Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Spl Issue [5] 2022 : 134-140

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

To Evaluate the Prevalence of Oral Mucosal Changes in Paint Factory Workers of Delhi NCR Region

Jitender Morwal, Aparna Dave, Manpreet Arora, Pulin Saluja. and Radhika Rai
Department of Oral Pathology & Microbiology and Forensic Odontology,
S.G.T. Dental College, Hospital & Research Institute, Gurugram, Haryana
Corresponding Author: Aparnaad15@Gmail.Com

ABSTRACT

Workers in paint manufacturing are potentially exposed to chemicals that are found in paint products.They are exposed to complex mixture of organic solvents, heavy metals and other compounds with potential mutagenic properties. These chemicals have a potential to cause disorders of various organ systems. Not many studies have been reported where oral mucosal changes were evaluated in persons working in paint factory, who are more prone to exposure to chemical and their toxic effects. So a study to evaluate the oral mucosal lesions in paint factory workers was attempted. To study the prevalence of oral mucosal changes in paint factory workers with or without oral habit and to establish co-relation if any, of oral mucosal changes in workers of paint factory who are residing in the factory premises in comparison with workers who are residing outside the vicinity of paint factory area in Delhi NCR region. 150 workers were included in the study. Out of total 150 workers, 57 workers were residing in paint factory premises and 93 workers resided outside factory premise. Out of the total 150 workers, 58 workers did not have tobacco habits whereas 92 workers were associated with tobacco habits. Oral examination was carried out and the details were recorded. A significant difference in incidence rate of angular cheilitis, leukoplakia,melanotic mucosa, gingivitis, periodontitis and gingival hyperplasia was noted in workers who were residing within premises of factory and were having tobacco habit as compared to those workers who were staying out of the factory premises and with those not associated with tobacco habits.

Conclusion: *The findings of this study provided an insight in to the oral mucosal status of the paint factory workers. Exposure to various chemicals and tobaccohabits both together cause deleterious effect on oral health.*

KEYWORDS- *Paint factory workers, chemicals, angular chelitis, Melanotic Mucosa. Leukoplakia, erythroplakia*

Received 22.10.2022 Revised 23.11.2022 Accepted 12.12.2022

INTRODUCTION

Paint is one of the oldest synthetic substances known, with a history stretching back into prehistoric times. A mixture of clay, chalks, and animal fat was used for painting which was over a period of time replaced by pigments and wax. Availability of colors from natural and synthetic sources, lead to the development of paints and emergence of paint factories [1] .

Approximately 200000 workers worldwide are associated with paint manufacture. Workers in manufacturing units of paints are potentially exposed to chemicals which are present in paint products, although the pattern and degree of exposure to individual agents may differ than what is seen in painters.[2]Inhalation and dermal contact are the other major source of exposure.

Thousands of chemicals that are used in paint products include pigments, extenders, binders, additive, and solvents (Toluene, Xylene, Ketones, Alcohols, Benzene, Esters and Glycol ethers, Chlorinated solvents like Trichloroethylene, Perchloroethylene. These are seen to cause hematological, cardiovascular, neurological, metabolic, allergic as well as local effects.

The available data suggesting the prevalence of smoking in painters, although limited, indicates that there is an increased risk for lung cancer, and this rise in the number of cases cannot be attributed only to the smoking habit. The risks for cancers of the esophagus, bladder and stomach have been observed, but these numbers were generally smaller than the numbers seen for lung cancer. In some of the studies, it has been suggested that there is an increase risks for leukemia and for cancers of oral cavity and larynx.[2]

Not many studies have been reported where oral mucosal changes have been evaluated in persons working in paint factory, who are more prone to exposure to chemical and their toxic effects. The study attempts to evaluate the oral mucosal lesion/changes that can be seen in paint factory workers, with/without tobacco habits in Delhi NCR region.

