IRAQI Academic Scientific Journals
العراقية المجلات الأكاديمية العلمية
ISSN:1813-1638
The Medical Journal of Tikrit University
Journal Homepage: http://mjtu.tu.edu.iq
MJTU
The Medical Journal of Tikrit University

Prevalence of symptoms and severity of asthma among adolescent in Baghdad, Iraq: Based on Global Asthma Network (GAN) Phase I

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Received: 06/02/2025
Revising: 07/02/2025
Proofreading: 13/02/2025
Accepted: 11/05/2025

KEY WORDS:
Asthma, Prevalence, school children, ever asthma, severe asthma symptoms, GAN

ABSTRACT

Introduction: Asthma is one of the most important chronic illnesses in the world, affecting both adults and children, but adolescents suffer from the biggest burden of the condition.

Objective: Is to assess asthma regarding current prevalence, severity of symptoms and the need for medical care among school children aged 13-14 years in Baghdad.

Method: This cross-sectional study was conducted on both sides of Baghdad from Juan to September 2021, using the translated Arabic questionnaire of Global Asthma Network (GAN) Phase I and the methodology adhered to the GAN's protocol. A total of 43 schools were selected using multi-stage cluster sampling technique and the data was obtained via an electronic questionnaire.

Results: In this study, 2835 students 1314 (46.6%) girls and boys1521 (53.4%) boys participated. Prevalence of ever wheezing was 10.4 % among them (46.5%) had current wheezing. No significance association between boys and girls (p >0.001). 18.4% of students with current wheezing suffer from severe asthma.

The prevalence of ever asthma was 9% with no significant association between boys and girls (P= 0.39). Among asthmatics (1.9 %) reported they were hospitalized urgently for breathing difficulties more than two times in the past year, boys are more than girls with significant difference between them (p= 0.02). 17.3% of the students with ever asthma missed school in the past year because of breathing difficulties and it was significantly higher in girls (p<0.001).

Conclusion: The prevalence of current wheeze in school children aged 13-14 years in Baghdad was very high compared to the global prevalence.

Keywords: Asthma, Prevalence, school children, ever asthma, severe asthma symptoms, GAN.

DOI: http://doi.org/10.25130/mjotu.30.1.1

INTRODUCTION:

Asthma is one of the most significant chronic diseases worldwide. It affects both adults and children, moreover adolescents showed the greatest burden of disease in terms of prevalence and severity.(1,2)According to Global Asthma Study Phase I (GAN I), 9.1% of children aged 13 to 14 worldwide have asthma.(3)

The inflammatory process in the airway lead to mild to severe symptoms like wheezing ,coughing, chest tightness and shortness of breath which indicate alterable airway obstruction.(4) Asthma is less common among children from low to middle income countries, however it has a greater health impact due to insufficient diagnosis and treatment.(5) Although the exact cause of asthma is still generally unidentified, the probability of developing it affected by genetic predisposition, early life events and environmental exposures, this vulnerability is further increased by urbanization, obesity, and allergy .(6) Sex hormones may may play a role in the etiology of asthma since boys are more likely to experience asthma as during childhood. while the condition becomes more common in female after puberty.(7)

Improving asthmatics quality of life and reducing the economic burden could be achieved by following evidence-based management of uncontrolled asthma(8)

The Global Asthma Network (GAN), established in 2012, succeeding the International Study of Asthma and Allergies in Childhood ISAAC's work, seeks to enhance global asthma surveillance and management, focusing on low- and middle-income regions. Standardized questionaries used to examine asthma prevalence in the same age group and compare between centers in both developed and developing countries.(1)

Although asthma is a growing health issue in many countries, there is currently a lack of thorough information on its prevalence and severity among adolescents in Iraq. The purpose of this study is to find out how common asthma is and how severe it is among schoolchildren aged 13 to 14 in Baghdad ,which eventually contributes to better health outcomes and quality of life.

MATERIAL

Study design and setting

This study was a cross-sectional study implemented throughout educational directorates on both sides of Baghdad city, between Juan and September 2021.

Ethical consideration

The implementation of GAN Phase I in Iraq was authorized by the Ministry of Health (MOH) and the Ministry of Education (MOE). The questionnaire was in electronic format and accessible via a link, so passive consent was obtained from students and their parents. The questionnaire began with a message stating that enrollment was voluntary, and that all personal data would be remain strictly confidential.

Inclusion and exclusion criteria

The target group included in the study consists exclusively of school children aged 13 - 14 years, the sample frame included boys' and girls' students from public schools across urban and rural regions on both sides of Baghdad city , private, religious schools and special educational needs schools were excluded.

