

CASE REPORT

ROLE OF RETINOL AND TOCOPHEROL IN COMBATING SMOG CAUSED ILLNESS AMONG YOUNG WOMAN

Bisma Laeeque¹, Asma Akmal¹, Zirgham Masood², Laeeque Chaudhary³, Zainab Jamil⁴

¹College of Home Economics, Lahore, ²University of Central Punjab, Lahore, ³District Health Officer, Kasur, Punjab, ⁴Lahore College for Women University, Jhang, Punjab, Pakistan.

ABSTRACT

Retinol and Tocopherol are commonly known as fat soluble Vitamin A and D. This research was undertaken with the objective to study Vitamin A and D's effect in combating smog caused illness among females. This case report highlights diseases caused among young woman of Lahore due to smog. Hypothesis formulated for this study was accepted after testing that intake of daily-recommended amount of Vitamin A and D by females helps them in fighting diseases caused by smog. An intervention based on Food and Nutrition Board's Recommended Dietary Allowances (RDAs) was planned. After the analysis of data by SPSS and excel, it was indicated that women could fight smog caused diseases better by including Vitamin A and D in their daily diet. It was also found that a strong positive correlation existed between good health condition among females and intake of Vitamin A and D.

Keywords: Retinol; Tocopherol; Smog; Public Health; Smog Caused Illness.

Corresponding Author:

Bisma Laeeque

College of Home Economics,
Gulberg III, Lahore, Pakistan.
Email: bislaeeque@gmail.com
doi.org/10.36283/PJMD8-4/016

INTRODUCTION

Lahore experiences fifth weather smog every year around the start of October to end of November. A number of cities around the globe suffer from this weather condition as well. Smog is composed of fog, which is mixed with smoke. A study indicates that smog is a potential and eminent reason behind respiratory and cardiovascular diseases among urban Chinese¹. A number of studies that smog affects human eye, skin and mucous membranes linings and cause cough, flu, itchy eyes, skin allergies, chronic obstructive pulmonary disease (COPD) and in certain extreme cases cancer²⁻⁵ has established it. Another experimental study indicated that ozone enhanced smog particles caused cardiopulmonary disorders in mice⁶. It is reported that an increase of 15% in number of asthma patients increased in New Jersey during smog in 1988 and 1989 and in West Germany in 1985 there was recorded an 8% increase in the number of mortalities, the number of patients admitted to the hospital by 15% and 12% increase in the number of outdoor patients^{7,8}.

Both Vitamin A and Vitamin E are fat-soluble vitamins, which are required by human body for

normal functioning. Vitamin A also known as retinol is considered effective and beneficial for vision^{9,10} skin and for maintaining the health of mucosal walls. Retinol is being used widely in skin treatment¹¹. It was found that retinol has the power to effect molecular and cellular properties of human dermis and epidermis and can uplift aged skin^{12,13}. Furthermore, it plays a very significant role in not only keeping the epithelial cells healthy but also in their differentiation and proliferation. Vitamin A can be obtained from butter, egg, cheese and liver and from plant sources in form of beta-carotene, which is further, converted into retinol, during its digestion in the body. These plant sources are the deep leafy green vegetables and yellow fruits such as papaya and mangoes. Similarly, Vitamin E also known as Tocopherol found in spinach, tomatoes, almond, sunflower seeds, peanuts, kiwi, mango etc., is beneficial for human skin and is also an anti-oxidant¹⁴. In addition to these, Vitamin E plays a pivotal role in strengthening human immune system. Vitamin E plays a scavenger role in combating influenza not by its antiviral prowess but by guarding human liver and lungs owing to its anti-oxidizing properties. This study was undertaken to investigate the role of Vitamin A and E in combating illness caused due to smog among young woman. This

study will prove beneficial for woman as by making simple dietary additions to their meal they will be able to fight the nuisances caused by smog. Furthermore, this study will help to strengthen their immune system, as it will reduce the need to use medicine. This study also adds to the knowledge base on human nutrition by highlighting the advantages and benefits of Retinol and Tocopherol.

