

REVIEW ARTICLE



## Occupational dental health hazards: A review

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### Abstract

Dental health is as important as general health, but the irony is; it has not received the same amount of importance as that of the general health. This fact is even more prevalent in the labourers, who are bound to neglect their oral health because of busy scheduled and stressful life. The present review article will explore the facts about the relationship between the working environment and the dental health status in different occupation scenarios. An extensive literature survey was performed using the Google scholar, EBSCOhost, science direct and the PubMed central to explore the various dental health conditions existing in different occupational scenarios. The most prevalent oral health conditions were dental caries, periodontitis, dental attrition and erosion, bruxism and missing teeth. All these conditions were either due to the physical environment of the occupation or else due to occupational related stress and the habits to relieve the same stress. Field workers had a higher prevalence of oral health conditions than the office workers. Exposure of the labour class to the varying physical environment in the work place may be the major reason for the deterioration of their oral health and demand of the present time is 'prevention is better than cure.' Thus, providing of the protection mask and the utilization of the same are the need of the day.

**Keywords:** Dental, hazards, health, occupation

### Introduction

The environment is one among the many determinants of the human health. The key to man's health lies largely in his environment, and the study of the disease is really the study of man and his environment. Hippocrates was the first person who related the environment and the disease. Later the concept of disease and environment association was revived by Pettenkofer.<sup>[1]</sup>

The macro or the external environment is all that which is external to the individual human host.<sup>[2]</sup> And the modern concept of the environment is not limited to water, the air and soil (physical environment), but also the social and economic condition to which the host is exposed.

'Occupational environment' means the sum of external conditions and influences, which prevail at the place of work and which have a bearing on the health of working population.<sup>[1]</sup> The interaction of the individual with the physical, chemical and biological agents of the work place as great bearing on his physical and the psychological health.

It is considered that the industrialization is the sign of progress, and this can be proved by the fact that all the developed countries in the world are the contributions of the industrialization. It also is the fact that industrial progress and the growth of a nation go hand

in hand. Alteration of the natural existing physical environment by such kind of progress has made the man to live in a complicated environment. By each day, the complexity is increasing as man is becoming more ingenious. If these trends persist, it is feared that the very "quality of life" we cherish may soon be in danger.<sup>[1]</sup>

Exposure to chemical, physical, and biological agents in the workplace can result in adverse effects on workers ranging from simple discomfort and irritation to debilitating occupational diseases such as lung fibrosis, neuropathy, deafness, organ damage, and cancers of various sites.<sup>[3]</sup> For the overall well-being of the person, dental health is as essential as total body health. Through the present article, the truth behind the influence of work place environment on the dental health will be reviewed with the help of existing literature based evidence [Table 1].

### Dental Erosion

Dental erosion has been defined as a progressive, irreversible loss of dental hard tissue by a chemical process, usually by acids other than those produced by plaque bacteria.<sup>[4]</sup> The erosion of teeth was most commonly seen in the individuals who worked in acid factories.<sup>[5-15]</sup> It is a common oral finding in professional wine tasters. There existed a significant difference for the erosion between the wine tasters and the non-wine tasters.<sup>[16]</sup>

