Introduction

Sleep quality has been observed as the most salient element for the health of an individual. In India, the prevalence of poor quality of sleep among adolescents was almost 38% and this is an alarming rise when compared with the previous decades. Sleep is needed for the physical and psychological development of every human being. An average of 9.1 h sleep per day has been estimated as good sleep. Poor sleep is related to reduced immunity, inflammatory responses and poor diet. The Centres for Disease Control and Prevention (CDC) has declared sleep deprivation a public health crisis as we are in the modern era of industrialization, any alterations or changes in their working environment can have a massive impact on their sleep quality. Workers in any environment face a lot of problems which may impact their health and personal life. The Health Insurance Review and Assessment Service in Korea outlined that more than 6 lakh people were treated for sleep problems.

Background: Nowadays, a shift in our lifestyle which espouses long working hours and low sleep quality can have a direct impact on the general health and oral health status. Sleep deprivation results from intense long working hours. Aim: To recognize the impact of long working hours, on sleep and oral health assessments of migrant construction workers. Materials and Methods: This is a cross-sectional study conducted among migrant construction workers working in Chennai comprised of 1,521 participants. The sleep quality was assessed using the Insomnia Severity Scale-7 and the working hours was found using the Google forms and their oral health status was assessed using the Oral hygiene index-Simplified (OHIS-S) and the Decayed Missing and Filled teeth (DMFT) index. The data were analysed using IBM SPSS Statistical Software version 23.0. Statistical tests like the Chi-square association and one-way Analysis of variance (ANOVA) (normally distributed) were used for the analysis of three group comparisons. Results: From the study results, most of the participants were between 25 and 35 years, smokers, had negligence on oral health and had poor sleep quality due to their long working hours. On the association between the working hours per week and OHIS, DMFT and Insomnia Severity Scale total score, a statistically significant relationship was found using the one-way ANOVA. Conclusion: The results from our study brought neglected oral health care of the construction workers into the limelight which will help us in our future efforts to improve the oral health of the construction workers.

Keywords: Decayed teeth, insomnia, long working hours, oral health

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sleep-related diseases in hospitals. Thus, sleep deprivation affects not only the workers’ health but also the country’s economic productivity.\(^7\)

In respect to many ranges of the sleep parameters, poor quality of sleep was noted and experienced by the construction workers in India. The construction workers are prone to have sleep deprivation which opens the pathway to a higher amount of daytime sleepiness during working schedules.\(^8\) Several previous studies reported that most of the construction workers were likely to experience health problems.\(^9,10\) The main reason behind sleep deprivation and its consequences was long working hours which was usually termed hazardous to the worker’s health. Many restrictions and standards like a minimum daily rest period of 11 consecutive hours, a minimum of 20 min rest in any work period of more than 6 h and paid annual leave of at least 4 weeks have been introduced to reduce the burden of the workers. Since migrant construction workers cannot afford the medical and dental facilities available in our country, we have to encourage the workers at the primary level themselves to visit primary health care centres.

Long working hours is critical risk factor and it causes elevation of the catecholamine levels even during rest time which in turn increase oxidative stress.\(^10\) The increase in oxidative stress and systemic inflammation can cause periodontal diseases in oral health.\(^11\) The long working hours of migrant construction workers definitely have an impact on their sleep and general and oral health. The long working hours and shift work indeed affect the oral and general health of the construction workers due to longer duration of work, inadequate sleep and heavy workload.\(^12\) This paper was hypothesized to assist the oral health professional to recognize the impact of long working hours on sleep and oral health assessments.

**Materials and Methods**

The present cross-sectional study was conducted among migrant construction workers in Chennai who are working under various construction companies. A study was conducted from 26 July to 26 September 2021 (\(n = 1521\)). The workers were selected through a multistage sampling method. Chennai was divided into five major zones: Chennai North, South, East, West and Central. From each zone, a specified construction company was selected randomly and from each selected company, the workers who were present on the day of the study collection were included. The study was approved by the Institutional Review Board of Saveetha University. Informed consent was collected before the start of the study. The study purpose and its theme were clearly explained to the study participants. The anonymity of the participants was maintained and no personal information of the participants was included in the survey. The sample size was calculated as 1,521 workers using the previously published article\(^13\) by keeping 95% confidence interval and 5% of type II error using G power version 3.0 software.

