



HAIRFALL DUE TO AIR POLLUTION**SHANTHI EDWARD¹, KOKILA S^{2*} AND S. GOPALAKRISHNAN³**Department of Community Medicine, Sree Balaji Medical College and Hospital, Chrompet,
Chennai -600044***Corresponding Author: Dr. Kokila S: E Mail id: gopikasharmi@gmail.com**Received 23rd March, 2021; Revised 24th April 2021; Accepted 20th May 2021; Available online 1st Dec. 2021<https://doi.org/10.31032/IJBPAS/2021/10.12.5785>**ABSTRACT**

Background: Hair loss is a common problem in men and women. Correct diagnosis of hair disorders is complex and requires evaluation of clinical presentation, history, physical examination, and laboratory tests. The current study includes hair fall due to air pollutants and dust particles that clog in the hair and be the major common cause of hairfall. There are evidences that dandruff is also one of the major common causes of hairfall [2]. The current study tells about people who live in the urban areas are more affected with hair fall than those who live in the rural areas [3]. People who sweat a lot has also increased tendency of hair fall due to dust and minute dust particles that open up the clogs and causes hair fall.

Aim: The aim is to know the cause of hair fall is mainly due to air pollutants that has clogged in the hair root and causes hair fall, dandruff and other hair problems. **Method:** The study was a cross sectional study. The subjects were 100 individuals with 18-25 years of age in an urban area of kancheepuram district. The mode of data collection was online. The individuals were oriented upon the data of knowledge, attitude, motivation and valid questionnaire were collected from the individuals. Result: Among 100 individuals 93.2 percent have hair fall and 6.8 percent doesn't have hairfall and among 93.2 percent who have hair fall 48.9 percent have continuous hairfall and 18 percent have occasional hair fall and 30.8 percent varies seasonally. And the major cause for the hairfall is because they live in a highly polluted area that is 63.9 percent of them. **Conclusion:** The major cause of hair fall is air pollutants and dust particles that clog in the scalp and gets sticks to it and causes hair fall.

Keywords: hair fall, alopecia, hairshaft abnormalities

INTRODUCTION

There is worldwide awareness on respiratory diseases, sinus problems and allergies caused by air pollution. Now we have evidence that this can also occur in indoor environments [4]. The skin and hair form the first barrier exposed to pollution. Large suspended particle, small airborne particles, smoke and gaseous pollution settle on the scalp and hair, causing irritation and damage [5]. The fact was noticed when Industrial Toxicology Research Center, Lucknow, published a study with reference to effects on human hair in 1994 [6]. Hair loss due to pollution (HDP) can coexist or mimic androgenic alopecia just like diffuse un-patterned hair loss, diffuse alopecia areata, early cicetritial alopecia or chronic telogen effluvium can mimic androgenic alopecia [7]. The current study shows that the amount of pollutants even indoor can also affect the hairshaft and causes hairfall. There is increased tendency of association of hairfall and dandruff. Pretending dandruff also to be the one of the major causes of hairfall. As Chennai seems to be the one of the highly polluted metro cities in India.

METHODOLOGY

The current cross sectional study taking 100 individuals and the study area consisting of people of urban area of kancheepuram district. The current study

population includes young adults in the age group of 18 to 25 years. A questionnaire was prepared regarding hair fall and the responses have been recorded. The current study yields prevalence of hair fall due to air pollutants. The data collected was analysed statistically by SPSS version 17.0.

RESULT

Among 100 individuals 93.2 percent have hair fall and 6.8 percent doesn't have hair fall. And among 93.2 percent who have hair fall 48.9 percent have continuous hair fall and 18 percent have occasional hair fall and 30.8 percent varies seasonally. And the major cause for the hair fall is because they live in Chennai which seems to be the one of the highly polluted metro cities in Indian that is 63.9 percent of them. There is association of dandruff and hair fall. Causing dandruff to be major criteria for hair fall. According to the survey that have collected the prevalence of hair fall due to dandruff is high comparatively (**Figure 1-3**).

The people who sweat a lot has 8.90 times higher rate of hairfall than people who sweat less comparatively. Sweating is associated with the hair fall. There is positive association of sweating with hairfall, is shown in **Table 1**.

The frequency of people having dandruff has 1.98 times higher rate of hairfall than people who doesn't have dandruff (**Table 2**).