CASE REPORT

This study was undertaken to study the role of Vitamin A and E i.e., Retinol and Tocopherol in combating smog caused illness such as sore throat, cough, flu and itchy eyes. Feedback was assembled only from females. The respondents of this study were between age range (20- 30). The respondents were taken from woman colleges of Lahore. Only those females were made part of study who were unmarried and were declared physically fit after complete physical checkup by a general physician and who claimed that they suffered from smog caused illness in smog period of 2017. Vitamin A and E was given to the respondents from dietary sources only namely fish, eggs, olives, papaya, spinach, carrots, beets, almond, peanuts and sunflower seeds. A daily intake of 0.7 mg of Vitamin A and 15 mg of Vitamin E as recommended by Food and Nutrition Board (FNB) was given to the respondents for five weeks. Purposive sampling strategy was employed in this study. An experimental research design was used for this research. The respondents were daily given Vitamin A and Vitamin E enriched lunch in college. The intervention began in the third week of September 2018 and finished in last week of October 2018.

RESULTS

It is exhibited in the figure above that during smog illnesses from which woman suffered from are from most frequent to least frequent in decreasing order mild cough, dermatitis, influenza, emphysema, COPD, itchy eyes and asthma (Figure A).

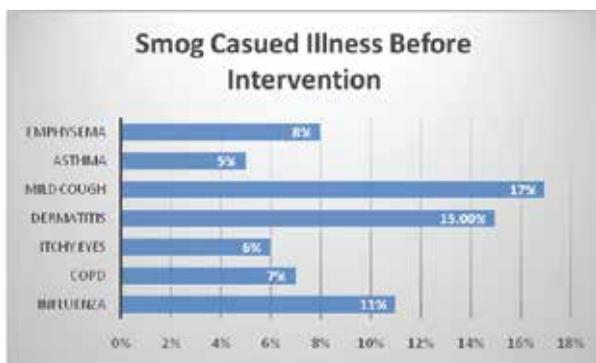


Figure A: Smog caused diseases in the sample before intervention.

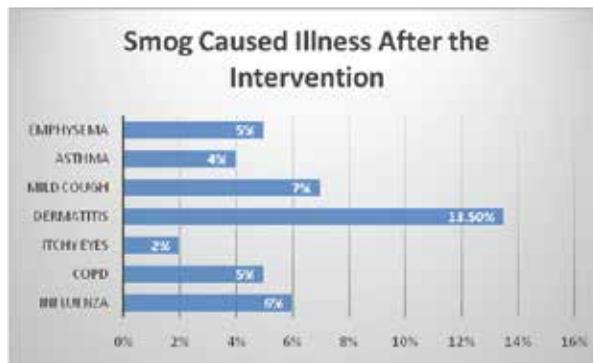


Figure B: Smog caused diseases among sample after the intervention.

The figure above (Figure B) illustrates the decrease in the reported maladies by the sample after the intervention. It was found in a descending order that after the intervention dermatitis was most prevalent, followed by mild cough, influenza, COPD, emphysema, asthma and itchy eyes.

Table1: Pre and post test health conditions.

		Mean	Std. Deviation	Std. Error Mean
Pair 1	pre test health condition	27.3800	9.52167	.95217
	post test health condition	57.7300	6.47740	.64774

It is indicated in the Table 1 that after the intervention an improvement was observed among the participant's health. The mean health of students after intervention was higher i.e., (M= 58; SD=.65) as compared to pre test which was (M=27; SD=.95).

Table 2: Student's health condition after taking Vitamin A and Vitamin E.

		Paired Differences				t-test	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	pre test - post test	30.35000	11.78372	1.17837	32.68815	28.01185	25.756	99	.000

It is indicated by the Table 2 that a significant difference was present in student's health condition after taking Vitamin A and Vitamin E [p< .005, t=25.76 (99)]. Hence, the hypothesis formulated for the study was accepted that intake of daily-recommended amount of Vitamin A and D by females helps them in fighting diseases caused by smog.

Table 3: Correlation between vitamin A and E intake.