Before the start of the study, two examiners were standardised and calibrated in the Department of Public Health Dentistry, Saveetha Dental College, Chennai, to ensure uniform interpretation, understanding and application of codes used in the study. The examiners were named Examiner A and Examiner B and underwent training for a day. They were trained to record the Insomnia Severity Index and Oral health Status using the Oral hygiene Index-Simplified and DMFT index.

**Inclusion and exclusion criteria**

- The workers who were present on the day of data collection were included.
- The workers who were not present during data collection were excluded and those who were older than 60 years were excluded.

**Survey tool**

A prevalidated and tested questionnaire containing four parts in which the first part has demographic details, which includes age, gender, educational level, occupation type, and the second part, which consists of questions like self-assessment of oral health, working hours per week, number of times brushing per day, dental check-up within the last 1 year, smoking status and the average hours of sleep per day. The third part contains a standardized Insomnia Severity Scale which contains seven questions related to the quality of life. The total scores range from 0 to 28 with the higher scores indicating clinical insomnia; 0–7 indicate clinically significant insomnia, scores ranging from 8–14 indicate subthreshold insomnia, 15–21 interpret moderate severity and 22–28 indicate clinical insomnia (severe).\(^13\) The Insomnia Severity Index is a five-point Likert scale in which the first three questions contain (None, Mild, Moderate, Severe and Very Severe) and the next four questions also have the five-point Likert scale (Very satisfied, Satisfied, Moderately satisfied, Dissatisfied, Very dissatisfied). The final part records the oral health assessment status which scores the Oral hygiene Index-Simplified and DMFT.

**Statistical analysis**

The frequency and per cent of categorical variables were computed to delineate the demographic characteristics of the study participants. The Statistical Package for Social Sciences (SPSS) version 23.0 was used to analyse the findings. Normality tests like the Shapiro–Wilks and Kolmogorov–Smirnov were estimated. Statistical tests like the Chi-square association and one-way ANOVA (normally distributed) were used for the analysis of group comparisons. The level of statistical significance was predetermined to be \(P < 0.05\).

**Results**

The present study was conducted on a study population of 1,521 participants in which 90% (\(n = 1,368\)) of the participants were males and 10% (\(n = 152\)) of the participants were females. More than half of the population (53.2%) was between 25
and 35 years, 21.6% of the workers belonged to 36–45 years whereas only 11.1% of the workers were below 25 years. As we expected, 58.4% of the included workers completed only their middle schooling whereas 38.4% of the workers studied only till high school and only 3.2% started their college education but none of them completed it. Most of the workers (n = 1,432) were working in the production line and only 5.8% were from the administrative department [Table 1].

The answers were recorded in level 2, which consists of questions like self-assessment of oral health, working hours per week, brushing behaviour, average hours of sleep per day, dental check-up status and their smoking behaviour. Coming to self-assessment of their oral health, most of the workers (78.4%) gave moderate answers and only 5.3% of the participants were worried about their oral health. Surprisingly, more than half of the workers (51.6%) worked more than 60 h per week, and on interrogation, some confessed that they worked more than 13–15 h per day and only 2.6% of the workers were working less than 40 h per week. Only 6.8% of the workers (n = 104) brushed twice per day and 93.2% of the workers brushed only once. Surprisingly, 80.5% of the workers never visited a dentist in their lifetime and 19.5% of the workers (n = 296) visited once. When inquiring about their smoking status, it was found that 76.3% of the participants were current smokers which means three-fourths of the participants were smokers and only 16.7% of the workers were non-smokers. From the study results about the average hours of sleep per day, only 12.1% of the participants slept more than 8 h per day and 44.7% of the participants slept on an average of 5–6 h per day.

