



A COMPREHENSIVE REVIEW ON OCCUPATIONAL ASTHMA, ITS MANAGEMENT AND MANIFESTATION IN MISCELLANEOUS INDUSTRIES

Sehrish Badar*¹, Sheikh Abdul Khaliq², Danish Raza³, Syed Waseemuddin Ahmed¹, Zafar Alam Mahmood¹, Iqbal Azhar¹, Ishrat Younus⁴, Saman Usmani⁵

¹ Department of Pharmacognosy, University of Karachi. Karachi, Pakistan

² Department of Pharmaceutics, Hamdard University. Karachi, Pakistan

³ Department of Quality Operations, Jamjoom Pharma, Jeddah, Saudi Arabia

⁴ Department of Pharmacology, Hamdard University. Karachi, Pakistan

⁵ Department of Pharmaceutical Chemistry, Jinnah Sind Medical University. Karachi, Pakistan

*Corresponding Author: Sehrish Badar, Rph, Pharm.D, M.Phil, Department of Pharmacognosy, Faculty of Pharmacy, University of Karachi. Email: Sehrish.zaman1@gmail.com

ABSTRACT

Occupational asthma is a major health illness. In developing countries this occupational asthma is much more prevalent and most often reported. Therefore, it was an alarming need to assess prevalence and risk factors of occupational asthma. This review focused on the incidences of occupational asthma its types, pathophysiology, different trends, its awareness and occurrence in various industrial sectors. With this extensive review we can better evaluate the causal factors, prevalence and natural remedies suppressing the risk of occupational asthma to help the working community for better health and life. Further investigations should be done in this regard to develop strategies and interventions to overcome this problem. The review and the findings may become more meaningful if its assessments reflect real improvements and implementation for the betterment and protection of health.

Key words: occupational asthma, pathophysiology, incidence, remedies

INTRODUCTION

Asthma is a complicated inflammatory illness of the airway that includes the initiation of numerous inflammatory and auxiliary cells, all of which discharge inflammatory mediators that bring out the common pathophysiology patterns of asthma¹. This study on occupational asthma was completed from 18th May 2017 till 15th September 2017.

Asthma is a genuine general wellbeing issue all through the world, influencing individuals of all ages. At the point when asthma is not in control, can put extreme breaking points on everyday life, and is once in a while lethal. Asthma is an issue characterized by its clinical, physiological, and pathological attributes². The prevalent element of the clinical history is shortness of breath, particularly around sleeping time, frequently joined by cough. The fundamental physiological element of asthma is airway impediment described by expiratory wind current limitation. The predominant obsessive element is aviation route inflammation, sometimes connected with aviation route basic switches. Because there is no unmistakable meaning of the asthma

phenotype, specialists contemplating the improvement of this unpredictable malady swing to attributes that can be measured equitably, for example, atopy (showed as the vicinity of positive skin-prick tests or the clinical reaction to regular natural allergens), aviation route hyperresponsiveness (the inclination of aviation routes to contract unreasonably in light of triggers that have almost no impact in ordinary people), and different measures of unfavorably susceptible sensitization³.

William w. Busse et al. (2001) reported those factors which can contribute in developing asthma, these factors provides the grounds on the basis of which cause of asthma can be known^{4,5,6}.

Table I:⁷ Factors influencing the development and expression of asthma

Prime factors
Genetic
• Genes pre-disposing to atopy
• Genes pre-disposing to airway hyperresponsiveness
Obesity
Sex
Environmental factors
Allergens
• indoor: domestic mites, furred animals (dogs, cats, Mice), cockroach allergen, fungi, molds, yeasts
• outdoor: pollens, fungi, molds, yeasts
Infections (predominantly viral)
Occupational sensitizers
Tobacco smoke
• passive smoking • active smoking
Diet
Outdoor/indoor air pollution

Barbara p yawn from therapeutic centre usa expressed in his research that asthma is a typical constant ailment that outcome in huge weight for patients, families, and the medicinal services framework and we can prevent asthma and its morbidity or mortality with great significance⁸.