**Table 1:** Different dental hazards and the associate occupation reported in the literature

Dental condition	Occupation	Reports
Dental erosion	Acid factory workers	Amin <i>et al.</i> (2001)
		Ann-Katrin <i>et al.</i> (2005)
	Wine taster	Erik PP and Charlotte G. (1991)
	Battery workers	Kim <i>et al.</i> (2006)
	Food industry workers	Kim HD and Douglass CW. (2003)
		Fukayo <i>et al.</i> (1999)
		Tuominen <i>et al.</i> (1991)
		Vianna MI and Santana VS. (2001)
		Gamble <i>et al.</i> (1984)
		Tuominen M. (1991)
		Suyama <i>et al.</i> (2010)
		Mulic <i>et al.</i> (2011)
		Wiegand A and Attin T. (2007)
Dülgergil <i>et al.</i> (2007)		
Goto <i>et al.</i> (1996)		
Periodontal diseases	Industrial workers	Peterson PE and Henmer P. (1988)
		Lie <i>et al.</i> (1988)
		Dagli <i>et al.</i> (2008)
		Panos <i>et al.</i> (1990)
		Petersen PE and Tanase M. (1997)
		Amin <i>et al.</i> (2001)
		Kumar <i>et al.</i> (2008)
		Pilot <i>et al.</i> (1989)
Dental caries	Mining workers	Hohlfeld M and Bernimoilin JP. (1993)
		Dagli <i>et al.</i> (2008)
	Food industry workers	Peterson PE and Henmer P. (1988)
		Panos <i>et al.</i> (1990)
		Petersen PE and Tanase M. (1997)
		Helena MK. (1978)
Dental attrition/wear	Mining workers	Kumar <i>et al.</i> (2008)
		Pilot <i>et al.</i> (1989)
Para functional activities	Industries where there is chronic exposure to noise	Hohlfeld M and Bernimoilin JP. (1993)
		Enbom <i>et al.</i> (1986)
		Jokstad <i>et al.</i> (2005)
		Tuominen M and Tuominen R. (1991)
		Kovacevic M and Belojevic G. (2006)
Oral mucosal and oral cancerous lesion	Industrial/mining/factory workers	Kovacevic M. (1989)
		Alajbeg <i>et al.</i> (2012)
		Giraki <i>et al.</i> (2010)
		Ohayon <i>et al.</i> (2001)
		Ahlberg <i>et al.</i> (2002)
		Ahlberg <i>et al.</i> (2004)
		Manfredini <i>et al.</i> (2004)
		Nakata <i>et al.</i> (2008)
		Pierce <i>et al.</i> (1995)
		Watanabe <i>et al.</i> (2003)
Oral mucosal and oral cancerous lesion	Industrial/mining/factory workers	Dagli <i>et al.</i> (2008)
		Vianna <i>et al.</i> (2005)
		Vianna <i>et al.</i> (2004)
		Koskela <i>et al.</i> (1990)
		Browne <i>et al.</i> (1977)
		Jahanbani J. (2003)
		Duraiswamy <i>et al.</i> (2009)
		Jahanbani <i>et al.</i> (2009)

Nevertheless, in a review article by Wiegand and Attin, they claim that the literature evidence show that the occupational dental erosion is limited to the battery and galvanizing workers. They also claim that the data available for the other occupations needs to be confirmed by further studies.<sup>[17]</sup> The fumes produced in the industries like phosphate, battery (sulfuric acid, lead acid, and chromic acid), silicone sealers (acetic acid release), copper smelters (sulfuric acid), zinc extraction by electrolytic methods, war industry are deleterious to oral hard and soft tissues.<sup>[5-18]</sup> There existed a highly significant difference for the prevalence of dental erosion between the control group and the acid factory workers.<sup>[5,6,10,11,13]</sup> The medical problems like upper respiratory tract symptoms persisted commonly in these workers.<sup>[6]</sup> In battery factory workers the incidence of erosion was more common in the anterior region<sup>[7,19]</sup> and the posterior region showed incidence of attrition.<sup>[7]</sup> However, in another study in organic and inorganic acid factories, showed the prevalence of erosion to be more in maxillary teeth<sup>[11,19]</sup> contrasting results were reported in the recent study where the erosion was seen in the mandibular anterior teeth.<sup>[15]</sup> But, Mullic *et al.*, noted that the erosion was most commonly seen on the occlusal surface of the mandibular molar tooth<sup>[16]</sup> in the wine tasters. By wearing the protective respiratory mask, one can reduce the overall occupational dental erosion.<sup>[8,9]</sup> Dental erosion was noticed even in the female food industry workers, owing to the inhalation of the dust containing tartaric acid, sucrose, magnesium sulphate and sodium bicarbonate. It also noted that the Longer the duration of exposure more the chances of dental erosion.<sup>[15,19]</sup> In the recent study on dental erosion, they have measured the density of acid in the working environment and have found out a significant relationship between the density of the acid and erosion rate.<sup>[15]</sup>

