
Both	3.994	(2.571-60886)	0.039*
Others	-		

In order to estimate the linear nature of the relationship that exists between the CPI, which serves as the dependent variable, and the myriad of other variables, a stepwise multiple linear regression analysis was carried out (Table 6). Oral hygiene practices, harmful oral habits, age, education level, and gender were found to be the best predictors of CPI, with these factors accounting for 78 percent, 67 percent, 42 percent, 35 percent, and 16 percent of the variance, respectively. Other predictors included age.

Table 6. **Analysis using stepwise multiple linear regression with the Community Periodontal Index as the dependent variable**

Model	R	R^2	F-value	p-value
1	0 .281 (a)	0.078	33.23	0.001(a)
2	0. 260 (b)	0.067	23.09	0.001(b)
3	0. 206 (c)	0.042	19.12	0.001(c)
4	0.188(d)	0.035	15.45	0.001(d)
5	0.128(e)	0.016	14.87	0.001(e)

a Predictors: (Constant), Oral Hygiene Practices
b Predictors: (Constant), Oral Hygiene Practices, Adverse Oral Habits
c Predictors: (Constant), Oral Hygiene Practices, Adverse Oral Habits, Age
d Predictors: (Constant), Oral Hygiene Practices, Adverse Oral Habits, Age, Education
e Predictors: (Constant), Oral Hygiene Practices, Adverse Oral Habits, Age, Education, Sex.

DISCUSSION

There is no equivalent to the national dental health service that exists in other developed countries in India. The population under study has limited access to oral health care services because there is no provision for dental consideration. The government does provide formal medical care at rural areas but there is no provision for oral care. To begin the planning process for an oral health promotion program based on a high-risk approach, baseline information on the individuals' periodontal status must be collected. Because there is a dearth of published research on the periodontal health of industrial workers in India, we decided to conduct the present study in order to evaluate the periodontal health of a population representative of Gurgaon's industrial workforce.

Periodontal disease is a chronic condition that can last for a significant amount of time and is brought on by a number of different factors that are associated with living a normal life. It is brought on when there is a disruption in the harmony that exists between the resistance of the host and the factors that incite that disease. The use of a toothbrush and toothpaste was the oral hygiene practice that was observed to be most common among the population under study (82.4 percent). This finding was very similar to the outcomes that were accounted for by Sakthi *et al* [21] in Chennai, India, where 76.9 percent of the building construction workers cleaned their teeth with toothbrushes and toothpaste on a daily basis. Correspondingly Gaikwad *et al* [22] among matchbox factory workers (89.6%), Sharma et al [23] among cement factory workers (86.7%), and Bansal and Veersha [24] (91%) have detailed something similar.

The industry operates nonstop in order to produce goods, and the workers are required to perform taxing tasks in shifts that rotate regularly. They have a morning shift, an afternoon shift, and a night shift, and each shift lasts for eight hours. Because of the longer working hours, many people end up staying at their jobs for significantly longer than is necessary. Industrial workers may be identified as a high-risk group due to a high prevalence of negative oral habits such as smoking, using smokeless tobacco, drinking alcohol, or a combination of any of these. People are driven to poor oral health by the physically taxing work, which increases their consumption of alcoholand tobacco [25].

The overall prevalence of tobacco consumption was 86.2 percent, which was similar to the Ansari et al. study, [26] (85.9%). Although the prevalence of tobacco use in our research was lower than that which was accounted for by Iribarren C [27] and Ansari et al.[26], it was more noteworthy than the prevalence of tobacco use that was reported by Mou *et al* [28]. The highest prevalence of negative oral habits that were observed in industrial workers was related to the use of smokeless tobacco, which accounted for 47.4 percent of the total. This could be attributed to a lack of awareness regarding the potentially harmful effects of tobacco and the products made from tobacco. To prevent themselves from falling asleep during their night shifts, employees often start smoking or chewing tobacco (14.5 percent smokers and 47.4 percent chewers in the present study). Furthermore, teamwork and peer influence add to their higher prevalence and gradually they get addicted such a lot of that without chewing tobacco they don't get into work. It is accounted for that overtime work influences different aspects of a person's lifestyle and that probably incorporates oral health behavior [29, 30]. The explanation underlying this might be low educational status occupation including hard work, and poverty combined with ignorance.

