Research Paper

Obesity In Children With Asthma Referring to Pediatric Clinics in Hamadan, Iran (2007 and 2018)

Mojgan Safari[1*]

1. Department of Allergy and Immunology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran.

Use your device to scan and read the article online

Citation *Safari M.* Obesity In Children With Asthma Referring to Pediatric Clinics in Hamadan, Iran (2007 and 2018). Journal of Pediatrics Review. 2025; 13(4):325-330. http://dx.doi.org/10.32598/jpr.13.4.1078.1

http://dx.doi.org/10.32598/jpr.13.4.1078.1

Article info:
Received: 14 Jun 2025
First Revision: 28 Jun 2025
Accepted: 11 Aug 2025
Published: 01 Oct 2025

Key Words:
Asthma, Obesity, Children, Body mass index (BMI)

ABSTRACT

Background: Prevalence of obesity and asthma have increased recently, likely due to the transition to a westernized lifestyle and urbanization. Obesity can increase the risk of asthma.

Objectives: This study aimed to investigate the co-occurrence of asthma and obesity in children referring to pediatric clinics in Hamadan, Iran, in 2007 and 2018.

Methods: This is a correlational study with a cross-sectional design that was conducted in 2007 (phase I) and in 2018 (phase II) in Hamadan, Iran. In phase I, participants were 101 children with asthma aged 1-12 were referred to Ekbatan Hospital. In phase II, participants were 100 children with asthma aged 1-16 referred to Besat Hospital. Their information, including age, body mass index (BMI), and family history, was recorded in two phases.

Results: Among participants, 61.4% in the first phase and 60% in the second phase were male. The mean age of children in the first and second phases was 4.45±2.72 and 7.19±3.47 years, respectively. It was found that 31.7% of children in the first phase and 33.3% in the second phase were obese. Although a high BMI is a risk factor for asthma, most children had a normal weight in both phases. Therefore, it can be said that obesity is not related to asthma.

Conclusions: The findings do not support the association of obesity with asthma in children. Further studies with a prospective design and a larger sample size are recommended to investigate this relationship more thoroughly.

** Corresponding Author:*
Mojgan Safari, Associate Professor.
Address: *Department of Allergy and Immunology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran.*
Tel: *+98 (918) 3121760*
E-mail: *mojgan.safaei@umsha.ac.ir*

Introduction

Asthma is a reversible obstruction of both small and large airways, triggered by severe reactions to various immunological or non-immunological stimuli [1]. Its symptoms include recurrent episodes of coughing, chest tightness, shortness of breath, and wheezing. Although asthma is a chronic condition that can develop at any age, it often initiates in childhood [2, 3]. Asthma is one of the most prevalent chronic diseases affecting children, contributing significantly to the global burden of disability-adjusted life years [4].

Obesity, as a global epidemic according to the World Health Organization (WHO), has exhibited a concerning surge over the past two decades, particularly among children [5]. Pediatric obesity and asthma are significant chronic childhood conditions that have become increasingly prevalent worldwide in recent decades [6, 7]. Numerous epidemiological studies have reported the concurrent occurrence of these two disorders [8]. Various complications associated with obesity, including disrupted fat metabolism, gastro-esophageal reflux, sleep disturbances, type 2 diabetes mellitus, and hypertension, can either contribute to or exacerbate asthma [9, 10]. Obese individuals are more susceptible to ozone triggers and tend to experience greater airway irritation. Additionally, hypotheses have emerged concerning the association of insulin and hyperinsulinemia with lung disease and asthma [11, 12].

While there is strong evidence indicating the occurrence of asthma and obesity in children, it remains uncertain whether one of these conditions triggers the onset of the other [13]. Furthermore, it appears that age- and gender-specific indicators may play a contributing role, although no definitive evidence exists to determine the most appropriate indicator [14, 15]. Moreover, the majority of studies concentrated solely on a one-way relationship between asthma and obesity [13]. Over the past two decades, the prevalence of both childhood asthma and obesity has increased [16] with clear differences between regions, including the Eastern Mediterranean and Iran [17, 18]. Children with higher body mass index (BMI) are at higher risk of developing asthma. These findings support the idea of an "obesity-related asthma" phenotype [19-21]. Therefore, this study aims to assess the comorbidity of asthma and obesity in Iranian children.