MATERIAL AND METHOD

The study aimed at evaluating the prevalence of oral mucosal changes in paint factory workers with or without oral habit and to establish co-relation if any, of oral mucosal changes in workers of paint factory who are residing in the factory premises in comparison with workers who are residing outside the vicinity of paint factory area in Delhi NCR region.

A descriptive cross-sectional study was conducted. Prior to the conduct of the study a prior approval was taken from the ethical committee and permission was taken from the authorities of industry. In the study, 150 paint factory employees were examined. Paint factory employees who were available and those who agreed to participate were included in the study. After explaining the procedure of the study, a written consent form was taken from each subject in the language known to them.

The examiner was trained in the department under the guidance of the subject's expert to make sure that uniform interpretations, understanding, and application of the criteria are to be observed and recorded so consistent examination can be carried. Demographic details and data about the work environment, oral hygiene habits, tobacco habits,etc were recorded in a proforma. Standard procedures were followed to ensure infection control during the examination procedure.

RESULTS

A total number of 150 workers were taken in the study. Out of total 150 workers, 57 workers were residing in paint factory premises and 93 workers resided outside factory premise. Out of the total 150 workers,58 workers did not have tobacco habits whereas 92workers were associated with tobacco habits.

In 58 workers who were not associated with any tobacco habits, angular cheilitis was observedin 2 workers. Out of the 92 workers who had tobacco habits, angular cheilitis was observed in 12 workers.A significant difference in incidence rate of angular cheilitiswas noted in workers without tobacco habit in comparison to workers without tobacco habit. (Table 1)

Table 1: Prevalence of Angular cheilitis amongst paint factory workers with/without tobacco habit

	Angular cheilitis	Total workers
Without habit	2	58
	3.4%	38.7%
With habit	12	92
	13.0%	61.3%
Total	14	150
Chi-square value = 3.870, p-value = 0.049*		

Out of 150 workers, 57workers were residing in paint factory premises and 93 workers resided outside factory premise. Incidence rate of angular cheilitis was14.0% in cases who were residing within the premises and 6.45% rate of incidence was noted in those cases residing outside the paint factory premises and the difference was significant.**(Table 2)**

Table 2:Prevalence of Angular cheilitis amongst paint factory workers residing within and outside factory premises

	Angular cheilitis	Total
Residing outside factory premises	6	93
	6.45 %	62.0%
Residing within factory premises	8	57
	14.0 %	38.0%
Total	14	150
Chi-square value = 2.402, p-value = 0.046*		

Incidence of leukoplakia in workers who did not have tobacco habit was 1.7% and those with tobacco habit was 5.4%. No case of erythroplakia was seen in workers who were not associated with tobacco habits whereas the rate of incidence of erythroplakia in workers with tobacco habit was 2.1% (**Table 3**)

Table 3: Prevalence of Leukoplakia and Erythroplakia amongst paint factory workers with and without tobacco habits

	Erythroplakia	Leukoplakia	Total
Without habit	0	1	58
	0.0%	1.7 %	38.7%
With habit	2	5	92
	2.1%	5.4%	61.3%
Total	2	6	150
	1.3%	4.0%	100.0%
	Chi-square value = 1.278, p-value = 0.258	**Chi-square value = 3.615, p-value = 0.041***	

7.0% incidence rate of leukoplakia was noted in workers who were residing inside the paint factory premises, and 2.1% was observed in cases who were residing outside the vicinity of paint factory area. Rate of incidence of erythroplakia was 3.5% in cases who were residing in paint factory premises. Difference was significant **(Table 4)**

Table 4: Prevalence of Leukoplakia and Erythroplakia amongst workers residing outsideand within factory premises

	Erythroplakia	Leukoplakia	Total
Residing outside factory premises	0	2	93
	0 %	2.1 %	62.0%
Residing within factory premises	2	4	57
	3.5 %	7.0 %	38.0%
Total	2	6	150
	1.3 %	10.5 %	100%
	Chi-square value = 1.278, p-value = 0.258	**Chi-square value = 2.580, p-value = 0.048***	

