ejpmr, 2020,7(10), 412-416

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

PERFUME RELATED ASTHMA IN PAKISTAN

[1]*Dr. Syed Anzar Ahmed, [2]Dr. Alvina Tariq and [3]Dr. Amna Anzar

[1,3]Dow University of Health Sciences.
[2]Jinnah Sindh Medical University.

***Corresponding Author: Dr. Syed Anzar Ahmed**

Dow University of Health Sciences.

Article Received on 23/07/2020 **Article Revised on 13/08/2020** **Article Accepted on 03/09/2020**

ABSTRACT

Background: Perfume fragrances are likely to cause allergic reaction and airway obstruction among the asthmatic patients. Moreover, other symptoms of the allergic reaction also include chest tightening and wheezing. **Aim:** The study aims to assess perfume related asthma among the residents of Karachi, Pakistan. **Methodology:** The study has employed quantitative approach and recruited 120 patients from the clinics of general practitioners of all districts of Karachi. The age of participants were ranged between 20 to 30 years. Questionnaires were filled by the participants that included demographic details and other questions based on Likert scale. The participants were also told to rate perfume fragrance on the basis of multiple dimensions including; irritation, annoyance, and perceived intensity. **Results:** Majority of the recruited participants were males (62.5%); whereas, 37.5% were females. 31.7% of the participants had acquired asthma as a result of environmental conditions and 16.7% suffered from it since birth. The results clearly depicted that perfume fragnance is one of the major reasons that triggers asthma as it can cause airway obstruction, develop bronchial hyper-responsiveness, and increase activity of airway passage. **Conclusion:** Although perfume fragrance is one of the reasons for triggering asthma but there are many other factors that are inter-linked with initiating the allergic reaction.

KEYWORDS: Airway Obstruction, Allergy, Asthma, Fragrance, Hyper-activity, Hyper-sensitivity, Perfume.

INTRODUCTION

Perfumes are made up of complex mixtures of more than 4,000 animal and vegetable extracts, which are obtained from non-organic and organic compounds. The fragrances within the perfumes are responsible for causing airway obstruction among the asthmatic patients. Perfumes have been associated with certain allergic reactions, including asthma or rhinitis among the individuals, who are exposed to such fragrances within the environment (Lessenger, 2001). Other common symptoms of causing exacerbations include wheezing and chest tightening. An immediate response of airways was documented among the individuals who had developed viral respiratory infections and allergic rhinitis. Moreover, airway hyperactivity is documented among the patients depicting asthma like symptoms (Weinberg et al., 2017). The fragrance products like the personal care products, perfumes, air freshners, laundary supplies etc. are omnipresent in the modern society.

The products with fragrance are responsible for eliciting adverse health effects among the individuals like asthmatics. The indoor air pollutants such as the volatile organic compounds are generated as a result of fragranted products (Zock et al., 2007). A large array of products is associated with frangrance chemicals. Asthma induced as a result of perfume fragrances is characterized by the development of bronchial hyper-responsiveness, which controls the breathing process. Moreover, certain fragrances may also result in irritation of the bronchial limits, causing overstimulation of the respiratory system. The perfume fragrances tend to alter the breathing rates as a result of emotional memory of that particular fragrance (Zock et al., 2007).

These fragrances may result in positive response towards relaxation and may even result of excitation of certain cells. Unlike menthone and pentyl acetate, unpleasant fragrances like hydrogen sulphide and ammonia are responsible for reducing breathing rate among some of the individuals (Wolkoff & Nielsen, 2017). Various health and environmental concerns have been visualized after identifying certain fragrances in the consumer products. The perfume fragrances are characterized as putative as they stimulate the symptoms of asthma. Asthma is characterized as a chronic inflammatory disorder of the respiratory tract. It produces significant challenges for the affected individuals as they loose productivity at work and bear financial burdens for the medical care.