Methods

This is a correlational study with a cross-sectional design that was conducted in 2007 (phase I) and in 2018 (phase II) in Hamadan Province, Iran. In phase I, all children under 12 years of age with asthma (n=101), who were referred to Ekbatan Hospital in Hamadan from 2001 to 2007, and had medical files, were entered into the study. Their information, including age, sex, birth weight, family history of asthma, parental allergy history, child's allergy history, BMI, and severity of asthma, was extracted from the medical files of children. In phase II, participants were children aged 1-16 years old (n=100) who referred to the Besat Asthma and Allergy Clinic in Hamadan and had clinical symptoms such as coughing, recurrent whizzing, and diagnosis of asthma (forced expiratory volume in 1 second [FEV1] lower than the normal predicted value, a FEV1/forced vital capacity ratio <0.8, and a positive response to bronchodilator testing (beta 2 agonist) that increases FEV1 by at least 12%). Information on age and sex, history of allergy in the child (allergic hives, atopic dermatitis, allergic rhinitis), family history of allergy, birth weight, history of breastfeeding, and duration of illness and drug use were collected using a questionnaire.

To measure the weight of children based on age, we used table scales for children <2 years old and Seca 786 dial scales for children >2 years old. The weight was expressed in kilograms. Depending on the child's age, height measurement was done in a sleeping position for children <3 years old by using the neonate Height gauge (Seca 416) and in a standing position for children >3 years old. The height we expressed in meters. To calculate BMI based on the age of the patient, the weight was divided by height squared. Based on the CDC and WHO growth charts for age- and sex-specific BMI cutoffs, underweight: BMI <5th percentile, normal weight: A BMI of 5-85th percentile, overweight: A BMI of 85-95th percentile, and severe obesity: BMI ≥95th percentile [21].

To describe and report quantitative variables with normal distribution, Mean±SD were used, while for quantitative variables with abnormal distribution, median and interquartile range were used. For qualitative variables, frequencies and percentages were used. Chi-square test was used for data analysis in SPSS software, version 26. The significance level was set at 0.05.

Results

In phase I, among 101 children with asthma, 62 were male (61.4%) and 39 were female (38.6%) (Table 1). The mean age of children was 4.45±2.72 years, ranging from 1 to 12. In phase II, among 100 children with asthma, 60(60%) were male and 40(40%) were female. The mean age of participants was 7.19±3.475 years, ranging from 2 to 16.

In the first phase, 32(31.7%) children were obese, of whom 22 were male and 10 females. Based on the chi-square test results, there was no significant difference in the comorbidity of asthma and obesity based on BMI (P=0.301). In the second phase, 33(33%) were obese (Table 1). Of the 33 patients who had obesity, 11(33.3%) were girls and 22(66.7%) were boys (P=0.034), but there was no significant difference in the comorbidity of asthma and obesity based on BMI (P=0.34).

In the first phase, 20 children (19.8%) had a positive family history of allergic diseases (8 boys and 12 girls), and there was a significant difference in the comorbidity of asthma and obesity based on family history of allergic diseases (P=0.028). In the second phase, 24(72.7%) had a positive family history of allergic diseases. There was no significant difference in the comorbidity of asthma and obesity based on family history of allergic diseases (P=0.909).

Discussion

The current studies have shown that asthma and obesity rates have increased, especially among children. The purpose of this study was to assess the comorbidity of asthma and obesity in two separate phases (2007 and 2018). Based on the results of both phases, we found no evidence of the association between asthma and obesity in children. Our results are similar to a recent study on pediatric obesity-related asthma. This group often has more symptoms, worse control, and sometimes a weaker response to inhaled corticosteroids [19]. Other studies also showed that metabolic changes in early life can raise asthma risk and may drive inflammation and airway remodeling [22, 23]. Current international guidelines recommend that obesity should be assessed and managed as part of asthma care [24].

Madeira et al. also found no notable difference in spirometry patterns or the usage of corticosteroids between asthmatics with and without obesity [5]. Another study showed that, although obese individuals more frequently report asthma, dyspnea, and bronchodilator usage following exercise, they have a reduced likelihood of experiencing airflow obstruction compared to their non-obese counterparts [25]. Given the ongoing concern linking obesity to asthma development, it is imperative to prioritize preventive strategies for each patient [26].

In the first phase of our study, no significant difference was found in the family history of allergy among the children under study. However, a significant difference was found based on a positive family history of asthma between boys and girls. Additionally, no significant difference was observed between the two genders concerning obesity. In terms of family history of allergy,

Table 1. Characteristics of children in two study phases

Variables		No. (%)/Mean±SD	
		Children in Phase I (n=101)	Children in Phase II (n=100)
Gender	Male	62(61.4)	60(60)
	Female	39(38.6)	40(40)
Family history of allergy		20(19.8)	24(72.7)
BMI	Obesity	32(31.7)	33(33)
	Overweight	11(10.9)	14(14)
	Normal weight	55(54.5)	51(51)
	Underweight	3(2.9)	2(2)
Age (y)		4.45±2.72	7.19±3.47

there was no significant difference between obese and non-obese patients. In the second phase of our study, no significant difference was identified in the co-occurrence of asthma and obesity based on family history.