Prevalence of Melanotic Mucosa Amongst Paint Factory Workers

In present study,itwas observed that incidence rate of melanotic mucosa was 18.5% in workers, who were associated with tobacco habits, and 1.7% was noted in workers who were not associated with tobacco habits. (**Table 5)**

Table 5 : Prevalence of Melanotic mucosa amongst workers with and without tobacco habits

	Melanotic mucosa	Total
Without habit	1	58
	1.7%	38.7%
With habit	17	92
	18.5%	61.3%
Total	18	150
	12.0%	100.0%
Chi-square value = 9.456, p-value = 0.002*		

Melanotic mucosa was observed in 15.7% of cases in those who were residing inside the paint factory premises and 9.6% in cases in those who were residing outside the vicinity of the paint factory. There was significant difference between the cases who were residing inside and outside the paint factory premises. **(Table 6)**

Table 6: Prevalence of Melanotic mucosa amongst workers residing within and outside factory premises

	Melanotic mucosa	Total
Residing outside factory premises	9	93
	9.6 %	62.0%
Residing within factory premises	9	57
	15.7 %	38.0%
Total	18	150
	12.0%	100%
Chi-square value = 3.250, p-value = 0.046*		

Prevalence of Gingivitis amongst Paint Factory Workers

The rate of incidence of Gingivitis was 42.35 % in workers who were associated with tobacco habits and was 36.2% in workers who were not associated with any tobacco habits, and the difference was statistically significant **(Table 7)**.

Table 7: Prevalence of Gingivitis amongst workers with and without habits

	Gingivitis	Total
Without habit	21	58
	36.2 %	38.7%
With habit	39	92
	42.3%	61.3%
Total	60	150
	40 %	100%
Chi-square value = 12.546, p-value = 0.002*		

The incidence rate of gingivitis was 52.6% in workers who were residing inside the paint factory premises and 32.2% in workers who were residing outside the vicinity of paint factory premises and difference was statistically significant. **(Table 8)**

Table 8: Prevalence of Gingivitis amongst workers residing within and outside factory premises

	Gingivitis	Total
Residing outside factory premises	30	93
	32.2 %	62.0%
Residing within factory premises	30	57
	52.6 %	38.0%
Total	60	150
	40 %	100%
Chi-square value = 6.112, p-value = 0.013*		

Prevalence of Periodontitis Amongst Paint Factory Workers

An incidence rate of periodontitis of 27.1% was seen in workers who were associated with tobacco habits and only 1.7% in workers who were not associated with tobacco habits and statistically significant difference was noted.**(Table 9)**

Table 9: Prevalence of Periodontitis amongst workers with and without habits

	Periodontitis	Total
Without habit	1	58
	1.7%	38.7%
With habit	25	92
	27.1%	61.3%
Total	26	150
	17.3%	100.0%
Chi-square value = 16.080, p-value < 0.001*		

The incidence rate of periodontitis in workers residing within the premises of paint factory was 28% and in workers who were residing outside the premises of paint factory, it was found to be 10.7% and difference was statistically significant **(Table 10)**

Table 10: Prevalence of Periodontitis amongst workers residing within and outside factory premises

	Periodontitis	Total
Residing outside factory premises	10	93
	10.7 %	62.0%
Residing within factory premises	16	57
	28.0 %	38.0%
Total	26	150
	17.3 %	100%
Chi-square value = 3.162, p-value = 0.038*		

Prevalence of Gingival Hyperplasia amongst Paint Factory Workers

Table 11: Prevalence of Gingival hyperplasia in workers with and without tobacco habits

Incidence rate of gingival hyperplasia was 4.3% in workers who were associated with tobacco habit whereas no case of gingival hyperplasia was observed in workers who were not associated with tobacco habits. (table 11)

	Gingival hyperplasia	Total
Without habit	0	58
	0.0%	38.7%
With habit	4	92
	4.3 %	61.3%
Total	4	150
	2.6 %	100.0%
Chi-square value = 5.328, p-value = 0.021*		