Variable	Pearson Correlation	Sig(2-tail)
Vitamin A* Good Health	.617	<i>p</i> <.005
Vitamin E* Good Health	.588	<i>p</i> <.005

It is exhibited in the Table 3 that a strong positive correlation was present between Vitamin A and E intake during smog period for maintaining good health.

DISCUSSION

This experimental research study was conducted in a selected urban area of Lahore, which is situated along the busy roads of the central part of city Lahore. All the participants of the study are young females, who were unmarried and physically fit but were reported with an aggravation of symptoms of certain ailments due to rising smog in the urban environment. Smog causes mild to chronic cough, flu, chronic obstructive pulmonary disease, itchy eyes and increases incidences of dermatitis as exhibited in Figure A.

This study was undertaken to investigate role of Vitamin A and E in prevention of smog caused illness among females. Data was accumulated from college girls. This data was processed by using SPSS software. For results, and presentation of results, different statistical analytical tools were used like percentage, bar graphs, mean and correlation to present the result comprehensively. The statistical analysis and results are shown and proved that the hypothesis formulated was valid i.e., Retinol and Tocopherol helps to prevent smog caused illnesses among young girls strengthening the findings¹⁴ of that Vitamin A and E improves vision, reduces chances of skin diseases such as dermatitis, fights influenza and strengthen immune system. Thus, there is significant improvement in their physical health. Furthermore, it was also revealed that after the intervention health status of girls improved during smog period and 67% of the sample respondents who received the intervention reported feeling less or no cramps and pain during menstruation.

It was discovered by the tests and depicted in results that the respondents (who reported difficulties in catching breath before the intervention) described that they were comfortable in catching breath after the intervention. Hence, the symptoms of Emphysema were reduced 3% from 8% to 5% within the intervention period of just, six weeks by taking recommended amount of Retinol and Tocopherol in their diet. Although, asthma has been reduced from 5%-4% (means only by 1% reduction). On other hand, mild cough symptoms have been shown maximum reduction by percentage that is

10 from 17% to 7%, which is fortifying the implementation of the research findings. Symptoms of dermatitis were reduced only 1.5% from 15% to 13.50% after the period of intervention. Itchy eyes symptoms, among respondents have been reduced 4% from 6 to 2 percent. COPD stands for chronic obstructive pulmonary, lung disease. COPD is a term applied to a family of diseases that includes chronic bronchitis and emphysema, is also shown 3% reduction in symptoms, from 7% to 5%. The symptoms of influenza had shown drastic decline of 11% to 6% of the sample respondents reported itching sensation in the eyes (Figure B) during smog period of 2018 supporting the findings of different studies^{12,13}.

Pearson Correlation was conducted, and it was found that Vitamin A and E has a strong positive correlation in maintaining good health condition of respondents during smog prevailing period in the city Lahore. On the grounds of above discussion, it is concluded that Vitamin A i.e., Retinol and Vitamin E i.e., Tocopherol are dietary supplement and provided to the respondents by natural means in their lunch during the experimental period of six weeks. The defined time-period or intervention, which has been, began in the third week of September 2018 and ended in the last week of October 2018.

Retinol and Tocopherol were given to selected young girls in fix amount of daily intake of 0.7 mg and 15 mg in amount as recommended by Food and Nutrition Board (FNB). Retinol and Tocopherol were used as a dietary supplement. Retinol is also called as Vitamin A. This vitamin is of in yellow color and, found in green and yellow vegetables, egg yolk, and fish-liver oil. This and its other forms of vitamin A are needed for eyesight, maintenance of the skin, and human development. It is converted in the body to retinal and retinoic acid through which it acts. It is essential for growth and for vision in dim light. Tocopherol helps young women to combat smog caused illness such as mild to chronic cough, emphysema, dermatitis, COPD, itchy eyes and influenza. These Vitamins could be taken easily from dietary sources both animal and plants. They are found in a number of foods such as deep leafy green vegetables and yellow fruits such as papaya and mangoes, egg, tomatoes, almond, sunflower seeds, peanuts and spinach that are easily affordable by all the classes of our society. The treatment of air borne diseases is expensive and become the cause of disturbance of socio-economic life among urban dwellers. Therefore, by taking diet rich in Vitamin A and E i.e., one can escape economic strain inflicted on the patient in form of medicine and used as a mitigation tool against the prevention of smog causes ailments from taking toll on human body by attacking its defense system, eyes, skin, throat, other vital organs and helps to fight COPD.