### Periodontal Diseases

Overall periodontal status of the industrial or the factory workers remained poor.<sup>[5,20-24]</sup> But the amount of sugar intake and the sweetening agent use along with sugar increased the risk of periodontal diseases.<sup>[25]</sup> Age of the worker was directly proportional to the poor periodontal health and the probing depth.<sup>[21,26]</sup> Apart from this the habits had their own share of adding the burden to the prevalence of periodontal diseases.<sup>[26]</sup> However, the white collar group or the administration workers had better periodontal health then the factory workers.<sup>[21]</sup> Nevertheless, in the survey by pilot *et al.*<sup>[27]</sup> it was reported that there existed no significant difference in the periodontal status of three groups of the factory worker; mining equipment factory, a cotton mill and a factory of heavy machinery. There was an increase in the periodontal pocket and attachment loss prevalence, and it was positively associated with age of the acid factory workers<sup>[14,28]</sup> then the control group.

### Dental Caries

High caries index is one of most common oral findings in the mining workers.<sup>[20,22,24,26,29]</sup> The literature shows that the

workers working in sweet food industries are more prone to have higher caries index.<sup>[30,31]</sup> Nevertheless, Massiln *et al.*, through their study discards the hypothesis that airborne sugar is an occupational dental health hazard<sup>[32]</sup> and same was supported by the statement that the confectionery industry did not seem to be an exceptionally hazardous environment for dental health in general. Studies do claim that the proper oral hygiene instructions followed by periodic dental evaluation improved the workers oral health condition.<sup>[26]</sup> There are less chances of caries development with high income/high occupational status individuals then with individuals of the low status occupation, thus proving the influence of social inequalities playing the role in the prevalence of caries.<sup>[33]</sup>

**Dental Attrition/Wear**

It is one of the common dental problems noticed in the miners.<sup>[34]</sup> The duration of the working has a definite influence on the enamel wear, longer the person has worked in the mining field greater are the chances of the enamel wear. Same has been proved in the earliest study to the latest study on the dental wear and the working environment.<sup>[20,34,35]</sup> Few studies took control group-the non-miners for comparing the extent of wear between the two groups, they found that white collar workers or the non-miners showed less prevalent dental wear.<sup>[20,35,36]</sup> This observation can be attributed to the mining environment, specially the abrasive component of the air which they breathed. Hundred percent abrasion was observed by Peterson and Henmer (1988) in the granite factory workers and was particular severe in the anterior teeth.<sup>[20]</sup> So, far the occupational related

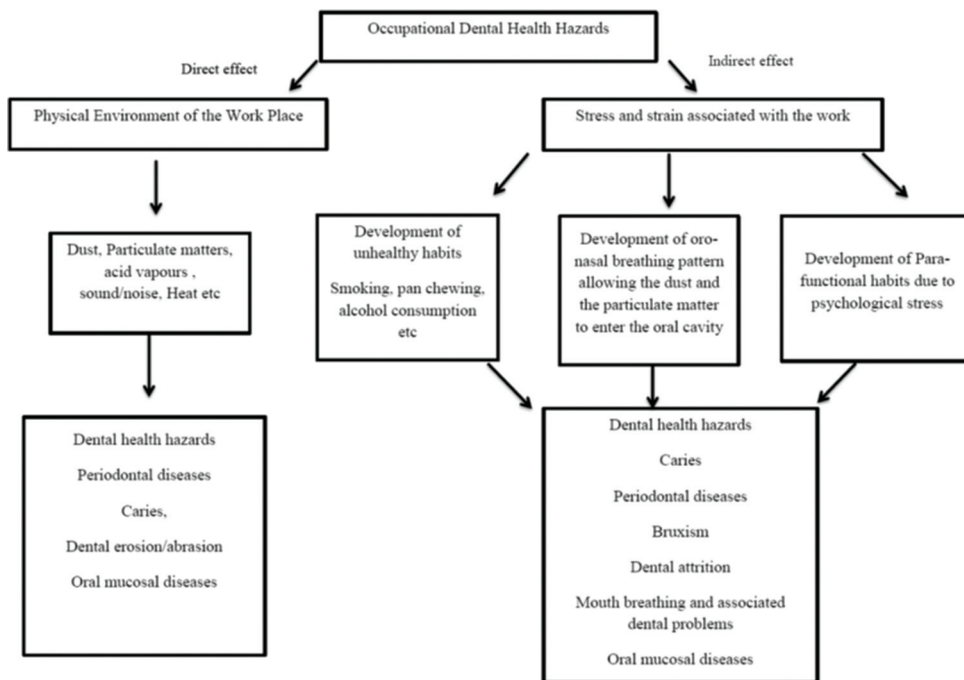
abrasion studies were conducted on cement factory workers, granite factory workers and olivine mining workers. Even the noise pollution in the industrial set up has bearing on the dental abrasion rate and same was proven in the study by Kovacevic and Belojevic (2006), they found female workers exposed to noise showed more prevalent abrasion.<sup>[37]</sup>