Characteristics of occupational asthma

Occupational asthma has transformed into the most prominent work related lung ailment in under developing and developed countries. Occupational asthma is an infection which is a direct result of the aviation route irritation and airway become hyper-responsive and this is called as bronchial hyper responsiveness⁹

Asthma is normal among grown-ups of working age and influences 5–10% of the populace around the world. Work related asthma has turned into a typical wok related respiratory issue in the industrialized sector. Blanc and Toren have demonstrated that 9% of instances of grown-up asthma—including basically new onset asthma and, substantially more once in a while, reactivation of prior asthma—are owing to work related¹⁰. Researches on that have utilized data gathered amid military administration proposed that work related components clarify 25% of obviously new cases. From a viable perspective, tending to over a significant time span work

related variables ought to be a need in the evaluation of grown-up onset asthma. Much of the time, work related exposures prompt new onset asthma in a solid subject, or working environment exposures may reactivate asthma in people who have been asymptomatic for a considerable length of time, or may exasperate prior asthma. For every situation, recognizing which of these conceivable outcomes is genuine (that is, business related exposures as asthma inducers or asthma triggers) is applicable for the administration of the illness, including aversion of extra cases, treatment, disability assessment, and remuneration^{11, 12}.

Types and pathophysiology

Jean-Luc Malo et al. (2009) reported that the work environment is a noteworthy contributor to the load of asthma. Despite the fact that the dominant part of cases most likely speak to what is marked work-exacerbated asthma, in countless, asthma is really brought on by 1 or more allergens present in the working environment; this is work related asthma. Two kinds of work related asthma are recognized, by the asthma shows up after a latency time. This article talks about (1) two kinds of allergens causing asthma with a dormancy period and acting through a clearly immunologic instrument (high-atomic weight agents and low-sub-atomic weight agents) and (2) allergens bringing about asthma without a latency period¹³.

Peter J Barnes (2001) reported that asthma is a very unpredictable ailment that is still ineffectively comprehended and whose reason stays obscure. One of the striking advances in the most recent decade has been the acknowledgment that cytokines assume a basic part in coordinating, propagating and opening up the inflammatory reaction in asthma. Surely the expanded and strange articulation of cytokines in aviation route cells is one of the real focuses of corticosteroid treatment, the best controller treatment for asthma at present accessible. Numerous cytokines and chemokines are included in the pathophysiology of asthma. While some of these cytokines, for example, interleukin (IL)- 1, tumor corruption variable and IL-6, are included in numerous inflammatory ailments, including unending obstructive aspiratory ailment, rheumatoid joint pain and inflammatory bowel disease, others are more particular to unfavorably susceptible irritation¹⁴.

Prevalence and incidence of occupational asthma

Asthma is an issue around the world, with an expected 300 million influenced people. In spite of many reports on the predominance of asthma in different populaces, utilization of institutionalized strategies to gauge the predominance of asthma and wheezing sickness, it gives the idea that the worldwide commonness of asthma extents from 1% to 18% of the populace in distinctive nations there is great proof that asthma pervasiveness has been expanding in some countries and has currently expanded. The world health organization has assessed that 15 million disability adjusted life years (DALYs) are lost every year because of asthma, speaking to 1% of the aggregate worldwide infection trouble. Yearly overall passing from asthma have been assessed at 250,000 and mortality does not seem to relate well with predominance. There is inadequate information to decide the conceivable reasons for the depicted varieties in pervasiveness inside and between populaces¹⁵.

Antti Karjalainen et al. (2000) exhibited a systematic exploration on occupation or industry-particular occurrence of work related asthma. Antti Karjalainen et al. calculated the rate of advised OA by occupation, industry and causative specialists in Finland for the years 1989–95. the quantities of instances of reported OA were recovered from the Finnish registry of occupational diseases for the populace somewhere around 20 and 64 years old. The quantities of

utilized laborers were recovered from statistics Finland. Occurrence rates were ascertained for every occupation, industry and the aggregate workforce. The rate was the most elevated in pastry specialists, different painters and lacquerers, veterinary specialists, substance laborers, agriculturists and other fabricating specialists, welders, plastic item specialists, butchers and wiener producers, and floor layers. Estimation of industry-incident rates shaped the premise for fruitful aversion of OA¹⁶.

