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ANALYSING THE CLINICAL KNOWLEDGE ABOUT ASTHMA FIRST-AID AND ITS CO-MORBID CONDITIONS MANAGEMENT AMONG MEDICAL PROFESSIONALS: A QUESTIONNAIRE BASED STUDY

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Abstract

Asthma is a long term reversible inflammation of the respiratory tract organs in which numerous cells and cell components partake: especially T lymphocytes, mast cells, eosinophils, epithelial cells, neutrophils and macrophages. Those people who are prone to this inflammatory problem frequently experience coughing, shortness of breadth, wheezing and chest tightness, particularly in the night or mornings.

Type 2 Diabetes Mellitus is a common morbidity in adults with asthma. Previous studies have reported that co-existing diabetes and asthma may be present in roughly 5% to 16% of patients.

Asthma is one of the common chronic illness that can complicate pregnancy and is the most common chronic respiratory disease in pregnant women with prevalence being 2% to 13% world-wide.

The objective of this study is to analyze the asthma first-aid and co-morbid management knowledge among medical professionals.

The study was quantitative and cross sectional. The study was primarily focused on asthma management in co-morbid conditions & its first-aid management . A reliable and pre-validated questionnaire tool was used for the collection of data. The study was made known to the participants, and they were asked to give their consent to take part. Than survey questionnaires were dispersed among the participating members and were approached to finish the questionnaires. For the analysis of data SPSS; version.24 was used. Descriptive statistics were applied to evaluate data in percentages and frequencies.

Consequently, some of the 250 professionals who participated in our questionnaire based-study had a family history of asthma. Approximately, 45 percent of all participants saw this value. The majority of participants were aware of the primary medical aid and management of asthma. However, their familiarity of its pervasiveness in various age group, sex, aggravating factors and its

management in co-morbid conditions like diabetes and pregnancy were assessed lower than the average.
The age of participating individuals came between 18-26 years and 80 percent of them belonging to undergraduate level of education and 55 percent of them were females.
It is needed that the medical professionals should be schooled the most up-to-date and cutting-edge guidelines to reduce morbidity exacerbation and mortality attributed with asthma.

INTRODUCTION

Asthma is a long term reversible inflammation of the respiratory tract organs in which numerous cells and cell components partake: especially T lymphocytes, mast cells, eosinophils, epithelial cells, neutrophils and macrophages. Those people who are prone to this inflammatory problem frequently experience coughing, shortness of breadth, wheezing and chest tightness, particularly in the night or mornings. This inflammatory process also enhances the hyper-responsiveness of the airways to different stimulations. In some asthmatic patients reversal of airflow obstruction may be impaired.[1]

Asthma is a very intricate illness that is as yet not well comprehend and it's etiology remaining obscure. One of the remarkable developments somewhat recently studied was that cytokines assume an important part in resulting, propagating and enhancing the red hot responses in asthmatic individuals.[2] As a matter of fact the increment and unusual articulation of the cytokines in respiratory tract organs is one of the major objectives of corticosteroids therapy which is by a wise margin the best approach for controlling asthma of present accessible. Numerous chemokines and cytokines are engaged with pathophysiology of asthma. [3]

About half of the twenty million Americans with asthma diagnoses are under the age of twenty. According to the Centres for Disease Control (CDC), there was a notable increase in asthma incidence, mortality, and morbidity in the United States between 1980 and 1998. In developed countries, asthma affects over 5% of the population, although it is underdiagnosed and undertreated. There is evidence that the prevalence and severity of asthma are rising. Asthma mortality appear to be on the rise, in contrast to other ailments that are generally treatable. The fact that these alarming increases are occurring in spite of a notable rise in the prescription of asthma medications indicates that the current asthma therapies are either ineffective or not being utilised to their fullest extent. Bronchodilator mechanisms have previously been the subject of [4]

Although the exact cause of asthma is unknown, there are recognised risk factors, including the role that genes and environment play in asthma development. Heritability ranges from 35% to 95%, suggesting that genetics play a role in asthma.[5] It has been known for a while that there are inherited components to asthma. Numerous studies have shown that children of asthmatic parent has expanded chances of developing asthma, with mother having a larger chance than father.[6]