In many studies, the prevalence of periodontal disease was viewed as almost 100 percent in adults [31-33]. There have been a few studies that have shown that only 3-3.5 percent of subjects ranging in age from 18-68 had completely healthy periodontium's, meaning that they did not require any kind of treatment (for example) [33, 34]. According to CPI, the periodontal disease was found to have a prevalence of 98.3 percent in our recent study, with only 0.440.02 healthy sextants. It was higher than the results of India's National Oral Health Survey and Fluoride Mapping, which took place in 2002-2003 [35].

This prevalence was practically identical to those which were obtained among German factory workers [36], coal mineshaft [5], and beedi factory workers in India [37], where it was discovered that more than 95 percent of the workers were enduring periodontal disease. In the population that was examined, bleeding (32.9 percent) and shallow pockets (27.9 percent) were the conditions that were most prevalent. Additionally, destructive periodontitis was seen in 19.5% of the subjects. Similar outcomes were observed in different studies [38, 39].

Gingival bleeding is an early sign of periodontitis and a leading risk marker for existing periodontal inflammation, both of which are factors in the development and progression of periodontitis. Gingivitis is an inflammation of the gingiva, which lines the gums that surround the teeth. The pervasiveness of gingivitis in our study population was 32.9% which was lesser than that revealed in a systematic review among the Indian population to be around 49% [40].

Calculus was most prevalent in individuals between the ages of 31 and 40 (33.1 percent), whereas shallow and deep periodontal pockets showed the highest prevalence (36.9 percent and 23.1 percent respectively) in individuals between the ages of 51 and 60. These results similar to that of Lie et al [41] conducted on aluminum factory workers. In addition, females (8.6 percent) had a significantly higher number of healthy scores than males (0.3 percent), which was in confirmation of the findings of various other studies [42].

According to a few different studies [43, 44], as the participants in the research got older, a greater proportion of them developed pockets. In this study, the older age group had a significantly higher odds ratio for periodontaldisease. Other studies [45, 46] confirmed this finding, showing that the prevalence and severity of periodontal disease increased with age. The findings of these studies were consistent with the findings of the present study. The current investigation found that males had a greater risk of periodontal disease than females did, as indicated by an odds ratio of 1.313. This was done based on studies of Japanese and beedi factory workers [8, 37]. In addition to age and gender, poor oral hygiene and bad oral habits are key predictors of periodontal disease. Oral hygiene aids other than a toothbrush and toothpaste, like finger and tooth powder or neem stick, increased periodontal disease risk. Since the level of oral hygiene is directly related to the amount of plaque build-up on the teeth, it is reasonable to predict that the level of oral hygiene in a population is emphatically related with the prevalence and severity of the periodontal diseases. The role of dental plaque as the primary etiological factor in the progression of periodontal diseases was shown by Loe and colleagues [47, 48].

However, the results of various epidemiological studies tend to fall into a wide variety of categories and categories. This could be due to different assessment strategies and instruments, gingival inflammation in the population, or how the results were interpreted. When compared to other risky oral behaviors, the current study found that smoking was a significant risk factor. Other risky oral behaviors included: Workers in Japanese factories also exhibited a trend that was very similar to this one. Tobacco smoke has been shown to contain more than 200 substances that are toxic to the body[8]. This increases periodontal disease susceptibility and may explain the higher incidence in smokers.4[9] According to the findings of the current research, a higher prevalence of severe periodontal disease was observed in participants with lower levels of education. The findings of our study agreed with the findings of another study on factory workers who had been exposed to beedi [37]. This may be because education level determines income or financial status, which affects dental health awareness and use.