From the study results of level 3 which included the Insomnia Severity Scale containing seven questions, only 21.6% of the workers (n = 328) had non-clinically significant insomnia and almost 33.2% of the workers had clinical insomnia (moderate severity) and 39.5% of the workers had subthreshold insomnia [Table 2].

From the level 4 recorded study results of the Oral Hygiene Index-Simplified, DMFT (decayed status), surprisingly, only 2.6% of the workers had good oral health status and 44.7% of the participants had poor oral health status. On recording the decayed, missing and filled teeth, only 2.6% of the participants had good status and only 46.3% of the participants had poor decay status [Table 3].

On examining the association between working hours per week and OHIS, DMFT, respectively, a statistically significant was relation found (P = 0.000), respectively [Tables 4 and 5]. A statistically significant relationship (P = 0.000) was found on the association between the working hours per week and the Insomnia Severity Scale total score. A statistically significant relationship (P = 0.000) was found on the association between the Insomnia Severity Scale total score, OHIS, and DMFT. On the association between the working hours per week and OHIS, DMFT and the Insomnia Severity Scale total score, a statistically significant relationship was found using the one-way ANOVA [Table 6].

### Discussion

This study is an effort to assess the impact of working hours on sleep quality and oral health status among migrant construction workers in Chennai. The current study obtains a result that most of the construction workers were above 25 years. The results were in contrast with the study done among industry workers by Anais et al.\[^{19}\] where most of the workers employed were below 20 years. In this study, 76.3% of the workers were current smokers which is in contrast with the study results obtained by Nagappan et al.\[^{17}\] where less than 50% of the migrant workers were only current smokers, whereas in a study conducted by Anil Raj et al.\[^{10}\] in

![Table 1: Sociodemographic variables of the study participants](image-url)

- **Variables**
  - Age
    - <25 years
    - 25–35 years
    - 36–45 years
    - 46–55 years
    - >55 years
  - Gender
    - Male
    - Female
  - Educational level
    - Middle school
    - High school
    - Graduate
  - Occupation type
    - Workers/production line
    - Administrative
  - Self-assessment of oral health
    - Good
    - Moderate
    - Bad
  - Working hours per week
    - <40 h
    - 49–60 h
    - >60 h
  - Number of brushings per day
    - Once
    - Twice
  - Dental check-up within last 1 year
    - None
    - Once
  - Smoking status
    - Non-smoker
    - Former smoker
    - Current smoker
  - Average hours of sleep per day
    - <5 h
    - 5-6 h
    - 7-8 h
    - >8 h

- **n (%)**

- Age
  - <25 years: 168 (11.1%)
  - 25–35 years: 808 (53.2%)
  - 36–45 years: 328 (21.6%)
  - 46–55 years: 176 (11.6%)
  - >55 years: 40 (2.6%)
- Gender
  - Male: 1368 (90%)
  - Female: 152 (10%)
- Educational level
  - Middle school: 888 (58.4%)
  - High school: 584 (38.4%)
  - Graduate: 1432 (94.2%)
- Occupation type
  - Workers/production line: 1432 (94.2%)
  - Administrative: 88 (5.8%)
- Self-assessment of oral health
  - Good: 248 (16.3%)
  - Moderate: 1192 (78.4%)
  - Bad: 80 (5.3%)
- Working hours per week
  - <40 h: 40 (2.6%)
  - 49–60 h: 696 (45.8%)
  - >60 h: 784 (51.6%)
- Number of brushings per day
  - Once: 1416 (93.2%)
  - Twice: 104 (6.8%)
- Dental check-up within last 1 year
  - None: 1224 (80.5%)
  - Once: 296 (19.5%)
- Smoking status
  - Non-smoker: 248 (16.3%)
  - Former smoker: 112 (7.4%)
  - Current smoker: 1160 (76.3%)
- Average hours of sleep per day
  - <5 h: 160 (10.5%)
  - 5-6 h: 680 (44.7%)
  - 7-8 h: 496 (32.6%)
  - >8 h: 184 (12.1%)
From our study results, it is recommended that proper sleep with oral hygiene instructions can be given as a first-line modality to the workers which can influence their lifestyle habits and can have a definite impact on their oral health status and periodontal disease.