Individuals with asthma may experience a single symptoms or a combination of symptoms, which may be constant or episodic. The primary indicators of asthma are cough, chest tightness, difficulty breathing, and wheezing.[7] Asthma is commonly diagnosed based on these symptoms, yet patients may lack awareness of their condition's features and severeness, particularly with chronic illness.[8]; Doctors assess for clinical features such as wheezing and shortness of breath, may also be inaccurate. In patients over the age of five, measuring lung function to detect airflow obstruction, particularly demonstrating the reversing of impaired pulmonary function, significantly enhances diagnosis certainty. Ensuring quality control and providing clear instructions for performing a forced expiratory maneuver are crucial. [9, 10]

DIABETES AS CO-MORBIDITY IN ASTHMA:

Type 2 diabetes mellitus is a common comorbidity in adults with asthma. Previous studies have reported that coexisting diabetes and asthma may be present in roughly 5% to 16% of patients, and people with asthma have been found to submit more diabetes-related healthcare claims than those without asthma. When asthma and diabetes occur together, the condition has been associated with poorer asthma control, greater healthcare use, and reduced quality of life. This makes patient-centered management important,

because the coexistence of both diseases can increase treatment burden and complicates the care of patients.[12]
In one prospective study of patients admitted with acute asthma exacerbations, hyperglycemia was linked to longer hospital stays which is not associated to the pathway of insulin administration. The mean hospitalization time was 8.2 days with insulin infusion, 10.2 days with subcutaneous insulin, and 5.8 days in patients without carbohydrate metabolism disturbance.
Compared with same- age individuals in the entire population, people with type 2 diabetes have been shown to report dyspnea and chronic cough/phlegm more frequently. These findings suggest that diabetes may be associated with accelerated lung aging.[13]
Advanced glycation end-products (AGEs) are formed through reactions involving glucose-derived compounds and proteins. AGE–RAGE signaling has been linked to inflammation, and RAGE is highly expressed in the lung, supporting a possible role in diabetes-related airway and pulmonary injury.
The lung contains a delicate alveolar-capillary network that is soft target to diabetic microvascular injury, thus leading to impaired lung function. This mechanism may be the contributing factor in respiratory complications including asthma.
For patients with multimorbidity such as asthma and diabetes mellitus, individualized and patient-focused treatment plans are essential. High treatment burden will generally reduce adherence and worsen the disease control and prognosis. In addition, simply increasing corticosteroid doses is not an ideal solution, because corticosteroids can worsen the glycemic control.

ASTHMA IN PREGNANCY:
Asthma is the most common condition that complicates pregnancy and is the most common chronic respiratory disease in pregnant women. Prevalence estimates vary by population and source; one review reports 5% to 8% in the United States and 2% to 13% worldwide. Severe asthma and poor asthmatic control have been reported in a notable proportion in the asthmatic pregnant women. Asthmatic exacerbations commonly occur during the 2nd and 3rd trimesters, with pregnant women being most at risk in the sixth month.[14]
As with asthma during pregnancy, and unlike during normal periods, care of an asthmatic individual should include assessing control of asthma (based on control of symptoms and risk of future adverse events such as medication side effects and exacerbations of asthma), inspecting any comorbidities and managing the condition.[15]
Fair control of asthma before pregnancy is associated with better health outcomes for both the mother and fetus.[16]
Asthma and gestational diabetes are associated with adverse pregnancy results including low birth weight, , neonatal intensive care and preterm birth.[17,18]
Asthma patients are at higher risk during pregnancy for gestational diabetes, especially if asthma is not efficiently managed. This risk may also be increased by the type of medications used. Inhaled corticosteroids (ICS) tend to have fewer systemic side effects and are not related with gestational diabetes. But, oral corticosteroids (OCS) may increase the risk of gestational diabetes[19].
GINA recommends that pregnant women with asthma should continue to take their asthma medications during pregnancy because the benefits of well-controlled asthma during pregnancy outweigh the potential teratogenic effects of asthma medications, asthma exacerbations and poorly controlled asthma. In addition to medication, a physician who is caring for a pregnant patient should guide and teach the patient about how to inhale properly, how to take medications on a regular basis (pregnant women typically take fewer medicines during pregnancy), and care for any co-occurring conditions. The safety profile of ICS, the mainstay of asthma care, is especially highlighted in standard GINA guidelines. There is satisfactory proof that the administration of ICS lowers the frequency of asthma-related episodes in pregnancies, while stopping them drastically raises the flare-ups.[20]
In the course of pregnancy, LTRA may be given as a secondary management treatment. Despite the paucity of proof supporting its application in pregnancies, some investigation indicates that montelukast therapy is safe for both the pregnant woman and the fetus [21] as well as that its therapeutic benefits outweigh any potential hazards to the fetus. Yet, in light of a paucity of protective evidence and the requirement for regular monitoring of hepatic function in its application, zileuton therapy is not consulted during pregnancy. [22]