Huang et al. conducted a retrospective analysis to compare asthma control in overweight/obese and normal-weight pediatric patients in West Texas. Their study found no statistically significant differences in age or gender between the study groups [27], consistent with the results of our study in two phases. Black et al. [28] conducted a prospective cohort study exploring the increased asthma risk and asthma-related healthcare complications associated with childhood obesity. They included 623,358 people aged 6-19 between 2007 and 2011 in different groups based on height, weight, and asthma symptoms. Their results contrasted with our results, as they found a significant association between high BMI and asthma, whereas we did not identify a statistically significant relationship between asthma and obesity. Similar to our study, they found no significant difference between boys and girls. Wicken et al. conducted two cross-sectional surveys in 1989 and 2000 to investigate the association between obesity and asthma in 11–12-year-old children in New Zealand. The study revealed a dramatic increase in the prevalence of asthma and its symptoms between 1989 and 2000, but no statistically significant association between asthma and obesity was found, aligning with our study's findings. Similar to our study, none of the associations between asthma and obesity showed significant gender differences [29]. TO et al. conducted a study to evaluate the association between obesity and asthma among school-aged children in Canada. They utilized baseline data from the national longitudinal survey of children and youth, including 11,199 children aged 4-11 years, for whom biological mothers reported data on asthma, height, and weight. The study found that the odds ratio for asthma, comparing the highest and lowest BMI categories, was 1.02 for boys and 1.06 for girls, suggesting no statistical association between obesity and asthma among children [30], consistent with our results. In their study, a maternal history of asthma was identified as a risk factor for asthma in all children, consistent with the results of the first phase of our study, but against the results of the second phase.

The results of a prospective 21-year study showed that a one-unit increase in BMI increases the risk of asthma by 10% increase. These findings suggest a common genetic risk factor between obesity and asthma [31]. The weight management programs can reduce the occurrence of asthma in children [32]. The results of a case-control study in Italy did not report a significant association between obesity and asthma in children and adults [33]. One potential reason for the differences in study results could be variations in the definition of asthma and obesity and non-uniform age distribution among study participants. The findings of Amra et al. demonstrated a relationship between BMI and asthma in children, although most participants in their study had a normal weight [34]. One potential reason for the discrepancy in results between our study and their study may be the inclusion of a control group in their study. Additionally, it can be related to differences in sampling methods, as they conducted their study at the community level, while our samples consisted of clinic attendees. In our study, FEV1 was considered an important indicator for assessing asthma severity and its association with BMI, even though studies in this area report different results [35, 36]. This can be another potential reason for the discrepancy in results regarding the comorbidity of obesity and asthma in childhood.

In our study, there was no significant gender difference in the comorbidity of asthma and obesity, in contrast to the findings of Cassol et al., who demonstrated a stronger association between asthma and BMI in girls [37]. Some studies also support our findings. However, studies on the gender-related aspects of asthma development in obese children showed contradictory results that require further evidence-based research in this area.

The findings of cross-sectional studies are not able to explain causal relationships. Given that prospective studies can identify common factors related to asthma and obesity, such as physical activity, psychological, and social factors, designing prospective studies to identify factors affecting the link between asthma and obesity is essential.

Conclusion

We found no evidence of the association of obesity with asthma among children. Although high BMI is a risk factor for asthma, most children with asthma in our study (both phases) had a normal weight. Our findings highlight obesity as a modifiable factor in pediatric asthma. This has significant value for prevention and more personalized care.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Research Ethics Committees of Hamadan University of Medical Sciences, Hamadan, Iran (Code: IR.UMSHA.REC.1397.742; IR.UMSHA.REC.1394.535).

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Conflicts of interest

The authors declared no conflict of interest.