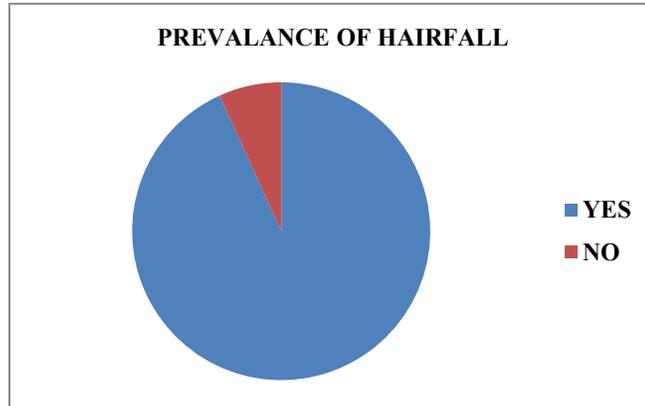


Figure 1: Prevalance of Hairfall

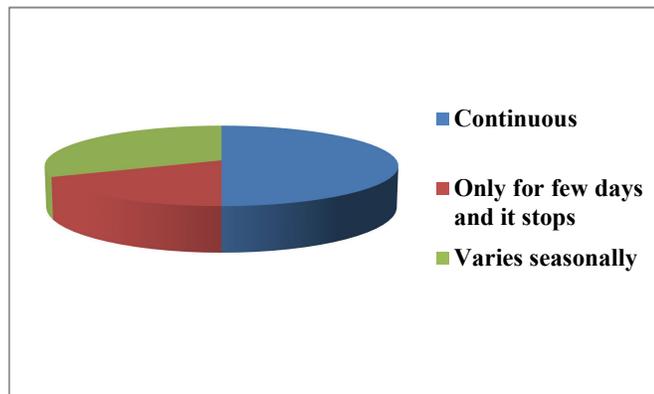


Figure 2: Frequency of Hair fall

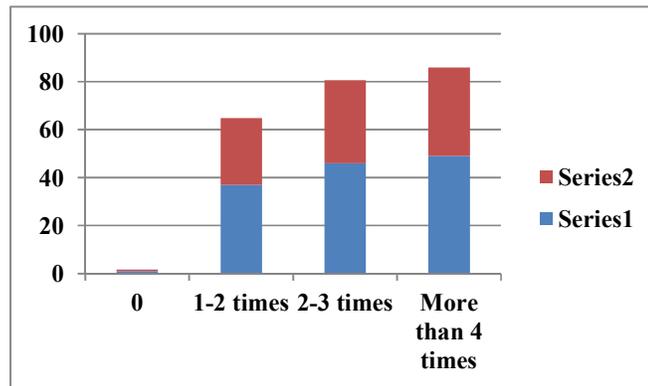


Figure 3: Frequency of Exposing Outside

Table 1: Association of Sweat and Hair fall

PEOPLE HAVING HAIRFALL	PERCENT	PEOPLE WHO SWEAT A LOT	PERCENT
YES	93.2%	YES	60.2%
NO	6.8%	NO	39.1%
TOTAL	100%	TOTAL	100%

Odds ratio : 8.90

Table 2: Association of Dandruff and Hair fall

people having dandruff		people having hairfall	
yes	51.1	yes	93.2
no	7.4	no	6.8
total	100	total	100

Odds ratio : 1.98

DISCUSSION

The prevalence of hairfall is 93.2% and people who doesn't have hairfall is 6.8% figure1. The hairfall is continuous for 48.9% of people and not continuous for 18% of people and varies seasonally for 30.8% people **Figure 2**. People who are frequently exposing outside has higher rate of hairfall than people who doesn't due to clogging of air pollutants **Figure 3**. The hairfall is a normal physiological condition that exists among all human kind. But the hairfall rate increases in urban areas [2] and the amount of hairfall is high in urban areas like one of the highly polluted metro cities in Chennai [8]. The air pollutants consists of minute dust particles that have proved to cause hairfall by clogging inside the hair and causing hairall [9]. There is association of dandruff and hairfall. People who have dandruff has 1.98 times higher rate of hairfall than people who doesn't have hairfall **Figure 3**. And people who sweat a lot have also shown higher amount of hairfall [6]. People who sweat a lot has 8.9 times higher rate of hairfall than people who doesn't sweat more figure4. Misery noted that exposure to pollution causes redness, irritation faster exfoliation of outer layers of the scalp, exposing sensitive inner

layers, causing more sensitivity, leading to further scaling and even psoriasis on prolonged exposure [4]. Patients complain of dandruff not responding to standard treatments [1]. Irritation due to pollution which on continued exposure, perpetuates excessive seborrhea and oily scalp With continued exposure to pollutants, hair follicles suffer unabated low grade inflammation leading to fibrosis and permanent hair loss [2]. Microscopic changes of signs of inflammation and accumulation of phagocytes are reported to be seen on scalp biopsy from effects of pollution [10].