Asthma exacerbations have been linked with exposure to the airborne chemicals. The residential and occupational exposure to the perfume fragrances and airborne

chemicals adjusted; although, there is limited scientific evidence to evaluate whether the adjusments are necessary and protective. The activation of autonomic nervous system (ANS) contributes towards the amplification of broncho-constriction, when the asthmatic attack is triggered. This occurs because the functionality of airways is under the control of ANS. Asthmatic patients are commonly observed as expressing their concerns regarding the possible impact of airborne chemicals and their health effects. However, these concerns are likely to be escalated when there is fragrance in airborne emission similar to that of the perfumes (Jaen & Dalton, 2014).

Two different sensory systems within the nose are activated as a result of increased concentration of perfume fragrances within the environment;

- Trigeminal system – connected via Cranial Nerve V
- Olfactory system – connected via Cranial Nerve I

Cranial Nerve V is also known as trigeminal nerve, which is characterized as unmyelinated free nerve distributed across the nasal, oral, and ocular mucosa. It is responsible for responding towards irritant vapor of perfumes leading to chemesthetic irritant sensations. These sensations include tingling, cooling, burning, and prickling. On the other hand, cranial nerve I, the olfactory nerve tends to provide neural information from the odorant receptors. Doty et al. (2004) explained the detailed mechanism of asthmatic attack that results due to perfume and other fragrances. The neuropeptide mediators (calcitoning gene related peptides and substance P) are released as a result of trigeminal stimulation from the volatile chemicals. A variety of physiological functions are affected as aresult of release of these neuropeptides. The physiological functions including vasodilation, respiration, and glandular secretions within the airway are responsible for triggering the symptoms of asthma.

Problem Statement

There are many factors such as respiratory tract infections, weather changes, fragnance of perfume, and smoke that are likely to trigger asthmatic attack among the individuals. Exposure to perfume consitutents has been investigated as it is sensitive for the individuals, who are suffering from idiopathic environment intolerance. Moreover, it is impossible to form generalized statements regrding fragrances and its potential effects that result due to its inhalation. The psychological and physiological processes associated with the irritating perfume fragrances elicit adverse symptoms among the asthmatic patients. It is significant to evaluate the capability of stimulus (perfume odor) to activate trigeminal fibers within the respirtaory system for the separation of adverse responses that were induced trigeminally or by perception of the odor. Therefore, the present study has shed light on the developemnt of perfume related asthma among the patients already suffering asthma.

Aim of the Study

The study has assessed the development of perfume related asthma among the residents of Karachi, Pakistan.

METHODOLOGY

The study design has been based on quantitative approach. The study has been conducted according to the Code of Ethics of the World Medical Association that is considered for conducting experiments that involve human beings. The study has included asthmatic individuals, who arrived for checkup in the clinics of general practitioners of different districts of Karachi. A total of 120 patients were recruited ranging from 20 – 30 years. Consents were taken from all the recruited participants before utilizing the questionnaire to collect demographic details of the patients, disease history, and clinical examination. The demographic details of the patients included gender, age, and duration of asthma. The questionnaire also included general questions related to asthma and factors that trigger asthmatic attacks among the recruited participants, which was based on the Likert scale. The participants <20 years and >30 years were excluded from the study.

An irritant sensation is likely to be produced as the odorants in high concentrations elicit responses through the trigeminal system, which is likely to affect the respiratory system. Phenyl ethyl alcohol (PEA) also known as pure odorant is not capable of activating trigeminal system within the airborne concentration. PEA was passed over a surface of vessel to odorize the air. This stimulus was delivered to the participant's nose through an olfactometer inserted into one nostril via Teflon nosepiece coupled with the nasal cannula. The participants had to rate the fragrance on the basis of multiple dimensions that included; irritation, annoyance, and perceived intensity. These dimensions were evaluated on the basis of general Labeled Magnitude Scale. The obtained data has been analyzed using Statistical Package of Social Sciences (SPSS) version 20.0.