Stepwise linear regression identified demographic factors as predictors of periodontal disease. Other factors included gender, age, and educational level. It was similar to study done in Finland [52]. This was the case because smoking is a known risk factor for periodontal disease. According to a number of studies [51,52,53], the two most significant risk factors for periodontal disease are educational level and gender. The study has a few flaws that need to be fixed before it can be considered complete. Studies that are cross-sectional are merely a snapshot: the same circumstances could have given different results if a different time period had been selected. In this vein, drawing conclusions about the chain of events that led to an effect is challenging. In spite of these restrictions, it is believed that these findings will provide benchmark data that can be used in the design of oral health promotion programs for this population. Before performing any invasive procedures, it is essential to perform a risk assessment on the individual and select the most appropriate preventive regimens. Only then can one hope to make any headway. Because of the possibility that an underestimation of prevalence was caused by the use of a scoring system for only a portion of the mouth (one that was based on index teeth), full mouth assessments are being recommended for the ongoing research [51, 52].

CONCLUSION

The findings of this study shed light on the periodontal health of industrial workers. This knowledge may aid in the design of studies that focus on further investigating the causes of these outcomes and, more importantly, in the planning of oral health promotion programs that employ both preventive and curative strategies. The actions and routines that people engage in on the job, which are influenced by both their personal and professional characteristics, are a major factor in determining an individual's oral health status.

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REFERENCES

1. Cavalcanti AF, Fernandes LH, Cardoso AM, Santos JS, Maia EG, Cavalcanti AL. (2017). Oral health status of Brazilian workers of a textile industry. Pesquisa Brasileira em Odontopediatria e Clinica Integrada;17(1):1-8.
2. Kim HD, Douglass CW. (2003). Association between occupational health behaviours and occupational dental erosion. J Public Health Dent : 63:4:244-249.
3. Cengiz Mİ, Zengin B, İçen M, Köktürk F. (2018). Prevalence of periodontal disease among mine workers of Zonguldak, Kozlu District, Turkey: a cross-sectional study. BMC public health. 18(1):1-7.
4. Shah N. (2007). Oral and dental diseases: Causes, Prevention and treatment strategies. NCMH Background papers-Burden of Disease in India;275-298.
5. Abbas I, Mohammad SA, Avidapu R. (2016). Oral health status of underground coal workers of Ramakrishnapur, Adilabad District, Telangana, India - across-sectional study. J Clin Diagn Res;10:ZC28–31.
6. Peterson PE. (2009). Continuous improvement of oral health in the 21st century- the approach of the WHO Global Oral Health Programme. The World Oral Health Report . WHO/NMH/NPH/ORH/03.2
7. Agarwal V, Khatri M, Singh G, Gupta G, Marya CM, Kumar V. (2010). Prevalence of periodontal diseases in India. J Oral Health Comm Dent;4:7-16.