Because the advantages of using systemic corticosteroids during pregnancy outweigh any possible dangers to the fetus, such as congenital malformations, pre-term delivery, low birth weight, and eclampsia, their use is recommended to be limited to the management of acute episodes and serious asthma. [23]
In addition to being linked to preterm delivery, being small for gestational age, low birth weight, preeclampsia, and an increased rate of unplanned abortions, acute asthma flare-ups during labor are also linked to a greater risk of birth defects if they happen in the initial trimester of gestation.[24]
Infections caused by viruses are a particularly frequent cause of chronic asthma flare-ups throughout pregnancy. Rhinovirus is currently identified as the most frequent viral cause for acute asthma-related exacerbations, particularly in the course of pregnancies.[25]
Pregnant woman's aversion to using the medications that were prescribed after finding out that they are expecting a child is another significant factor that contributes to acute episodes and inadequate asthma management. This fear stems from worries about the drugs' potential harmful teratogenic impacts on fetus development and the duration of the pregnancies.[26]

RATIONLE OF THE STUDY: In recent times, there have been seen an upward trend in asthmatic cases specifically in diabetic and pregnant patients.
Are Medical professionals clinically well-versed in its management in different case scenarios?

RESEARCH METHODOLOGY:

Study design
The study was quantitative and cross sectional. It primarily focused on asthma medical aid and co-morbid management knowledge among medical professionals.

Study setting and participants
The study was conducted in various institutes of SMBBMU Larkana Pakistan and medical professionals of the institution were included in this study.

Sample size
The applicable and rational size for the assessment was determined to be 250 medical professionals from SMBBMU Larkana Pakistan. The collection of sample was done in Nov 2022 to May 2023.

Duration of study:
The duration of study was 6 months.

Ethical considerations:
The ethical approval was obtained from ethical review committee SMBBMU Larkana Pakistan for using the participants data in the study.

Inclusion criteria
All medication professionals of various institutions of SMBBMU Larkana Pakistan.

Exclusion criteria
Individuals from non-medical profession were excluded.

Data collection
A reliable and pre-validated questionnaire tool was used for data collection. The study was made known to the participants, and they were asked to give their consent to take part. Than survey questionnaires were dispersed among the participating members and were approached to finish the questionnaires.

Statistical analysis
For the analysis of data SPSS; version.24 was used. Descriptive statistics were applied to evaluate data in percentages and frequencies.

RESULTS:

Consequently, some of the 250 professionals who participated in our questionnaire based-study had a family history of asthma. Approximately, 45 percent of all participants saw this value. The majority of participants were aware of the primary medical aid management of asthma at first glance. However, their familiarity of its pervasiveness in various age group, sex, aggravating factors and its management in co-morbidities like diabetic condition and pregnancy were assessed lower than the average.

The age of participating individuals came between 18-26 years and 80 percent of them were belonging to undergraduate level of education and 55 percent of them were females.

Table 1 Descriptive Statistics

Descriptive Statistics

	Skewness Std. Error	Kurtosis Statistic	Std. Error
What is your age?	.155	1.073	.308
What is your gender?	.154	-2.011	.307
What is your current education status?	.155	-.419	.309
Name of the institute you belong?	.156	-1.353	.312
Have your anyone in your family ever suffered from asthma?	.155	-1.990	.308
What is asthma?	.154	-.762	.307
Diagnosis of asthma is made primarily by:	.154	-1.463	.307
Valid N (listwise)			

Table 2 Number of Puffs of spacer given in acute asthma

How many puffs of spacer are given while administering asthma first aid?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	80	32.0	32.4	32.4
	4	121	48.4	49.0	81.4
	5	35	14.0	14.2	95.5
	6	11	4.4	4.5	100.0
	Total	247	98.8	100.0	
Missing	System	3	1.2		
Total		250	100.0		

Table 3 PRAM Score

PRAM score describes:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Oxygen saturation level	47	18.8	19.3	19.3
	Duration of asthmatic symptoms in a child	87	34.8	35.7	54.9
	Co2 saturation level	42	16.8	17.2	72.1
	Severity of asthmatic condition in child	68	27.2	27.9	100.0
	Total	244	97.6	100.0	
Missing	System	6	2.4		
Total		250	100.0		