RESULTS

The study has included 120 asthamtic adults, among which 62.5% were males and 37.5% were females. All the recruited participants were aged between 20 to 30 years. 43.3% were between 20 to 24 years; whereas, 56.7% were between 25 to 29 years. Majority of the participants (31.7%) had acquired asthma due to environmental conditions since not more than 1 year. Whereas, 25%, 17.5%, and 9.2% were suffering from asthma since more than 1 year, 2 years, and 3 years, respectively. 16.7% of the participants had asthma since birth (Table 1).

Table 1: Demographic Details of the Participants.

Measure	Item	Frequency	Percentage
Gender	Male	75	62.5%
	Female	45	37.5 %
Age	20 – 24 years	52	43.3%
	25 – 29 years	68	56.7 %
Duration of Asthma	<1 year	38	31.7 %
	>1 year	30	25%
	>2 years	21	17.5 %
	>3 years	11	9.2 %
	Since Birth	20	16.7 %

Regression analysis was performed to evaluate the association between dependent variable (perfume is casautive agent for triggering asthma) and other independent variables. The results showed significant results for perfumes causing airway obstruction (0.011), perfume cause airway hyper-activity (0.02), and development of bronchial hyper-responsiveness (0.13) (Table 2). The results clearly depict that perfume is a casautive agent for triggering asthma as it can cause airway obstruction, develop bronchial hyper-responsiveness, and increase activity of airway passage. ANOVA test was performed to determine any differences between the means that are statistically significant. The results have been analyzed at 0.05 level of significance (Table 3).

Table 2: Regression Analysis.

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
		.959	.126		7.591	.000
	Perfumes cause airway obstruction	.256	.099	.278	2.584	.011
	Perfumes are associated with allergic reactions	-.135	.118	-.159	-1.152	.252
	Perfumes cause airway hyperactivity	.313	.097	.402	3.229	.002
	Development of bronchial hyper-responsiveness	.172	.068	.265	2.527	.013
	Fragrance alter breathing rates	.071	.069	.128	1.031	.305
a. Dependent Variable: Perfume.is.causative.factor.triggering.asthma						

Table 3: ANOVA test.

		Sum of Squares	df	Mean Square	F	Sig.
Perfumes cause airway obstruction	Between Groups	49.136	4	12.284	56.083	.000
	Within Groups	25.189	115	.219		
	Total	74.325	119			
Perfumes are associated with allergic reactions	Between Groups	58.406	4	14.601	59.575	.000
	Within Groups	28.186	115	.245		
	Total	86.592	119			
Perfumes cause airway hyperactivity	Between Groups	76.330	4	19.082	79.910	.000
	Within Groups	27.462	115	.239		
	Total	103.792	119			
Development of bronchial hyper-responsiveness	Between Groups	107.595	4	26.899	73.656	.000
	Within Groups	41.997	115	.365		
	Total	149.592	119			
Fragrance alter breathing rates	Between Groups	161.987	4	40.497	109.998	.000
	Within Groups	42.338	115	.368		
	Total	204.325	119			

The qualities of odor were rated by manipulating perceived risks of exposure. The odor was characterized as irritating when it was percieved as harmful by the participants. The asthmatic patients showed greater tendency of developing bronchoconstriction, hyperventilation, and panic as soon as they were exposed to the PEA odor. Unlike bronchoconstriction and hyperventilation, panic attack was short lived as the

value obtained at baseline and after 2 hours were similar. The exposure to PEA odor did not enhance the responsiveness of autonomic nervous system. The symptoms of asthma were presented after around 24 hours of continous exposure.

DISCUSSION

Asthma has been associated with complex interplay of physiological, psychological, and immunological factors. Asthma is likely to influence around 15 – 20% of the children all across the world. Since the past decade there is significant increase in the incidence and severity of asthma. There is increase in the prevelance of asthma as there is increase in the impact of environmental allergens (Satti & Magzoub, 2014). A study conducted by Wolkoff and Nielsen (2017) investigated the abundnace of common airborne fragrances and it simpact of causing sensitization and irritation in the airways. The results showed that toxic effects of fragrance is responsible for altering the lung functioning. It is also capable of increasing the heart rate of some of the individuals exposed to perfume fragrances. Another study conducted by Zock et al. (2007) revealed that 30.5% of the participants reported irritation and 19% reported breathing difficulties and headaches. The increased proportion of individuals already suffering from asthma tends to develop significant chemical sensitivity.