WHO criteria for pollution levels

WHO recommended highest PM should be 100 ng/m³. The average particle matter (PM) in Mumbai varies from 238 ng/m³ to 643 ng/m³. Chennai levels of PM vary 398 ng/m³ to 760 ng/m³, being highest during Diwali fireworks and winter smog. Rising levels of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), ammonia (NH₃) and other gases are between 11-48%, these can adhere to the hair shafts causing damage, the levels can be 3-5 times higher during winter smog and Diwali [3].

Hair as a marker of pollution

Human hair has long been used as a biological marker for assessment of environmental pollutants, toxins, drug abuse and exposure to pesticides in farmers. Areas of mining and construction activity show higher concentration of PM. Concentration of mercury, zinc, lead, heavy metals can be determined from the air, dust and hair of the residents living around mining areas, indicating these as a cause of hair damage [4].

CONCLUSION

Pollution is on the rise all over the world and more so in Indian metros in one of the highly polluted cities like Chennai. Air pollution can contribute to scalp irritation, redness, itching, excessive sebum secretion, dandruff, pain in the hair roots and hair loss [7]. The combination is defined as sensitive scalp syndrome. The condition can mimic or overlap androgenic alopecia [8]. The possibility should be suspected to be discovered. Use of antioxidants, frequent scalp wash with mild shampoos, use of special EDTA shampoos and use of coconut oil or hair serum, are the remedies that can protect the hair from environmental damage [8].

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Ethical approval: The study was approved by the institutional ethics committee, Sree Balaji Medical College and Hospital.

REFERENCES

- [1] Potera C. Scented products emit a bouquet of VOCs. *Environ Health Perspect.* 2011; 119(1): A16.
- [2] Langer S, Modanova J, Arrhenius K, Ljungstrom E, Ekberg L. Ultrafine particles produced by ozone/limonene reactions in indoor air under low/closed ventilation conditions. *Atmospheric Environment.* 2008; 42(18): 4149-4159.
- [3] Wang S, Ang HM, Tade MO. Volatile organic compounds in indoor environment and photocatalytic oxidation. *State of the art.* 2007; 33(5): 694-705.
- [4] Srivastava AK, Gupta BN. The role of human hairs in health and disease with special reference to environmental exposures. *vet Hum toxicol.* 1994; 36(6): 556-560.
- [5] Misery L, Sibaud V, Ambronati M, Macy G, Boussetta S, *et al.* Sensitive scalp: does this condition exist? An epidemiological study. *Contact dermatitis.* 2008; 58(4): 234-238.
- [6] Misery L, Rahhali N, Ambonati M, Black D, Saint-Martory C, *et al.* Evaluation of sensitive scalp severity and symptomatology by using a new score. 2011; 25(11): 1295-1298.

- [7] Rinaldi F. Pollution, scalp and hair transplants. *Hair Transplant Forum International*. 2008; 18: 227.
- [8] Lanigan RS, Yamarik TA. Final report on the safety assessment of EDTA, calcium disodium EDTA, diammonium EDTA, dipotassium EDTA, disodium EDTA, TEA-EDTA, tetrasodium EDTA, tripotassium EDTA, trisodium EDTA, HEDTA, and trisodium HEDTA. *Int J Toxicol*. 2002; 21(2): 95-142.
- [9] Rele AS, Mohile RB. Effect of mineral oil, sunflower oil, and coconut oil on prevention of hair damage. *J. Cosmet Sci*. 2003; 54: 175-192.
- [10] Saint-Martory C, Roguedas-Contios AM, Sibaud V, Degouy A, Schmitt AM, Misery L. Sensitive skin is not limited to the face. *Br J. Dermatol*. 2008; 158(1): 130-3.