**Para Functional Activities**

Studies have shown that the individuals work in the environment with chronic exposure to noise have greater chances of acquiring para functional habits like bruxism.<sup>[38]</sup> The level of noise usually ranged from 99 to 105 decibels, with some extreme values to 130 decibels.<sup>[38]</sup> The sleep bruxism was associated with the psychological job stress.<sup>[39-44]</sup> But it also has been reported that sleep bruxism is weakly associate with certain job stresses in man.<sup>[45-47]</sup> The studies have shown positive correlation between smoking and tobacco chewing to the brusixm<sup>[39,43]</sup> and It was noted that administration job people had less chances of bruxism development<sup>[39]</sup> Contrastingly, another study reported no difference in perceived level of stress between bruxers and non-bruxers.<sup>[45]</sup> However, a statistically significant difference was noted for different job categories and the bruxism, with higher prevalence in highly responsible jobs.<sup>[46]</sup> There exists a direct correlation between tempopromandibular joint disorder and bruxism.<sup>[47-50]</sup>

**Oral Mucosal Lesions and Oral Cancer**

Prevalence of oral mucosal lesions was mainly related to the occupational stress to which the mining workers will be exposed.



**Chart 1:** The relation between occupation and the dental health

Noise, dust or fumes and poor maintenance of equipment added to the predisposing factor; the stress.<sup>[51]</sup> The exposure of the air borne dust particles in the mining, or the working atmosphere will lead to the cancerous lesion which can be mortal to the workers. Even the workers who were exposed to acidic fumes were at risk of developing in oral mucosal lesions<sup>[52,53]</sup> and this was more so with the workers without lip seal.<sup>[54]</sup> However, contrastingly it was reported that occupational acid air fumes didn't increase the occurrence of oral mucosal lesions but they lead to increase in the periodontal pocket depth.<sup>[14]</sup> Same was true for the cancer prevalence when the duration is taken into consideration. Longer the exposure more is the chance of cancer occurrence. The habits like tobacco chewing and pipe smoking apart from mining environment can act as triggering factors in causing the oral mucosal lesions.<sup>[55-57]</sup> The granite exposure, when pertaining to the general health, may be the etiological factor for the initiation and promotion of the malignant neoplasms.<sup>[57]</sup> However, there were studies which reported occupation has little effect on the occurrence of oral mucosal lesions.<sup>[58]</sup> Vianna *et al*, in their study conclude that the evidence of a chronic rather than acute irritative process suggests a possible step on the etiology of oral malignancies, which needs investigation.<sup>[53]</sup>

## Conclusion

Oral health is as important as general health, but it is receiving less attention than it actually deserves in the present scenario especially in the developing countries. The summary chart [Chart 1] shows the occupations and their relations. Among many factors which can detract the oral health of the person, the working environment and the amount of stress it induces on oneself is of major importance and again it has also not received its share of concern. The data presented in the article emphasize the need for educating the employer and the employees about the oral conditions, which can occur and the measures to prevent the same using the protective equipment.

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