Similarly, Goldberg, Xu and Christiani and Zock et al. (1993, 1993 and 2004) estimated the stability of the relationship between work related exposures and asthma might likewise be thought little of working environment based studies as a consequence of the sound worker health effect. This determination predisposition is less imperative in populace based studies. Although; few populaces based surveys have examined the part of particular exposure on the grounds that, to some extent, of the troubles in getting fair, legitimate estimation of work related exposures in vast studies depending on questionnaires for disclosure evaluation. Order of presentation taking into account employment title alone, regularly recorded in populace based studies, and is viewed as a poor marker of exposure to offending allergens. Self-reported disclosure, evaluated by questionnaire, may prompt some level of review inclination. However, recently, master audit techniques and occupation introduction grids have been utilized as a part of extensive populaces trying to give more noteworthy accuracy in exposure assessments according to employment title¹⁷.

Trends and risk factors of occupational asthma

Olivier Vandenplas (2011) basically surveyed the accessible confirmation relating to work related, natural, and individual elements that can influence the improvement of work related asthma. Expanding confirmation proposes that investigation of the inherent attributes of OA-bringing on specialists and related structure-action connections offers promising roads for evaluating the sharpening capability of operators that are presented in the work environment. The power of introduction to sensitizing asthmogens has been recognized as the most essential natural danger element for oa and ought to remain the foundation for essential counteractive action systems. The part of other ecological co-components (e.g., non-respiratory courses of introduction and associative presentation to tobacco smoke and different contaminations) stays to be further portrayed. There is persuading confirmation that atopy is an essential individual danger element for OA impelled by high-sub-atomic weight operators. There is some confirmation that hereditary components, for example, leukocyte antigen class ii alleles, are connected with an expanded danger of oa; on the other hand, the part of hereditary vulnerability variables is prone to be clouded by complex quality environment collaborations. OA, and asthma when all is said in done, is a mind boggling infection that outcomes from different cooperation between ecological components and host susceptibilities. Deciding these communications is an essential step towards actualizing ideal anticipation approaches¹⁸.

Basagana et al. (2001) thought about two employment introduction frameworks for the assessment of asthma dangers identified with particular wok related exposures in a group based study. They found that risks of current asthma side effects and wheeze in the most recent year connected with the exposure were assessed. Relationships between's particular exposures were examined utilizing logical variable investigation. Word related exposures to the high molecular-weight (mw) operators flour dust, chemicals, vermin and creature inferred proteins as got by the asthma-particular jem were absolutely connected with asthma outcomes. Many of the uncovered people worked in situations with different exposures. However, these particular presentation

dangers ought to be translated regarding the entire of corresponding exposures constituting the workplace¹⁹.

P.K. Henneberger et al. (2010) reported work related danger components for serious intensification of asthma and evaluation the degree to which occupation adds to these occasions. The outline classification of high amount of dusts, gas, or exhaust introduction proposed that occupation adds to roughly one in seven instances of extreme asthma in a working populace, and different asthmogens played an important role²⁰.

Moreover, Salvi and Barnes (2009) stated that overlooked diagnosis is for the most part because of the absence of particular indicative tests, the nonappearance of assaults of shortness of breath and continuous corresponding smoking propensities as dumbfound. Some of the researchers have reported comparable figures in their survey²¹.