Table 4 First aid in acute asthma
What is the first Aid when asthmatic symptoms occur abruptly?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Inhaled corticosteroid	160	64.0	66.4	66.4
	Bronchodilators	81	32.4	33.6	100.0
	Total	241	96.4	100.0	
Missing	System	9	3.6		
Total		250	100.0		

Table 5 Which is not commonly associated condition with asthma
Which is not commonly associated condition with asthma?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Obesity	58	23.2	23.7	23.7
	Allergic rhinitis	93	37.2	38.0	61.6
	Eczema	46	18.4	18.8	80.4
	Diabetes	48	19.2	19.6	100.0
	Total	245	98.0	100.0	
Missing	System	5	2.0		
Total		250	100.0		

Table 6 Acute attack of bronchial asthma during pregnancy is best managed by:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ipratropium	71	28.4	29.3	29.3
	Salbutamol	83	33.2	34.3	63.6
	Theophylline	63	25.2	26.0	89.7
	Corticosteroids	25	10.0	10.3	100.0
	Total	242	96.8	100.0	
Missing	System	8	3.2		
Total		250	100.0		

Table 7 Asthma with Diabetes as comorbidity is best managed by:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Theophylline	54	21.6	22.4	22.4
	Salbutamol	96	38.4	39.8	62.2
	Ipratropium	69	27.6	28.6	90.9
	Amlodipine	22	8.8	9.1	100.0
	Total	241	96.4	100.0	
Missing	System	9	3.6		
Total		250	100.0		

DISCUSSION:
According to our study, all of the health professionals evaluated expressed interest in having a basic understanding of first aid and co-morbid management for patients with asthma. The findings of our

study indicated that while a significant number of participants had excellent understanding of managing asthma in the first instance, the information regarding disease's incidence, aggravating factors and co-morbid management, as well as compelling disease states was lower than average. The outcomes are consistent with a number of published analyses, which showed that physicians specialising in respiratory care had a strong grasp of asthma management, prevention, and education.

A research study conducted in Calabar, Nigeria, assessed physicians' comprehension of the Global Initiative for Asthma (GINA) recommendations.[11] The 104 doctors were given 31 multiple choice questions spanning the seven major areas in accordance with the GINA criteria. (SEM Mean). The test's average overall score was 39.5, or 1.4%. With an overall score of 67.2 2.1%, Respiratory Physicians was the highest scoring group. Respiratory doctors scored significantly higher on items concerning illness control, prevention, and education than internists did. Our most recent survey revealed that participants' overall understanding of the triggers for asthma, pervasiveness and its management in co-morbid conditions like diabetes and pregnancy was lower than the average. In recent times, Diabetic and Pregnant patients are increasingly showing high incidence of asthmatic cases in clinical setting; health-care providers should have vast clinical knowledge to handle such dual/multi condition scenarios which require immediate medical attention. This discrepancy may be caused either due to the training received by medical professionals about asthma management is inadequate or their limited(infrequent) exposure to asthmatic cases in diabetic & pregnant patients.

Conducting clinical meetings on asthma and providing reference booklets are recommended strategies to increase asthma management awareness among clinical professionals and promote a professional expertise among them. These procedures negotiated the shortfall of data about asthma via medical professionals who could encounter inconveniences in diagnosing and overseeing asthma.

Asthma is portrayed by airway inflammations, responsible for cough, wheezing and breathing difficulties. It may become severe and fatal. Therefore, it is crucial for health care providers to be truly experts with good comprehension of the diseased state to treat their patients rationally.

The things that can set off an asthma attack, various kinds of asthma, and the treatments that are accessible must be known by medical practitioners. They should also be aware of the best ways to manage asthma and the signs and symptoms of an attack.

Understanding the various types of asthma is essential for health care providers because it enables them to determine the kind of asthma in their patients and how to manage it the best. The kind of treatment that a patient requires will depend on the kind of asthma they have. There are two types of asthma: allergic and non-allergic. Asthma which is classified as allergic is aggravated by triggers like pet dander, pollen and dust vermin whereas non allergic is aggravated by ecological parameters like cold, physical activity and stress.

Asthma attack triggers should be known to health professionals. Allergic responses include exercise, stress, cold air, and allergens. Health professionals must be aware of these triggers and assist their patients in avoiding them.

