



Dental Diseases of Acid Factory Workers Globally- Narrative Review Article

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Abstract

Background: Industrial growth is occurring exponentially, for unimpeded growth, industrial workers are recruited on a large scale globally. There are various sectors of industries present for which laborers are trained in accordance to their requirements. As workers possess the general health risk of occupational hazards, various labor laws, schemes and policies are undertaken by the government which are implemented by industries, but very few attention for oral health is being given because of which laborers are more progressing towards hidden adverse oral effects which can affect their working efficacy. Various studies on different sector workers were carried out focusing their oral health status but for acid factory workers it is neglected and therefore unrevealed to the society. For this purpose, in this article, though, paucity of literature, still, tries to enlighten the oral health status in acid factory industrial workers with available resources.

Keywords: Acid factory workers, Occupational health, Occupational disease, Dental diseases

Introduction

As a matter of fact that an individual is victimized when exposed to various combined factors which could be genetic and/or environmental in nature (1). Oral health is an integral part of general health and plays an important role in improving the quality of life. The oral cavity acts as a passage for numerous diseases of varied origin and along with discrete unique features present in it predisposes, particularly, to occupational diseases (2). Industrial revolution has made rapid strides in expanding industrial activity worldwide providing scope in employment for many and thus improving the standard of living of people. In the light of rapid economic growth and industrial progress, in such

countries, it becomes imperative that safety and health at workplace be given its due importance. Majority of people employed in various industries are exposed to hazardous environment. This exposure deteriorates the general and oral health of people, working in industries for long hours. Every occupation is associated with one or other ill effects on health. Studies have shown the association between occupational exposure and greater incidence of oral diseases (2, 3-5).

Most usual organs involved are spine, hands, head, lungs, eyes, skeleton, and skin. Ramazzini, “the father of industrial hygiene”, who was the first to advocate the inclusion of patient’s occupation in

medical history and to point out a number of oral symptoms (2) “as injurious effects of occupational hazards also manifest themselves in the teeth, jaw bones, periodontal tissues, tongue, lips and oral mucosa” (6). “Exposure to chemical, physical and biological agents in the work place can result in adverse effects on workers ranging from simple discomfort and irritation to debilitating occupational diseases” (7). “In addition, the health of industrial workers often goes uncared due to their stressful working conditions, busy schedules and poor economic conditions” (8). Ramesh et al. identified as a high risk group due to high prevalence of adverse habits and poor oral hygiene habits (82.4% subjects never cleaned their teeth) (5). Similarly, Sanadhya et al. evaluated oral health status of salt workers in which fluorosis and dental caries were significantly present (4). A study by Kiran Kumar et al. (9) was of the opinion that psychiatric morbidity is on the rise in industrial workers. The physically tedious work drives people to consume alcohol and tobacco which further deteriorate their oral health (10). Kumar et al (9) also found in his study that nicotine dependence is the major diagnosis (27.7%) followed by alcohol abuse (12.3%).

Industrial workers constitute a well-defined population group, and although they do not represent nationwide samples, such group is often readily available and therefore has several practical advantages in epidemiological studies. Industrial workers are at risk for health and dental problems as they have frequent shifts, low socio-economic status and neglected oral hygiene. Dental erosion refers to the loss of tooth substance by a simple chemical process due to the exposure to acids. Industrial environmental factors may be considered responsible for dental erosion among battery workers since they were exposed to sulfuric acid mists, the harmful processes are known as forming and charging. Severe attrition, i.e, mechanical wearing down of tooth surfaces during masticatory movements, has also been observed among battery workers (11,12).

The purpose of this review study was to evaluate the oral health situation of workers in battery factory; in particular, to describe the prevalence and

severity of dental erosion and attrition in relation to the exposure to airborne acids in the work environment.

Methods

A systematic review of literature has been done through Cochrane collaboration which engaged most of the articles published in peer-reviewed journals relating to the subject of occupational health hazards in industrial workers. Cochrane collaboration is an international non-profit organization whose goal is to keep informed, providing accurate information worldwide that develops and maintain systematic reviews. Source of systematic reviews includes original articles and review of articles on the results and outcomes of clinical procedures and treatment. To identify and review published materials using explicit and detailed methods through which selection of admissible evidences and thereby summarizing the relevant search. The review itself began with the search of relevant key words linked with the dental and medical profession like acid factory industrial workers, occupational health, occupational disease, dental hazards in acid factory industrial workers etc. in various search engines including Pub Med. Reports published only in English language were included in the review. The spot light of the present review would be to focus on acid factory industrial workers and dental hazards.