References

1. Dixon AE, Poynter ME. Mechanisms of Asthma in Obesity. Pleiotropic aspects of obesity produce distinct asthma phenotypes. Am J Respir Cell Mol Biol. 2016; 54(5):601-8. [DOI:10.1165/rcmb.2016-0017PS] [PMID]

2. Machado H. Asthma and Obesity during Childhood: A review of more than an occasional association. J Preg Child Health. 2017; 4:305. [Link]

3. Arshad SH, Kurukulaaratchy RJ, Fenn M, Matthews S. Early life risk factors for current wheeze, asthma, and bronchial hyperresponsiveness at 10 years of age. Chest. 2005; 127(2):502-8. [DOI:10.1378/chest.127.2.502] [PMID]

4. Asher I, Pearce N. Global burden of asthma among children. Int J Tuberc Lung Dis. 2014; 18(11):1269-78. [DOI:10.5588/ijtld.14.0170] [PMID]

5. Madeira LNO, Bordallo MAN, Borges MA, Lopes AJ, Madeira IR, Kuschnir FC. Relations between asthma and obesity: An analysis of multiple factors. Rev Paul Pediatr. 2020; 39:e2019405. [DOI:10.1590/1984-0462/2021/39/2019405] [PMID]

6. Chen Z, Salam MT, Alderete TL, Habre R, Bastain TM, Berhane K, et al. Effects of childhood asthma on the development of obesity among school-aged children. Am J Respir Crit Care Med. 2017; 195(9):1181-8. [DOI:10.1164/rccm.201608-1691OC] [PMID]

7. Baffi CW, Winnica DE, Holguin F. Asthma and obesity: Mechanisms and clinical implications. Asthma Res Pract. 2015; 1:1. [DOI:10.1186/s40733-015-0001-7] [PMID]

8. Shan LS, Zhou QL, Shang YX. Bidirectional association between asthma and obesity during childhood and adolescence: A systematic review and meta-analysis. Front Pediatr. 2020; 8:576858. [DOI:10.3389/fped.2020.576858] [PMID]

9. Forno E, Celedón JC. The effect of obesity, weight gain, and weight loss on asthma inception and control. Curr Opin Allergy Clin Immunol. 2017; 17(2):123-30. [DOI:10.1097/ACI.0000000000000339] [PMID]

10. Di Genova L, Penta L, Biscarini A, Di Cara G, Esposito S. Children with obesity and asthma: Which are the best options for their management? Nutrients. 2018; 10(11):1634. [DOI:10.3390/nu10111634] [PMID]

11. Ali Z, Ulrik CS. Obesity and asthma: A coincidence or a causal relationship? A systematic review. Respir Med. 2013; 107(9):1287-300. [DOI:10.1016/j.rmed.2013.03.019] [PMID]

12. Nigro E, Matteis M, Roviezzo F, Mattera Iacono V, Scudiero O, Spaziano G, et al. Role of adiponectin in sphingosine-1-phosphate induced airway hyperresponsiveness and inflammation. Pharmacol Res. 2016; 103:114-22. [DOI:10.1016/j.phrs.2015.10.004] [PMID]

13. Zhang Y, Chen Z, Berhane K, Urman R, Chatzi VL, Breton C, et al. The dynamic relationship between asthma and obesity in schoolchildren. Am J Epidemiol. 2020; 189(6):583-91. [DOI:10.1093/aje/kwz257] [PMID]

14. Willeboordse M, van den Bersselaar DL, van de Kant KD, Muris JW, van Schayck OC, Dompeling E. Sex differences in the relationship between asthma and overweight in Dutch children: A survey study. Plos One. 2013; 8(10):e77574. [DOI:10.1371/journal.pone.0077574] [PMID]

15. Ekström S, Magnusson J, Kull I, Andersson N, Bottai M, Besharat Pour M, et al. Body mass index development and asthma throughout childhood. Am J Epidemiol. 2017; 186(2):255-63. [DOI:10.1093/aje/kwx081] [PMID]

16. Chinn S, Rona RJT. Can the increase in body mass index explain the rising trend in asthma in children? Thorax. 2001; 56(11):845-50. [DOI:10.1136/thorax.56.11.845] [PMID]

17. Taherian MR, Fatemian F, Halimi A, Soleimani Y, Jorjani G, Nozari P, et al. Prevalence of asthma among children and adolescents in WHO's Eastern Mediterranean Region: A meta-analysis of over 0.5 million participants. BMC Public Health. 2024; 24(1):2148. [DOI:10.1186/s12889-024-18716-2] [PMID]

18. Zhang X, Liu J, Ni Y, Yi C, Fang Y, Ning Q, et al. Global prevalence of overweight and obesity in children and adolescents: A systematic review and meta-analysis. JAMA Pediatr. 2024; 178(8):800-13. [DOI:10.1001/jamapediatrics.2024.1576] [PMID]

19. Fainardi V, Passadore L, Labate M, Pisi G, Esposito S. An overview of the obese-asthma phenotype in children. Int J Environ Res Public Health. 2022; 19,(2):636. [DOI:10.3390/ijerph19020636]