A study conducted by Chen and Miller (2007) evaluated the role of some psychological variables that are responsible for inducing asthma exacerbation. The model formulated by Chen and Miller (Figure 1) that perception of perfume odor is capable for initiating emotional cognitive events. These events can terminate the interpretation and appraisal of uncontrolled health threat (asthmatic attack).

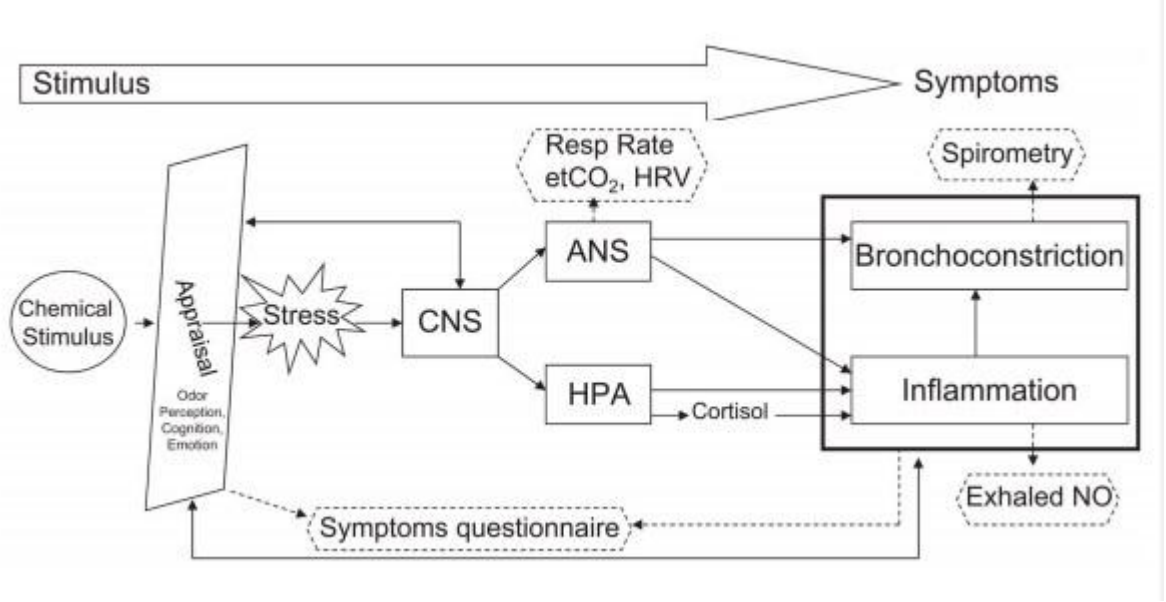

Figure 1: Model representing asthma exacerbation (Chen & Miller, 2007).

The physiological variables associated with perfume fragrance affect different biological pathways that initiate a cascade of events leading to changes in the smooth muscle tone, increased sensitivity towards inhaled agents, and inflammation of the airway. Strong fragrances may even stimulate both the branches of ANS; sympathetic nervous system and parasympathetic nervous system. The activation of both the systems stimulates sympathetic adrenal medullary axes and hypothalamic pituitary adrenal cortex. According to Ritz et al. (2010), the activation of parasympathetic nervous system causes bronchoconstriction. On the other hand, interaction and impact of cortisol, epinephrine, and norepinephrine is responsible for regulating other physiological processes.