CONCLUSION

In this study, it was found that the most prevalent diseases before the intervention were mild cough, dermatitis, influenza, emphysema, COPD, itchy eyes and asthma. While after the intervention, dermatitis was most prevalent, followed by mild cough, influenza, COPD, emphysema, asthma and itchy eyes. The hypothesis formulated for the study under discussion, indicates the intake of daily-recommended amount of Vitamin A and D by females, which helps them in fighting diseases caused by smog.

ACKNOWLEDGEMENTS

We specifically thank Government College of Home Economics, Lahore College for Woman University for helping us in this study.

CONFLICT OF INTEREST

There was no conflict of interest among the authors.

ETHICS APPROVAL

The study approval was sort from the M.Phil and PhD. Committee of College of Home Economics.

PATIENTS CONSENT

Verbal and written informed consent was obtained from all patients.

AUTHORS CONTRIBUTION

BL conceived the idea, did bench work, and wrote the manuscript. ZJ helped in the data collection. AA supervised the project, LC helped in designing the manuscript and ZM did the statistical analysis.

REFERENCES

- Ban J, Zhou L, Zhang Y, Anderson GB, Li T. The health policy implications of individual adaptive behavior responses to smog pollution in urban China. *Environ Int.* 2017;106:144-52.
- Bharadwaj P, Zivin JG, Mullins JT, Neidell M. Early-life exposure to the great smog of 1952 and the development of asthma. *Am J Respir Crit Care Med.* 2016;194(12):1475-82.
- Neidell MJ. Air pollution, health, and socio-economic status: the effect of outdoor air quality on childhood asthma. *J Health Econ.* 2004;23(6): 1209-36.
- Brunekeef B, Holgate ST. Air pollution and health. *Lancet.* 2002;360(9341):1233-42.
- Hazari MS, Stratford KM, Krantz QT, King C, Krug J, Farraj AK, Gilmour MI. Comparative cardio-pulmonary effects of particulate matter-and ozone-enhanced smog atmospheres in mice. *Environ Sci Technol.* 2018;52(5):3071-80.
- Cody RP, Weisel CP, Birnbaum G, Lioy PJ. The effect of ozone associated with summertime photochemical smog on the frequency of asthma visits to hospital emergency departments. *Environ Res.* 1992;58(1-2):184-94.
- Saari JC. Vitamin A and vision. In *The Biochemistry of Retinoid Signaling II* 2016 (231-259). Springer, Dordrecht.
- Mert H, Yıldırım S, Yörük İH, Irak K, Comba B, Mert N, Aysin N, Comba A. Retinol, α -tocopherol and vitamin D3 in White Muscle disease. *Med Wet.* 2018;74(7):441-4.
- Kong R, Cui Y, Fisher GJ, Wang X, Chen Y, Schneider LM, Majmudar G. A comparative study of the effects of retinol and retinoic acid on histological, molecular, and clinical properties of human skin. *J Cosmet Dermatol.* 2016;15(1):49-57.
- Shao Y, He T, Fisher GJ, Voorhees JJ, Quan T. Molecular basis of retinol anti-ageing properties in naturally aged human skin in vivo. *Int J Cosmet Sci.* 2017;39(1):56-65.
- Peechakara BV, Gupta M. Vitamin B2 (riboflavin). In *StatPearls [Internet]* 2018. StatPearls Publishing.
- Park K. Role of micronutrients in skin health and function. *Biomol Ther.* 2015;23(3):207.
- Hajian S. Positive effect of antioxidants on immune system. *Immunopathologia Persa.* 2016;1(1).
- Mileva M, Galabov AS. Vitamin E and Influenza Virus Infection. *Vit E Health Dis.* 2018:67.
- Ban J, Zhou L, Zhang Y, Anderson GB, Li T. The health policy implications of individual adaptive