Prevention and management of occupational asthma

Ms Dykewicz (2009) reported that occupational asthma (OA) may represent 25% or a greater amount of grown-up asthma. Increased comprehension of the pathogenesis of OA from receptive concoction sensitizers is prompting improvement of better indicative testing. Risk elements for OA including conceivable hereditary components are being outlined better. Ms Dykewicz mirrored an inexorably powerful proof premise for suggestions of analytic tests for OA incorporating sputum examination performed in connection to work introduction with suspected sensitizers. Preventive methodologies are inspected. Longitudinal investigations of patients with OA keep on demonstrating that opportune expulsion from introduction prompts the best forecast²².

Rolf Merget et al. (2001) reported that exposure lessening has turned out to be powerful in the aversion of work related asthma. Few information are accessible on the adequacy of optional avoidance projects, including restorative examinations and expulsion of specialists from presentation sources in the wake of distinguishing manifestations or signs demonstrative of a starting infection. This study demonstrates the adequacy of a therapeutic reconnaissance program for the counteractive action of work related asthma brought about by platinum salts²³.

7. Association of miscellaneous occupations with occupational asthma

Gianna Moscato et al. (2005) reported that hairdressers are at danger for work related respiratory maladies; however the danger variables, causal operators, and hidden instruments are not totally characterized. They depicted the elements of an expansive groups of hairdressers continuously alluded to our medical centre for suspected work related asthma. Over an 8-year period they portrayed persulfate salts, changeless hair colors and latex are causative specialists .patients with persulfate asthma had a long stretch of presentation to bleaching compounds, a long inactive period between the beginning of exposure and the start of signs and symptoms, and a predominant eosinophilic aviation route irritation in impelled sputum. They affirmed that persulfate salts are the real allergens included in oa and work related rhinitis in hair specialists²⁴.

Maya Obadia et al. (2009) portrayed that cleaners have been accounted for to have expanded danger for work related asthma side effects yet few studies have concentrated on non-local cleaners. In this study, they looked at occupational asthma and its side effects among cleaners and other building laborers and decided relationship with tasks. Female cleaners have more asthma side effects more awful at work than controls. Occupational asthma manifestations among male cleaners were connected with various particular cleaning assignments, for example,

waxing floors, wax-stripping floors, spot-cleaning covers, and cleaning tiles. Discoveries recommended that the requirement for school cleaners to have lessened presentation to cleaning chemicals and requirement for defensive methodologies amid execution of undertakings anticipated that would worsen asthma²⁵.

Hector G. Ortega et al. (2002) reported that occupational asthma is the most widely recognized work-related respiratory infection among developed nations. They reported shark cartilage dust as another potential reason for work related asthma. They depicted that a 38-year-old white male labored for a long time in an office which powdered different plastics. Sixteen months preceding his demise, the plant started granulating shark ligament. Following 10 months of presentation, he reported chest manifestations at work in relationship with introduction to shark ligament dust and doctor analyzed asthma. After six months, he grumbled of shortness of breath at work and died, from post-mortem it was affirmed asthma. Recognition of work related causes and triggers of asthma and expulsion of influenced people from these exposures is basic and can anticipate movement to irreversible or even deadly asthma²⁶.

Combating with herbal remedies

Bhoomika R. Goyal et al. (2007) reported the bronchoprotective impact of ethanolic concentrate of *Achyranthes aspera* linn. In toluene diisocyanate (TDI) actuated work related asthma in wistar rats. Wistar rats were isolated into four unique groups of eight in each. All rats with the exception of control gathering were induced by the intranasal use of 10% tdi to affect aviation route excessive touchiness. Toward the end of the study, after incitement with 5%tdi the symptoms were seen in all rats. They suggested that, tdi sensitized rats showed asthmatic side effects while *A. Aspera* and dexamethasone treated rats did not demonstrate any aviation route variation from the norm. The neutrophils and eosinophils in blood were diminished significantly; the aggregate cells and each distinctive cell specifically eosinophils in bal liquid were particularly decreased in treatment bunches when contrasted with tdi sharpened rats. The cell reinforcement action and histopathological perceptions additionally demonstrates defensive impact. From every single above discovering and perceptions, it can be reasoned that *A. Aspera* has advantageous part in work related asthma²⁷.