20. Maniscalco M, Paris D, Melck DJ, D'Amato M, Zedda A, Sofia M, et al. Coexistence of obesity and asthma determines a distinct respiratory metabolic phenotype. J Allergy Clin Immunol. 2017; 139(5):1536-47.e5. [DOI:10.1016/j.jaci.2016.08.038] [PMID]

21. Russjan E. The role of peptides in asthma–obesity phenotype. Int J Mol Sci. 2024; 25(6):3213. [PMID]

22. Listyoko AS, Okazaki R, Harada T, Inui G, Yamasaki A. Impact of obesity on airway remodeling in asthma: Pathophysiological insights and clinical implications. Front Allergy. 2024; 5:1365801. [DOI:10.3389/falgy.2024.1365801] [PMID]

23. Ng HF, Chin KF, Chan KG, Ngeow YF. The mRNA expression of soluble urokinase plasminogen activator surface receptor in human adipose tissue is positively correlated with body mass index. Genome. 2015; 58(6):315-21. [DOI:10.1139/gen-2015-0028] [PMID]

24. Global Initiative for Asthma. Global strategy for asthma management and prevention. Fontana: Global Initiative for Asthma; 2024. [Link]

25. Sin DD, Jones RL, Man SF. Obesity is a risk factor for dyspnea but not for airflow obstruction. Arch Intern Med. 2002; 162(13):1477-81. [DOI:10.1001/archinte.162.13.1477] [PMID]

26. Ahmadizar F, Vijverberg SJ, Arets HG, de Boer A, Lang JE, Kattan M, et al. Childhood obesity in relation to poor asthma control and exacerbation: A meta-analysis. Eur Respir J. 2016; 48(4):1063-73. [DOI:10.1183/13993003.00766-2016] [PMID]

27. Huang J, Lever J, Kola B. Comparing the asthma control in overweight/obese and normal weight pediatric patients: A retrospective study in West Texas. Southwest Respir CritCare Chron. 2018; 6(25):14-18. [DOI:10.12746/swrccc.v6i25.478]

28. Black MH, Zhou H, Takayanagi M, Jacobsen SJ, Koebnick C. Increased asthma risk and asthma-related health care complications associated with childhood obesity. Am J Epidemiol. 2013; 178(7):1120-8. [DOI:10.1093/aje/kwt093] [PMID]

29. Wickens K, Barry D, Friezema A, Rhodius R, Bone N, Purdie G, et al. Obesity and asthma in 11-12 year old New Zealand children in 1989 and 2000. Thorax. 2005; 60(1):7-12. [DOI:10.1136/thx.2002.001529] [PMID]

30. To T, Vydykhan TN, Dell S, Tassoudji M, Harris JK. Is obesity associated with asthma in young children? J Pediatr. 2004; 144(2):162-8. [DOI:10.1016/j.jpeds.2003.09.047] [PMID]

31. Nystad W, Meyer HE, Nafstad P, Tverdal A, Engeland A. Body mass index in relation to adult asthma among 135,000 Norwegian men and women. Am J Epidemiol. 2004; 160(10):969-76. [DOI:10.1093/aje/kwh303] [PMID]

32. Hallstrand TS, Fischer ME, Wurfel MM, Afari N, Buchwald D, Goldberg J. Genetic pleiotropy between asthma and obesity in a community-based sample of twins. J Allergy Clin Immunol. 2005;116(6):1235-41. [DOI:10.1016/j.jaci.2005.09.016] [PMID]

33. Lucas SR, Platts-Mills TA. Paediatric asthma and obesity. Paediatr Respir Rev. 2006; 7(4):233-8. [DOI:10.1016/j.prrv.2006.08.001] [PMID]

34. Amra B, Rahmani A, Salimi S, Mohammadzadeh Z, Golshan M. Association between Asthma and Body Mass Index in Children. Iran J Allergy Asthma Immunol. 2005; 4(1):33-7. [PMID]

35. Akerman MJH, Calacanis CM, Madsen MK. Relationship between asthma severity and obesity. J Asthma. 2004; 41(5):521-6. [DOI:10.1081/JAS-120037651] [PMID]

36. Ghabashi AE, Iqbal M. Obesity and its correlation with spirometric variables in patients with asthma. MedGenMed. 2006; 8(1):58. [PMID]

37. Cassol VE, Rizzato TM, Teche SP, Basso DF, Centenaro DF, Maldonado M, et al. Obesity and its relationship with asthma prevalence and severity in adolescents from southern Brazil. J Asthma. 2006; 43(1):57-60. [DOI:10.1080/02770900500448597] [PMID]