Perfume fragrance is considered as a neurological toxin and respiratory irritant and it is likely to pose serious health risks among individuals including asthmatic attacks, respiratory impairment, and tightening of throat. It is believed that asthma and other breathing problems are exacerabated through synthetic fragrances (De Vader, 2010). The study conducted by De Vader (2010) also revealed that the problem with fragrance products including perfumes is not the scent, rather the properties of synthetic chemicals derived from coal tar and pertroleum are the main reason for causing respiratory disturbances. According to the Health and Safety Bulletin (2003), more than 4000 chemical ingredients are used for preparing products in the fragrance industry, among which 80% of the chemicals are not tested for their toxicity. At the first exposure, chemical irritants present in a perfume fragrance initiate sensitizing process within the immune system and recognize the materials. Later, when the individual is re-exposed to the same fragrance a prompt response is generated. However, the negative impact of fragrances on the health of asthmatic individuals is well researched and documentes for many years.

CONCLUSION

Considering the environment of Karachi, Pakistan asthma has been considered as a common health problem among different individuals. Asthma is likely to get triggered by more than one factor in the same individual. The fragnance of perfumes have been characterized as one of the casautive factor to trigger asthma; although, impact of this factor is not that high. The results of the present study are limied and the study has not specified and confirmed the different types of irritations experienced by various individuals. Sensitivity towards specific fragrances is a common condition and needs further research and attention. Regular follow up along with prophylactic treatment is important for decreasing the morbidity and mortality of asthmatic consequences. Appropriate health education is also advised for the patient, which may include determination of factor that triggers asthmatic attack. Moreover, protocols for managing asthma modulated for local use would also provide great assistance.

REFERENCES

1. Chen, E., & Miller, G. E. (2007). Stress and inflammation in exacerbations of asthma. *Brain, behavior, and immunity*, *21*(8): 993-999. Doi: 10.1016/j.bbi.2007.03.009
2. De Vader, C. (2010). Fragrance in the workplace: what managers need to know. *Journal of Management and Marketing Research*, *3*: 1.
3. Doty, R. L., Cometto-Muniz, J. E., Jalowayski, A. A., Dalton, P., Kendal-Reed, M., & Hodgson, M. (2004). Assessment of upper respiratory tract and ocular irritative effects of volatile chemicals in humans. *Critical reviews in toxicology*, *34*(2): 85-142. Doi: 10.1080/10408440490269586
4. Health and Safety Bulletin. (2003). Risks to Asthma Posed by Indoor Health Care Environments: A Guide to Identifying and Reducing Problematic Exposures.
5. Jaen, C., & Dalton, P. (2014). Asthma and odors: The role of risk perception in asthma exacerbation. *Journal of psychosomatic research*, *77*(4): 302-308. Doi: 10.1016/j.jpsychores.2014.07.002
6. Lessenger, J. E. (2001). Occupational acute anaphylactic reaction to assault by perfume spray in the face. *The Journal of the American Board of Family Practice*, *14*(2): 137-140.
7. Ritz, T., Kullowatz, A., Goldman, M. D., Smith, H. J., Kanniess, F., Dahme, B., & Magnussen, H. (2010). Airway response to emotional stimuli in asthma: the role of the cholinergic pathway. *Journal of Applied Physiology*, *108*(6): 1542-1549. Doi: 10.1152/japplphysiol.00818.2009
8. Satti, S. A., & Magzoub, O. S. (2014). Risk factors for asthmatic children attending the paediatric clinic at Al-Aml National hospital, Sudan. *Global Advanced Research Journal of Medicine and Medical Sciences*, *3*(3): 059-063.
9. Weinberg, J. L., Flattery, J., & Harrison, R. (2017). Fragrances and work-related asthma–California surveillance data, 1993–2012. *Journal of Asthma*, 1-10. Doi: 10.1080/02770903.2017.1299755
10. Wolkoff, P., & Nielsen, G. D. (2017). Effects by inhalation of abundant fragrances in indoor air–An overview. *Environment International*. Doi: 10.1016/j.envint.2017.01.013
11. Zock, J. P., Plana, E., Jarvis, D., Antó, J. M., Kromhout, H., Kennedy, S. M., & Radon, K. (2007). The use of household cleaning sprays and adult asthma: an international longitudinal study. *American journal of respiratory and critical care medicine*, *176*(8): 735-741. Doi: 10.1164/rccm.200612-1793oc