Paul D. Blanc et al. (2001) reported that asthma and rhinosinusitis are normal restorative conditions among grown-ups. Elective medicines could affect wellbeing status among those people with these conditions. They evaluated the predominance of particular option treatment modalities, including home grown operators, ingestion of stimulated refreshments, homeopathy, needle therapy, and back rub treatments. Considering demographic variables, subjects with asthma were more probable than those with rhinitis alone to report caffeine self-treatment for their condition. They recommended that alternative medications are regular among grown-ups with asthma or rhinosinusitis and ought to be considered by social insurance suppliers and general wellbeing and arrangement experts²⁸.

Hajra Naz (2011) reported that *Nigella sativa* is a standout amongst most of the therapeutic seeds ever. The target of this survey is to underscore the viability and utilizations in the anticipation and treatment of various illnesses by this wonderful herb, whose significance had been said by the Holy Prophet (P.B.U.H) earlier. The seeds of *nigella sativa* have been utilized as a part of customary drug for the treatment of an assortment of illnesses including asthma. An extract of *nigella sativa* seeds displays spasmolytic and bronchodilator exercises interceded perhaps through calcium channel bar and this action is packed in the natural part. Its helpfulness for

asthma in conventional solution shows up in this way to be founded on a sound unthinking foundation. Hypersensitive infections (unfavorably susceptible rhinitis, bronchial asthma, atopic skin inflammation) were additionally treated with nigella sativa oil and it is turned out to be a powerful adjuvant for the treatment of unfavorably susceptible sicknesses²⁹.

Author's contribution

The project is an outcome of the intellectual environment of the whole team; and that all authors have contributed in various degrees to the designing, developing theory, supervising and interpretation to the research concept.

Conflict of interest

“No potential conflict of interest was reported by the authors”.

Acknowledgement

I am obliged to my colleagues, friends and family members for their constant support and encouragement. I thank all those who have helped me directly or indirectly in the successful completion of my article.

REFERENCES

1. Barnes PJ, Chung KF, Page CP. Inflammatory mediators of asthma: an update. *Pharmacol. Rev.* 1998;50(4):515-596.
2. Bateman ED, Hurd SS, Barnes PJ, Bousquet J, Drazen JM, Fitzgerald M, et al. Global strategy for asthma management and prevention: GINA executive summary. *Eur. Resp. J.* 2008;31(1):143-178.
3. Vincent SD, Toelle BG, Aroni RA, Jenkins CR, Reddel HK. “Exasperations” of asthma: a qualitative study of patient language about worsening asthma. *Med. J. Aust.* 2006;184(9):451.
4. William W, Busse MD, Robert F, Lemanske Jr., MD. Advances in immunology : asthma. *N Engl J Med.* 2001;344(5).
5. Postma DS, Bleecker ER, Amelung PJ, Holroyd KJ, Xu J, Panhuysen CIM, et al. Genetic susceptibility to asthma bronchial hyperresponsiveness coinherited with a major gene for atopy. *N Engl J Med.* 1995;333(14):894-900.
6. Shore SA, Fredberg JJ. Obesity, smooth muscle, and airway hyperresponsiveness. *J Allergy Clin Immunol.* 2005;115(5):925-927.
7. Anderson W J, Watson L, Lemanske RF, Busse WW. Asthma and the hygiene hypothesis. *N Engl J Med.* 2001;344(21):1643-1644.
8. Yawn BP, Bertram S, Wollan P. Introduction of asthma APGAR tools improve asthma management in primary care practices. *J Asthma Allergy.* 2008;1:1.
9. Chan –Yeung M. Occupational asthma. *Clin Rev Allergy.* 1998;4(3):251-266.
10. Blanc PD, Toren K. How much adult asthma can be attributed to occupational factors? *Am. J. Med.* 1999;107(6):580-587.
11. Katz I, Moshe S, Sosna J, Baum G L, Fink G, Shemer J. The occurrence, recrudescence, and worsening of asthma in a population of young adults: impact of varying types of occupation. *Chest.* 1999;116(3):614-618.
12. Meyer JD, Holt DL, Cherry NM, McDonald JC. Sword'98: surveillance of work-related and occupational respiratory disease in the UK. *Occ Med.* 1999;49(8):485-489.
13. Malo J-L, Chan-Yeung M. Agents causing occupational asthma. *J Allergy Clin Immunol.* 2009;123(3):545-550.