Table 12: Prevalence of Gingival hyperplasia in workers residing within and outside the factory premises

	Gingival hyperplasia	Total
Residing outside factory premises	1	93
	1 %	62.0%
Residing within factory premises	3	57
	5.2 %	38.0%
Total	4	150
	2.6 %	100%
Chi-square value = 2.388, p-value = 0.042*		

Incidence rate of gingival hyperplasia was 5.2% in those who were residing within the premises of paint factory, and was 1% was those who were residing outside the premises of paint factory and difference was statistically significant.**(Table 12)**

DISCUSSION

Work or the job does have a positive health promoting effect, as the earning from the job provides the workers with the basic necessities of life. However a reciprocal and interactive relationship exists between the workers and the work environment [3]. Awareness of such association between health and work helps in understanding and practicing occupational health and safety standards.

Often, at workplace the important safety norms are overlooked. With rise in industrial activity around the world has definitely improved standard of living, but these increased activity also lead to various occupational hazards [4]. Occupational hazard is the risk, danger or harm that an individual can be exposed to at the workplace, whereas occupational disease results from such exposure to the individual [3]. During work periods, workers can face numerous type of hazards. They are exposed biological agents,to various chemicals, different physical factors, and adverse ergonomic conditions. These factors are responsible for a wide range of health consequences.[5] In addition to this, the laborious and tiring physical work often drives people to develop alcohol and tobacco habits. These substances may further have an impact on health as well lead to deterioration of their oral health in form of periodontal and oral mucosal diseases [6].

Oral health is an integral part of general health. The oral cavity establishes a connection between the environment and the body, thereby creating an area that is prone to occupational disease, because of the direct exposure to various pollutants [2].

Numerous studies have shown that solvents used in the paint industries can cause health issues that include the involvement of other organ systems including central and peripheral nervous system.

Painters and workers working in paint industry are exposed to various chemical agents e.g., solvents (ketones,petroleum solvents, xylene, esters, alcohols, glycol ethers, toluene and benzene), titanium dioxide, hydrocarbons, iron compounds, chromium, asbestos lead and silica [2]. Tarvainen L et al in their study have reported that male painters presented significantly elevated SIR (standardized incidence ratio) for cancer of mouth and pharynx [8]. IARC have suggested that occupational exposure to fumes in paint industries to workers and to spray and building painters is carcinogenic [9][9] Brown L M et al

observed that the risk of cancer of oral cavity was raised among woman involved in lacquerers and glaziers work in paint factories [10].

An increase in incidence in angular cheilitis was observed in workers with habits as compared to those without habits. It has been observed that tobacco chewing usually leads to hyper salivation, which is one of the pre-disposing factors for angular cheilitis. Devani A et al, have observed that those who wear face masks as part of their occupation are more prone to *S.aureus* colonization which can lead to Angular cheilitis [11].

There was significant difference in occurrence of Angular cheilitis between those residing within premises and those residing outside the premises. An increase incidence of angular cheilitis was observed in those workers who were residing within paint factory premises. This could be related to the additive effects of constant chemical exposure. Stressed local environment and involvement of workers in deleterious habits could be other contributing factors.

An increase in incidence in leukoplakia and erythroplakia was observed in workers who had tobacco habit and were staying within premises of the factory. The increase in incidence can be mainly attributed to tobacco habits. Workers when working understressful working environment often develop some form of tobacco habit. BalasubramanianR , in his study noted that incidence rate of leukoplakia was 13.2% in granite factory workers which he attributed to the high use of tobacco, pan chewing or gutkha chewing, stress and malnutrition [12]. Dagli R J et al also found in their study a high incidence rate of leukoplakia in workers workingin green marble industry of Rajasthan. They also stated that tobacco is the main predisposing factor along with stressed working conditions and low socio economic issues [13] and these workersare often unaware about oral heath preventive methods and aids etc.