8. Yoshida Y, Ogawa Y, Imaki M, Nakamura T, Tanada S. (1997). Lifestyles and Periodontal Disease of Japanese Factory Workers. Environ Health Prev Med;1:188-192.
9. Workplace stress. A collective challenge. (2016). International Labour Organization. Available at https://www.ilo.org/safework/info/publications/WCMS_466547/lang--en/index.htm. Accessed on 04.10.2018.
10. Cryer B, McCraty R, Childre D. (2003). Pull the plug on stress. Harv Bus Rev;81(7):102-107.
11. Singh M, Ingle NA, Kaur N, Yadav P, Ingle E, Charania Z. (2015). Dental caries status and oral hygiene practices of lock factory workers in Aligarh City. J Int Oral Health;7(6):57–60.
12. Lacerda JT, Ribeiro JD, Ribeiro DM, Traebert J. (2011). Prevalence of orofacial pain and its impact on the oral health-related quality of life of textile industries workers of Laguna, SC. Brazil Ciênc Saúde Coletiva;16(10):4275-4282.
13. Nethravathi TD, Joshipura V, Venugopal S, Subbaiah SK, Jagadeesh KN, Apparaju V. (2015). A comparative assessment of periodontal status and treatment needs among population in Tumkur district using CPITN: An epidemiological study. J Adv Clin Res Insights ;2:120-123.
14. Kundu D, Mehta R, Rozra S. Periodontal status of a given population of West Bengal: An epidemiological study. J Indian Soc Periodontol 2011;15(2):126-129.
15. Goswami D. (2014). Periodontal treatment needs of a rural population of North East India. The Clarion ;3(1):8-12.
16. Gurugram among top 5 IT hubs in Asia Pacific". Hindustan Times. 28 May 2019. Retrieved 5th Sept 2018.
17. Kumar K.P. Narayana. (2013). “Gurgaon: How not to Build a City". Forbesindia.com. Archived from the original on . Retrieved 2 October 2013.
18. Kannan, Shilpa. (2013). "Gurgaon: From fields to global tech hub". BBC News. Archived from the original.
19. Cities having population 1 lakh and above, Census 2011" (PDF). censusindia.gov.in. Archived (PDF) from the original on 23 July 2013. Accessed on 5 Sept 2018.
20. World Health Organization, (1997). Oral health surveys. Basic methods 4th ed, Geneva: WHO.
21. Sakthi SS, John J, Saravanan S, Kumar RP. (2011). Periodontal health status and treatment needs among building construction workers in Chennai, India. J Int Oral Health;3(6):7-14.
22. Gaikwad R, Bhowate R, Bajad P, Gadbail AR, Gondivkar S, Sarode SC, Sarode GS, Patil S. (2017). Potential Predictor of Tobacco Cessation among Factory Workers: A Baseline Data of Worksite Tobacco Cessation Programs in the Central Part of India. J Contemp Dent Pract;18(10):1-7.
23. Sharma A, Thomas S, Dagli RJ, Solanki J, Arora G, Singh A. (2014). Oral health status of cement factory workers, Sirohi, Rajasthan, India. Journal of health research and review. 1:(1):15-19.
24. Bansal M, Veeresha KL. (2013). Oral health status and treatment needs among factory employees in Baddi-Barotiwala-Nalagarh Industrial hub, Himachal Pradesh, India. Indian J Oral Sci;4(3):105-109.
25. Gaikwad RN. (2019). Tribal Tobacco Survey among Young Adolescent of Central Part of India. World J Dent ;10(2):109-113
26. Ansari ZA, Bano SN, Zulkifle M. (2010). Prevalence of tobacco use among power loom workers - a cross-sectional study. Indian J Community Med;35(1):34-39.