14. Barnes P J. The cytokines and asthma: an introduction. *Resp. Res.* 2001;2(2):64-65.
15. Garcia-Marcos L, Quiros AB, Hernandez GG, Guillen-Grima F, Diaz CG, Urena IC, et al. Stabilization of asthma prevalence among adolescents and increase among school children (isaac phases i and iii) in spain. *Eur J Allergy Clin Immunol.* 2004;59(12):1301-1307.
16. Karjalainen A, Kurppa K, Virtanen S, Keskinen H, Nordman H. Incidence of occupational asthma by occupation and industry in Finland. *Am. J. Ind. Med.* 2000;37(5):451-458.
17. Goldberg M, Goldberg P. Measurement of occupational exposure and prevention: principal approaches to research. *Lung Biol Health Dis.* 1993;68:167-192.
18. Vandenas O, Dressel H, Wilken D, Jamart J, Heederik D, Maestrelli P, et al. Management of occupational asthma: cessation or reduction of exposure. A systematic review of available evidence. *Eur. Resp. J.* 2011;38(4):804-811.
19. Basagana X, Sunyer J, Zock J-P, Kogevinas M, Urrutia I, Maldonado JA, et al. Incidence of asthma and its determinants among adults in Spain. *Am J Respir Crit Care Med.* 2001;164(7): 1133-1137.
20. Henneberger PK, Mirabelli MC, Kogevinas M, Anto JM, Plana E, Dahlman-Hoglund A, et al. The occupational contribution to severe exacerbation of asthma. *Europ Resp J.* 2010;36(4):743-750.
21. Salvi SS, Barnes PJ. Chronic obstructive pulmonary disease in non-smokers. *The Lancet.* 2009;374(9691):733-743.
22. Dykewicz MS. Occupational asthma: current concepts in pathogenesis, diagnosis, and management. *J Allergy Clin Immunol.* 2009;123(3):519-528.
23. Merget R, Caspari C, Dierkes-Globisch A, Kulzer R, Breitstadt R, Kniffka A, et al. Effectiveness of a medical surveillance program for the prevention of occupational asthma caused by platinum salts: a nested case-control study. *J Allergy Clin Immunol.* 2001;107(4):707-712.
24. Moscato G, Pignatti P, Yacoub M-R, Romano C, Spezia S, Perfetti L. Occupational asthma and occupational rhinitis in hairdressers. *Chest.* 2005;128(5):3590-3598.
25. Obadia M, Liss GM, Lou W, Purdham J, Tarlo SM. Relationships between asthma and work exposures among non-domestic cleaners in Ontario. *Am J Ind Med.* 2009;52(9):716-723.
26. Ortega HG, Kreiss K, Schill DP, Weissman DN. Fatal asthma from powdering shark cartilage and review of fatal occupational asthma literature *Am J Ind Med.* 2002;42(1):50-54.
27. Goyal BR, Mahajan SG, Mali RG, Goyal RK, Mehta AA. Beneficial effect of *achyranthes apsera* linn. In toluene-di-isocyanate induced occupational asthma in rats. *Global J. Pharmacol.* 2007;1(1):6-12.
28. Blanc PD, Trupin L, Earnest G, Katz PP, Yelin EH, Eisner MD. Alternative therapies among adults with a reported diagnosis of asthma or rhinosinusitis: Data from a population-based survey. *Chest.* 2001;120(5):1461-1467.
29. Naz H. *Nigella sativa*: The miraculous herb. *Pakistan J Biochem Mol Biol.* 2011; 44(1):44-48.