There are various oral diseases found associated with acid factory industrial workers, among which more prevalent are periodontal diseases, dental caries and require specific attention.

Periodontal disease

The association between exposure to acid mists and periodontal disease may be a result of changes in intracellular and extracellular pH, which plays an important role in the control of cell growth and differentiation. Changes in physiological pH determine genotoxic effects (13,14) which may be evidence of inorganic acid carcinogenicity. Chronic irritation of tissues by acids is also responsible for increased frequency of infections and exposure to

sulfuric acid also leads to immune reactions such as a decrease in the phagocytic capacity of macrophages and cytotoxic activity of tumor necrosis factor, and increase the number of chromosomal abnormalities in human lymphocytes (13). "It can also compromise the local immune response produced by the saliva, as well as the systemic response through immunoglobulin changes" (15). These mechanisms related to the individual defense system support our study findings.

Almeida TF et al. (2008) conducted cross sectional study among 530 male workers at a metal processing factory which suggest that individuals exposed to inorganic acids like acid mists, composed of mixtures of sulfuric and chlorhydric acid, have an increased prevalence of periodontal attachment loss but this association was limited to the group that reported non-frequent use of dental floss (16). These results conflicted with Brazilian study where even several appropriate covariates were considered in the analysis (17).

Dental erosion or wears and dental caries

Industrial environmental factors have been reported to cause dental erosion (18). Gomes (1972) (19) reported the experience of electroplaters in the State of Sao Paulo, Brazil. Of the 223 workers, approximately 50% had yellowing and erosion of teeth. Duration of exposure was unstated, but it was mentioned that harmful effects were noted in less than a year, and that few workers remained many years in the industry. Similar result found in a case report that patient had 20 years of working period in the chromium exposed occupation and this duration is high enough to result dental erosion (20). Amin et al. (2001) conducted a comparison study among phosphate mining workers and battery workers in which they revealed that exposure to acid fumes (battery factory) in the work place was significantly associated with dental erosion and deteriorated oral health status (21). When compared with other studies, they also suggest that higher concentration of acid fumes in working environment are related to higher proportion of subjects with loss of tooth substance (22, 23). The relationship between occurrence of dental

erosion and length of acid exposure also showed significant results (23- 25).

In the UK caries experience was similar among acid workers and controls" (24), and the prevalence of caries was not higher in Norwegian zinc extraction workers than in comparable population groups" (26). Fukayo et al. (2011) conducted a cross-sectional survey of 350 male workers at a copper-mine smelter in Japan and they revealed different caries pattern among workers who had developed dental erosion indicating low-level but consistent exposure to acid which could have changed the risk for dental caries, possibly through the interactions of environmental acid and the pH-buffering action of saliva (27). This study confirms the severity of erosion increased with prolonged time of exposure.

Conclusion

It is very clear from the above discussion that despite numerous advancements, occupational oral health hazards are omnipresent and there is no look out for the oral health status of workers particularly for acid factory workers. Therefore, it is desirable to impart oral health education to them, to apprise them of the ill effects of work and teach remedial measures. Awareness programs and local group discussions are essential for improving the oral health status of these working communities. Health promotion among the industrial workers requires coordinated action by all concerned including the dental profession, local factory authorities, social and economic sectors and voluntary organizations. Mass media could also play a significant role by providing systematic updates regarding native and contiguous working conditions as to how it can be improved. Well Planned training programme should be conducted for new recruited members. Guidelines to the acid fumes industries are given like installing efficient ventilation and exhaust systems at work sites, implementation and mandatory use of Personal protective equipment should be provided like protective masks, goggles and face guards to workers and provide medical and dental care services.

Government must take suitable measures and a strict law for the rights of workers regarding health should be formulated along with regular inspections and follow up.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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The authors declare that there is no conflict of interest.

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