From our study results, more than 93.2% of the participants brush only once a day and only 6.8% of the workers brush twice a day, which is in contrast with the study results conducted by Sharma et al.[21] in which 36% of the workers brushed twice a day. This gives us a clue that construction workers brush only once a day due to their long working pressure and their sleep deprivation. From our study results, almost 40% of the participating workers had moderate severity clinical insomnia and clinical insomnia (severe). Almost half of the workers had poor oral health status on assessing the Oral Hygiene Index-Simplified and DMFT.

On comparing the association between the working hours per week and OHIS, the workers who were working more than 60 h per week had poor oral hygiene (74.5%). This tells us that there is a direct relationship between long working hours and the OHIS score. Long intense working hours without proper sleep can change hormones in our body which will alter the oral health status too. On comparing the sleep quality with OHIS, most of the participants who were suffering from clinical insomnia had poor oral hygiene status (72.7%). This is as per the study conducted in Saudi Arabia[23] in which the workers usually have poor sleep quality when compared with the other non shift workers. This tells us that sleep deprivation can lead to adverse hormonal profile and immune modulation that cause increased lymphocyte activation which can also cause immense production of interleukin. These results also showed that the oral health status was poor among the workers with long working hours and poor sleep quality.

To the best of our knowledge, this is the first study to assess the long working impact, sleep quality and oral health status. From our study results, it is recommended that proper sleep with oral hygiene instructions can be given as a first-line modality to the workers which can influence their lifestyle habits and can have a positive impact on their oral health status.

| Table 2: Participant’s scores for the seven components of the Insomnia Severity Scale | n (%) |
| --- | --- |
| Difficulty falling asleep |  |
| None | 152 (10%) |
| Mild | 664 (43.7%) |
| Moderate | 304 (20%) |
| Severe | 400 (26.3%) |
| Difficulty staying asleep |  |
| Mild | 264 (17.4%) |
| Moderate | 848 (55.8%) |
| Severe | 408 (26.8%) |
| Problems waking up too early |  |
| None | 208 (13.7%) |
| Mild | 504 (33.2%) |
| Moderate | 360 (23.7%) |
| Severe | 424 (27.9%) |
| Very severe | 40 (2.6%) |

| Table 3: Participants’ scores of the Insomnia Severity Scale, Oral Hygiene Index-Simplified, DMFT index | n (%) |
| --- | --- |
| Total score of the Insomnia Severity Scale |  |
| No clinically significant insomnia | 328 (21.6%) |
| Subthreshold insomnia | 600 (39.5%) |
| Clinical insomnia (moderately severity) | 504 (33.2%) |
| Clinical insomnia (severe) | 88 (5.8%) |
| Oral Hygiene Index-Simplified |  |
| Good | 40 (2.6%) |
| Fair | 800 (52.6%) |
| Poor | 680 (44.7%) |
| DMFT |  |
| Good | 40 (2.6%) |
| Fair | 776 (51.1%) |
| Poor | 704 (46.3%) |

Chennai, more than 90% of the migrant workers were smokers. Most of the participants included were males (90%) whereas in the study conducted in Japanese University most of the participants included were females in which they assessed sleep quality and periodontal disease.[19] From our study results, more than 51.6% of the workers were working more than 60 h per week which is in accordance with the study results conducted by Setia et al.[23] in which 7–46% of the workers worked more than 60 h per week. This gives a gist that most of the construction workers worked almost 8–12 hours per day which can have a definite impact on their sleep quality and oral health status.
Conclusion

Based on the study results, the construction workers participating in the study were exposed to sleep deprivation without their knowledge due to their long working hours. Sleep patterns can have a definite negative impact on our general health which influences our oral health too. The workers should be made aware to accomplish a healthy lifestyle pattern and instructions can be given on proper sleep and oral hygiene. The results from our study brought the neglected oral health care of the construction workers into the limelight. This will help our future efforts to improve the oral health of construction workers.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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