Sampling and sample size

Baghdad had 6 educational directorates, and the total number of secondary schools is (n=985), to mitigate possible bias A multi-stage cluster sampling technique was used to select the minimum representative sample size which was 43 schools to estimate the prevalence of asthma and wheezing. From selected schools, 145 classes were randomly selected as the primary sampling units (PSU). The number of schools in each stratum and the number

of classes randomly selected from each school were determined based on the size of the stratum and the school respectively.

The sample size of this study was calculated using a modified version of Cochran's sample size formula, adjusted for finite population correction (FPC), response rate (RR), and stratification (S). It ensures proper sample size by counting the total population, expected response rate, and the need for stratified sampling. The total sample size was 2900 and the number of clusters was145.

The study utilized the standardized written questions of GAN Phases I protocol, which were generated from the ISSAC questionnaires used in Phases I and III.(9–11)The relevant questionnaire was translated into Arabic. After conducting a pilot study with **100** randomly selected children, their feedback was incorporated into the final version of the questionnaires.

The demographic data include (name of the directorate, name of the school, date of birth, and sex).

Definition of Items

Based on GAN classification standard, core questionnaire for wheezing and asthma asking about basic symptoms, case definitions and severity. In this study, the prevalence of asthma symptoms was built on students' responses regarding wheezing or whistling in the chest during the last 12 months, positive answers to “Have you had wheezing or whistling in the chest in the past 12 months?” is regarded as a current asthma symptom.(10)

Severe asthma symptoms are categorized by the presence of current wheezing along with any of the following in the past 12 months: four or more wheezing episodes, sleep disturbances due to wheezing occurring at least one time per week or wheezing notably severe to interfere with speech.(10)

Positive answers to the question, "Have you ever had asthma?" are used to determine the prevalence of asthma.

Anyone who answered "yes" to this question was asked about their history about the need for urgent doctor visits, visits to the emergency room and hospital admissions.(10)

School absenteeism was an indicator of the burden of the disease on students’ life.(10)

Statistical analysis

The data were analyzed statistically using the SPSS software, version 29. Chi-square test was utilized to assess the relationship between variables that were presented as percentages**.** A p-value of less than 0.05 indicating statistical significance.

RESULTS

The study was conducted on a randomly selected sample of 2900 school children from Baghdad city. The age group was (13-14) years. data were missing for 65 children. A total of 2835 school children aged 13-14 years from 43 secondary schools throughout Baghdad submitted the questionnaire, response rate was (97.8%).About half of children were boys1521 (53.4%) while1314 (46.6%) were girls. The prevalence of wheezing in the chest ever was (283)10.4 % and gender was not significantly associated with symptoms ($p>0.05$). Out of 283 children with wheezing ever, 129 (46.5%), reporting wheezing in the past 12 months (current wheezers) without significant difference between boys and girls (p 0.562).

Among current wheezers, more than half 69 (54.6%) had 1-3 wheezing episodes in the past 12 months, 17 (12.4%) had 4-12 episodes and 24 (18.4%) had more than 12 episodes. The analysis did not indicate a significant association between gender and the frequency of wheezing episodes (none / 1-3 / ≥ 4) p=0. 974.About one third (31.7%) suffered from trouble sleeping due to wheezing more than one night each week.

Likewise, the results showed that 51.5% of boys and 65.1% of girls reported speech limitation to only one or two words each time between breaths due to wheezing more than once per week in the past 12 months. There were no significant differences between boys and girls concerning sleep disturbance and speech affection due to wheezing in the past year. (p 0.643, p 0.119) respectively.

The question used to evaluate the prevalence of ever asthma was addressed to all participants. The result showed that the total prevalence of ever asthma was(264) 9% , 9.8% in girls and 8.3% in boys. No significant association was found between gender and prevalence of ever asthma (p 0.39). Data regarding wheezing and severity of wheeze are presented in table 1. Regarding looking for medical care, the questions were directed to those participants who responded yes to "ever had Asthma". 9 (3%) of them reported emergencies visits by a doctor for breathing difficulties without hospitalization in the past 12 months. No significant difference between boys and girls (P= 0.88).

Concerning The number of emergency department visits for breathing difficulties without hospitalization in the past 12 months, 30 (10.9%) had 1 - 3 times, 3 (1.2%) had Four to twelve times and 7(2. 6%) stated they had been more than twelve times. No significant difference between boys and girls. P 0.64

Focusing on the number of hospitalizations for breathing difficulties in the past 12 months, (6)1.9% of students reported being hospitalized urgently more than twice more than twice in the past year. The prevalence was significantly higher among girls than boys (P = 0.02).

In terms of school absences **17.3**% of the asthmatic respondents missing school in the past year, with a significantly higher rate among girls (P < 0.001).