A remarkable increase in incidence of melanotic mucosa was seen in workers who had tobacco habits. Such pigmentation often develops as a result of smoking and may develop at any sitewith increased tendency to affect facial gingiva[6]. The frequency such presentations increasewith heavy usage of cigarette.It is acommon observation that those workers who often stay within premises of the factory develop a frequent habit of tobacco use.

Patel P et al [14] also found that prevalence rate of melanotic mucosa about 2.3% and Sudhakar S et al reported incidence rate of melanotic mucosa was 2.77% to 4.17% in Eluru, Andhra Pradesh [14]. Neville B stated in his study that melanin acts as a protective layer against harmful substances present in tobacco [16].

In the present study an increase in rate of incidence of gingivitis was noted in workers with tobacco habits It is a well-known fact that gingivitis is highly associated with lack of oral hygiene but tobacco does have a significant role in effecting the oral health which was clearly evident in our study. Also there are other factors that might increase the incidence of gingivitis like where does the individual resides. In our study, an increase in incidence rate of gingivitis was observed in workers residing inside the paint factory premises. This significant increase in the incidence rate can be attributed to the fact that those who reside within the factory premises are more exposed to the chemicals as compared to those residing outside. The constant irritation caused by the regular exposure to these toxic chemicals can further add to the ill effects caused by tobacco and poor oral hygiene on the oral health. There is another factor which cannot be ignored is their low socio-economic status and lack of awareness about the oral health which further make them more prone to such diseases. Cengiz M I et al [7], Abbas I et al [17**]** also found increase in incidence rate of gingivitis in coal mine workers, which they attributed to low socioeconomic status and stressful working environment, wherein they often develop habit of tobacco and alcohol consumption and soon develop oral and general health issues.

Similar observations were seen in case of periodontitis. A significant difference was noted in the incidence of periodontitis in workers residing within premises and those staying outside. This difference might be due to the synergistic effect of tobacco habits along with constant chemical exposure through inhalation and ingestion in those residing within the premises. Other local factors could also contribute to periodontitis. In a study by Kumar G et al, prevalence of periodontitis was high in sea food industry employee.

An increase in incidence of gingival hyperplasia was seen in workers having tobacco habits and in those residing within premises of factory. It can be said that tobacco is one of the factors which can lead to gingival hyperplasia along with other local, environmental and social factors. The constant exposure to the various chemicals can have a negative effect on oral health. Gingival enlargement is a common trait of gingival disease which is commonly found in workers working in different types of Industries. These enlargements maybe inflammatory, drug related, those associated with systemic conditions or diseases, neoplastic. Usually the factory workers are used to deleterious habits as they work in a very stressful environment and are unaware of the preventive measures. So they frequently develop various oral health related problems [19].

CONCLUSION

The findings of this study provided an insight in to the oral mucosal status of the paint factory workers in Delhi NCR region, and it has been observed that concepts of routine oral health check up and awareness about oral health have been largely neglected. Probably various chemicals present in the paints when inhaled or ingested and stressed working conditions at their work place which may lead to increased consumption of various forms of tobacco, acts synergistically to cause deleterious effects on oral health. Prevalence of oral mucosal lesions like Erythroplakia, Angular cheilitis, Leukoplakia, Gingival hyperplasia and Periodontitis were found to be more in workers residing in paint factory premises associated with tobacco habits in comparison with those who were residing outside the factory premises and were not associated with tobacco habits.

This data will help in planning oral health promotion programs, encouraging oral screening examination along with routine health care examination. Further studies are on a large scale are needed to evaluate oral health status of paint factory workers.