Asthma treatment options should also be well-known to medical practitioners. Corticosteroids, bronchodilator and modifiers of leukotrienes are examples of these. In addition to modifying ones life style to stay away from stressors, exercise often and quitting smoking.

Clinical professionals should know symptoms and indications of an asthma attacks, as well as the fitting moves toward take to deal with the condition. These include keeping an eye on the patient's breathing, providing oxygen and medication administration. This study has assessed the asthma medical aid and management knowledge among clinical experts . The consequences of study states that most of the health professionals had primary asthma medical aid and management familiarity. Nevertheless, their understanding on its pervasiveness, aggravating factors, inhalers techniques, management in co-morbid conditions was evaluated lower than the average.

The study's findings suggest that health professionals should receive additional asthma management trainings and instructions. This is particularly crucial for people who don't know how to use inhalers or how important triggering factors are. In addition, it is essential to make certain that health providers are aware of the most recent advancements in the management of asthma, such as the application of biologics and other novel approaches.

Additionally, it is essential to ensure that health providers are aware of the significance of patient guidance and training. Educating them on avoidance of triggering factors, adherence to medicines and comprehending the clinical features of asthma attacks are part of this.

Lastly, it is crucial to ensure that health care providers are familiar with the meaning of early asthma investigation and it's management. Initial examination and management of asthma help assist lessening the seriousness of its attack and work on personal satisfaction.

Conclusively, this survey based study has demonstrated that clinical professionals require additional asthma treatment education and training especially when dealing diabetic patients with asthma or pregnant asthmatic patients. Making sure that healthcare providers are aware of the most recent advancements in managing asthma, the significance of patient counselling and backing, and the significance of initial investigation and management. As a result, asthmatics will receive the best feasible therapies.

CONCLUSION:

The majority of participants were aware of the primary medical aid and management of asthma. However, their familiarity of its pervasiveness in various age group, sex, aggravating factors and its management in co-morbid conditions were assessed lower than the average and is considered as inadequate for medical professionals in advanced clinical settings. It is crucial requirement for health professionals to comprehend the medical aid and management knowledge especially the latest guidelines which are crucial for proper management of asthma and alleviate the symptomatology in order to enhance the personal satisfaction of asthmatic patients.

RECOMMENDATIONS:

Based on this study, the following suggestions are developed:

- To provide medical professionals with adequate knowledge to reduce morbidity exacerbation and mortality attributed with asthma, institutions should hold seminars which provide awareness about asthma's first aid clinical management and its management in co-morbid diabetes and pregnancy which in recent years have seen extra-ordinary spike.
- Medical professionals should be schooled the most up-to-date and cutting-edge guidelines.

REFERENCES:

Pryor, M., Clutter, J., Varekojis, S. M., Alasmari, A., Gardenhire, D. S., Keene, K. S., ... & Byington, R. L. Respiratory Care Education Annual.

Barnes, P. J., Chung, K. F., & Page, C. P. (1998). Inflammatory mediators of asthma: an update. Pharmacological reviews, 50(4), 515-596.

Chung, K. F. (1999). Barnes PJ. Cytokines in asthma. Thorax, 54, 825-857.

Peter J. Barnes. (1989). A New Approach to the Treatment of Asthma. The New England Journal of Medicine.

Ober, C., and Yao, T.C. (2011). The genetics of asthma and Allergic disease: A 21st century perspective. Immunol. Rev. 242, 10–30.

Lim RH,Kobzik L (2009) Maternal transmission of asthma risk. Am J Reprod Immunol 61: 1–10.

National Heart, Lung, and Blood Institute. Guide-lines for the Diagnosis and Management of Asthma(EPR-3). 2007)

Killian, K. J., E. Summers, R. M. Watson, P. M. O'Byrne, N. L. Jones, And E. J. M. Campbell. 1993. Factors contributing to dyspnea during Bronchoconstriction and exercise in asthmatic subjects. Eur. Respir. J. 6:1004–1010

Standardization of Spirometry, 1994 Update. American Thoracic Society. Am J Respir Crit Care Med 1995

Pellegrino R, Viegi G, Enright P, et al. Interpretative Strategies for lung function tests. Eur Respir J 2005 (In Press).

Victor Aniedi Umoh, I. E. (2012). Knowledge of the asthma guidelines among doctors in a tertiary hospital in Nigeria. Indian Journal of Allergy, Asthma, & Immunology, 77-82.