27. Iribarren C, Friedman GD, Klatsky AL, Eisner MD. (2001). Exposure to environmental tobacco smoke: association with personal characteristics and self reported health conditions. Journal of Epidemiology & Community Health. ;55(10):721-8.
28. Mou J, Fellmeth G, Griffiths S, Dawes M, Cheng J. (2013). Tobacco Smoking Among Migrant Factory Workers in Shenzhen, China. Nicotine Tob Res;15(1):69-76.
29. Bannai A, Tamakoshi A.(2014). The association between long working hours and health: A systematic review of epidemiological evidence. Scand J Work Environ Health;40:5-18.
30. Jang TW, Kim HR, Lee HE, et al.(2015). Overwork and cerebro cardiovascular disease in Korean adult workers. J Occup Health;57:51-57.
31. Bertl K, Tangl S, Rybaczek T, Berger B, Traindl-Prohazka M, Schuller-Götzburg P, Grossschmidt K. (2020). Prevalence and severity of periodontal disease in a historical Austrian population. Journal of Periodontal Research. 55(6):931-45.
32. Raitapuro-Murray T, Molleson TI, Hughes FJ. (2014). The prevalence of periodontal disease in a Romano-British population c. 200-400 AD. British dental journal. ;217(8):459-66.
33. Gaikwad RN.(2019). Behavioural perspective of tobacco use among youth of Vidarbha region of Maharashtra state in central part of India. Brazilian Dental Science. 30;22(3):358-64.
34. Kwok V, Caton JG. (2007). Commentary: prognosis revisited: a system for assigning periodontal prognosis. Journal of periodontology. 78(11):2063-71.
35. Bali RK, Mathur VB, Talwar PP, Chanana HB. (2004). National Oral Health Survey and Fluoride Mapping 2002-2003 India. Dental Council of India and Ministry of Health and Family Welfare (Government of India).
36. Hohlfeld M, Bernimoiilin J-P: (1993). Application of the community periodontal index of treatment needs (CPITN) in a group of 45-54-year-old German factory workers. J Clin Periodontol;20:551-555.
37. Shaikh H, Shankar S, Vinay S. (2011). Assessment of periodontal status and treatment needs among Beedi factoryworkers Harapanahalli town, Davangere district, Karnataka. JIADS ;2:13-17.
38. Baelum V, Pisuithanakan S, Teanpaisan R, Pithpornchaiyakul W, Pongpaisal S, Papapanou PN et al. Periodontal conditions among adults in Southern Thailand. J Periodontal Res 2003;38:156-163.
39. Dini EL, Guimaraes LO. Periodontal conditions and treatment needs (CPITN) in a worker population in Araraquara, SP Brazil. Int Dent J 1994;44:309-311.
40. Janakiram C, Mehta A, Venkitachalam R . (2020). Prevalence of periodontal disease among adults in India: A systematic review and meta-analysis. J Oral Biol Craniofac Res;10(4):800-806. doi: 10.1016/j.jobcr.2020.10.016.
41. Lie T, Due NA, Abrahamsen B, Böe OE. (1988). Periodontal health in a group of industrial employees. Community Dent Oral Epidemiol;16(1):42-46.
42. Corbet EF, Holmgren CJ, Lim LP, Davies WI. (1989). Sex differences in the periodontal status of Hong Kong adults aged 35-44 years. Community Dent Health;6(1):23-30.
43. Skaleric U, Kovac- Kavcic M. (1989). Periodontal treatment needs in a population of Ljubljana, Yugoslavia. Community Dent Oral Epidemiol;17:304-306.
44. Guile EE. (1992). Periodontal status of adults in Central Saudi Arabia. Community Dent Oral Epidemiol ;20:159-160.
45. Albandar JM. (2000). Periodontal diseases in North America. Periodontology 2002; 29:31-69.
46. Corbet EF, Wong MC, Lin HC. (2001). Periodontal conditions in adult Southern Chinese. J Dent Res 80:1480-1485.
47. Tirth A, Yadav V, Tangade PS, Ravishankar TL, Chaudhary S, Mathur A. (2013). Assessment of Dental caries status, Periodontal health and oral hygiene practices among two Populations of Moradabad city, India. International Journal of Occupational Safety and Health. 3(2):8-11.
48. Silness J, Loe H. (1964). Periodontal disease in pregnancy. Correlation between oral hygiene and periodontal condition. Acta Odontol Scand;22:121-135.
49. Gabriel HE, Liu Z, Crott JW, Choi SW, Song BC, Mason JB et al. (2006). A Comparison of Carotenoids, Retinoids, and Tocopherols in the Serum and Buccal Mucosa of Chronic Cigarette Smokers versus Nonsmokers.Cancer Epidemiol Biomarkers Prev;15:993-999.
50. Alduwayghiri EM, Khan N, Alotaiby F, Alrebdi A, Alduwayghiri R, Beegum F. (2022). Comparative study on general population's perspective toward COVID-19 vaccines in Saudi Arabia–After a year of vaccine immunization. NeuroQuantology. 1344-54.
51. Alrebdi, A. (2022). Bibliometric assessment of laser therapy in dentinal hypersensitivity. International Journal of Health Sciences, 6(S3), 10747–10754.
52. Paulander J, Axelsson P, Lindhe J. (2003). Association between level of education and oral health status in 35-, 50- , 65- and 75-year-olds. J Clin Periodontol 30(8):697-704.
53. Persson GR, Persson RE, Hollender LG, Kiyak HA.(2004). The impact of ethnicity, gender, and marital status on periodontal and systemic health of older subjects in the Trials to Enhance Elders' Teeth and Oral Health (TEETH).J Periodontol;75(6):817-823.