REFERENCES

1. Waldie JM, Clark MDT. (1974). Paints and pigments surface coatings, material and their usage. Oil and Color Chemists Association Australia; (1):1-19.
2. Drastyana SF, Mukono J, Notopuro H. (2014). Effect of exposure to Benzene vapor against IgG and workers health complaints at gas station in Surabaya through Phenol levels in urine. International Refereed Journal of Engineering and Science; 3 (8): 18-22.
3. Shane JL, Jennifer TP, Snyder CR. (2000). Positive psychology, the scientific and practical explorations of human strengths.
4. Awodele O, Papoola TD, Ogbudu BS, Akinyede A, Coker HAB, Akintonwa A. (2014). Occupational hazards and safety measure amongst the paint factory workers in Lagos, Nigeria. Safety and Health at Work; 5:106-111.
5. Zhang L, Bassig BA, Mora JL, Vermeulen R, Gejohn DY, Curry et al. (2013). Alteration in serum immunoglobulin level in workers occupationally exposed to trichloroethylene. Carcinogenesis; 34(4): 799-802
6. Sridharan G. (2014). Epidemiology, control and prevention of tobacco induced oral mucosal lesions in India. Indian J Cancer ; 51: 80-85.
7. CengizMI, Zengin B, Icen M, Kokturk F. (2018). Prevalence of periodontal diseases among mine workers of Zonguldak, Kozlu District, Turkey: a cross sectional study.BMC Public Health; 18: 361.
8. Tarvainen L, Kyyronen P, Kauppinen T, Pukkala E. (2008). Cancer of the mouth and pharynx, occupation and exposure to chemical agents in Finland (in 1971-95).Int. J.Cancer;123: 653-659.
9. IARC-summaries and evaluation. (1989). Occupational exposures in paint manufacture and painting. 47: 329.
10. Brown LM, Moradi t, Gridley G, Plato N, Dosemeci M, Fraumeni JF. Exposure in the painting trades and paints manufacturing industry and risk of cancer among men and women in Sweden. J. Occup Environ Med 2002; 44: 258-64.
11. Devani A, Barankin B. Answer: Can you identify this condition? Can Fam Physician 2007;53(4): 1022-1023.
12. Balasubramanian R. (2014). Prevalence of oral mucosal lesions among granite factory employees in NanjangudTaluk, Mysore. Global Journal of Medical Research: Dentistry and Otolaryngology; 14(5).
13. Dagli RJ, Kumar S, Dhanni C, Duraiswamy P, Kulkarni S. (2008). Dental health among green marble mine laborers, India. J Oral Health Comm Dent;2: 1-7.
14. Patel P, Patel V. (2011). Oral mucosal lesion among residents of a town in North Gujarat. National J Med Res; 1:3-6.
15. Sudhakar S, Praveen KB, Prabhat MP. (2011). Prevalence of oral mucosal changes in Eluru, Andhra Pradesh- An institutional study. J Oral Health Comm Dent ;5:42-48.
16. Neville B, Damm DD, Allen CM, Bouquot J. (2001). Oral and maxillofacial pathology.2nd ed. St.Louis, Missouri: Elsevier Publishers.
17. Abbas I, Mohammad SA, Peddireddy PR, Mocherla M, Koppula YR, Avidapu R. (2016). Oral health status of underground coal mine workers of Ramkrishnapur, adilabad District, Telangana, India- A cross sectional study. J ClinDiagn Res. 10(1):28-31.
18. Kumar G, Suresan V, Janeswar A, Subramanya GB, Jha K. (2016). Periodontal health status, oral mucosal lesions and adverse oral habits among sea food industry employees of Bhubaneswar, Odisha. J Indian Assoc Public Health Dent;14: 292-297.
19. Padmanabhan S, Dwarakanath CD. (2013). Severe gingival enlargement associated with aggressive periodontitis. J Indian Soc Periodontol.17(1):115-119.

CITATION OF THIS ARTICLE

Jitender Morwal, Aparna Dave, Manpreet Arora, Pulin Saluja. and Radhika Rai : To Evaluate The Prevalence Of Oral Mucosal Changes In Paint Factory Workers of Delhi NCR Region. Bull. Env.Pharmacol. Life Sci., Spl Issue [4]: 2022: 134-140.