Prevalence of comorbidity of chronic diseases in Australia. Caughey GE, Vitry AI, Gilbert AL, Roughead EE. BMC Public Health. 2008;8:221. doi: 10.1186/1471-2458-8-221. [DOI] [PMC free article] [PubMed] [Google Scholar]

Type 2 diabetes is associated with an increased prevalence of respiratory symptoms as compared to the general population. De Santi F, Zoppini G, Locatelli F, Finocchio E, Cappa V, Dauriz M, Verlato G. BMC Pulm Med. 2017;17:101. doi: 10.1186/s12890-017-0443-1. [DOI] [PMC free article] [PubMed] [Google Scholar]

Bonham C.A., Patterson K.C., Strek M.E. Asthma Outcomes and Management During Pregnancy. Chest. 2018;153:515–527. doi: 10.1016/j.chest.2017.08.029. [DOI] [PMC free article] [PubMed] [Google Scholar]

Murphy V.E. Asthma in pregnancy-Management, maternal co-morbidities, and long-term health. Pt ABest Pract. Res. Clin. Obstet. Gynaecol. 2022;85:45–56. doi: 10.1016/j.bpobgyn.2022.06.005. [DOI] [PubMed] [Google Scholar]

Bravo-Solarte D.C., Garcia-Guaqueta D.P., Chiarella S.E. Asthma in pregnancy. Allergy Asthma Proc. 2023;44:24–34. doi: 10.2500/aap.2023.44.220077. [DOI] [PMC free article] [PubMed] [Google Scholar]

Couillard S., Connolly C., Borg C., Pavord I. Asthma in pregnancy: An update. Obstet. Med. 2021;14:135–144. doi: 10.1177/1753495X20965072. [DOI] [PMC free article] [PubMed] [Google Scholar]

Murphy V.E. Asthma in pregnancy-Management, maternal co-morbidities, and long-term health. Pt ABest Pract. Res. Clin. Obstet. Gynaecol. 2022;85:45–56. doi: 10.1016/j.bpobgyn.2022.06.005. [DOI] [PubMed] [Google Scholar]

Friedman A.M., DiMango E.A., Guglielminotti J.R., Huang Y., Wright J.D., D'Alton M.E., Wen T. Trends in and Maternal Outcomes of Delivery Hospitalizations of Patients With an Asthma Diagnosis. Obstet. Gynecol. 2022;139:52–62. doi: 10.1097/AOG.0000000000004635. [DOI] [PubMed] [Google Scholar]

Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2024. Updated May 2024. [(accessed on 14 April 2024)]. Available online: www.ginasthma.org.

Wang H., Li N., Huang H. Asthma in Pregnancy: Pathophysiology, Diagnosis, Whole-Course Management, and Medication Safety. Can. Respir. J. 2020;2020:9046842. doi: 10.1155/2020/9046842. [DOI] [PMC free article] [PubMed] [Google Scholar]

Bravo-Solarte D.C., Garcia-Guaqueta D.P., Chiarella S.E. Asthma in pregnancy. Allergy Asthma Proc. 2023;44:24–34. doi: 10.2500/aap.2023.44.220077. [DOI] [PMC free article] [PubMed] [Google Scholar]

Wang G., Murphy V.E., Namazy J., Powell H., Schatz M., Chambers C., Attia J., Gibson P.G. The risk of maternal and placental complications in pregnant women with asthma: A systematic review and meta-analysis. J. Matern. Fetal Neonatal Med. 2014;27:934–942. doi: 10.3109/14767058.2013.847080. [DOI] [PubMed] [Google Scholar]

Couillard S., Connolly C., Borg C., Pavord I. Asthma in pregnancy: An update. Obstet. Med. 2021;14:135–144. doi: 10.1177/1753495X20965072. [DOI] [PMC free article] [PubMed] [Google Scholar]

Jackson D.J., Gern J.E. Rhinovirus Infections and Their Roles in Asthma: Etiology and Exacerbations. J. Allergy Clin. Immunol. Pract. 2022;10:673–681. doi: 10.1016/j.jaip.2022.01.006. [DOI] [PMC free article] [PubMed] [Google Scholar]

Tanasković N., Zvezdin B., Vučić M., Kovačević T., Baroš I. Influence of pregnancy on flow and level of control allergic asthma and rhinits. Respiratio. 2017;7:38–45. doi: 10.26601/rsp.aprs.17.6. (In Serbian) [DOI] [Google Scholar]