DISCUSSION

This is the first national study to investigate the prevalence and severity of asthma among children aged 13–14 years in Baghdad using A validated questionnaire from the GAN Phase I questionnaire that was applied between June and August 2021. Out of 2835 children who were included in the analysis, it was revealed that the prevalence of ever wheezing in the chest was (283)10.4 % with no significant association was observed between gender and symptoms (p>0.05). In contrast, a study conducted in the United Arab Emirates in 2021 revealed that almost one-third of children between the ages of 13 and 14 had experienced wheezing or whistling at some point in their lives.(12).Wheezing or whistling in the chest during the last 12 months is considered a current asthma symptom.(1) Among those who suffer ever wheeze, we found that 129 (46.5%) have experienced a history of wheezing in the last 12 months, with no significant difference between boys and girls, (p 0.562). These findings highlight a significant public health concern in adolescents; however, it is considerably higher than the global average rates reported in 63 centers across 25 countries, which found a prevalence was 11.1% among adolescents aged 13–14 years.(1)

In the Middle East, the current wheeze has become more common among adolescents. This could be due to a combination of environmental causes, lifestyle changes, and exposure to other risk factors such air pollution.(13)In other countries prevalence rates of current wheeze in adolescent were much lower the prevalence observed in this study Iran was **%19** , Indonesia was 4.6% , Spain was 14.7%, Brazil was 15.8%, and Mexico was 11.6% . (14–18)

Air pollution is a significant risk factor for asthma**.** Exposure to smoke, allergens, and industrial pollutants increases

susceptibility to asthma particularly in urban and industrial locations.(19)Iraq's air pollution exceeds environmental standards and contributes to respiratory diseases and other serious diseases because of high concentrations of harmful gases, suspended particulates and heavy metals.(20)However, we were unable to link the different prevalences to the degree of air pollution Regardless of country income, adolescents continue to have a significant prevalence of severe asthma symptoms that frequently disrupt their daily lives.(1) Among current wheezers, approximately one-third had four or more episodes of wheezing in the chest, wheezing disturbed sleep more than one night/week in 31.7% of students, while more than half them were only able to say one or two words between breaths due to wheezing. There were no significant differences in symptoms severity between girls and boys. The higher prevalence of severe asthma symptoms observed in this study highlights the necessity to target public health interventions among adolescents with asthma**.** Similarly, Triasih R, et al found 34.7% of adolescents with current wheeze had severe wheeze. (15)

Air pollution, both indoors and outdoors, is a serious public health issue that negatively affects asthma outcomes. Pollutant exposure may exacerbate asthma, causing symptoms to get worse, and leading to increased hospitalizations.(21)

The Eastern Mediterranean Regional Office (EMRO) countries had an overall asthma prevalence of 10.61%. The prevalence of asthma varied by nation, with Qatar having the highest rates (16.69%). Lebanon, Palestine, and Tunisia had the lowest prevalence rates (4.59–6.75%).(22)The prevalence of ever asthma in this study was 9% (264) and no significant association was observed between gender and prevalence of ever asthma. These findings align closely with the prevalence reported from UAE, where the ever-had Asthma prevalence among adolescents was 9.8%. (12) The variation in the prevalence of childhood asthma observed around the region could potentially be attributed to these dust storms. (23)There were more than one hundred dust storms in the Middle East within a four-year period, with Iraq accounting for most dust storm sources (55.31%), followed by Saudi Arabia (12.29%), Jordan (11.73%), and Syria (19.55%). (24)

To evaluate the need for medical care follow-up questions were posed to those participants who answered yes to “ever had Asthma” which included 264 adolescents, and all questions referred to the past 12 months. Only (3%) of them reported their urgent need to visit a doctor for breathing difficulties more than 12 times, while (14.7%) had an urgent Emergency visit for breathing difficulties without being admitted to the hospital. Moreover (8.6 %) were hospitalized urgently for breathing difficulties more than twice. The prevalence was significantly higher in boys than girls (P = 0.02). Hospitalizations for asthma are more likely to occur in younger people, females, and those from lower socioeconomic status.(25)

These findings are align with those reported in a study conducted in Indonesia which found that hospital admission due to breathing problem was (8.7%) and Emergency room visits (14.3%)(15) Mild and well-controlled asthma needs fewer ER visits, while exposure to risk factors leads to exacerbation and frequent ER visits. For better asthma outcomes it is crucial to treat and monitor asthmatic children. (26)

Around half of schoolchildren with asthma missed at least one school day during the past year due to their condition. Children with asthma-related absenteeism were

more likely to have persistent asthma in terms of asthma severity compared to those who did not.(27) The prevalence of school absenteeism in the last year because of breathing difficulties was 17.3% and it was significantly higher in girls ($p<0.001$).According to a study done in Korea 9.1% of asthmatics were absent because of their breathing problem.(28)Compared to adults, adolescents reported missing work or school more frequently. This might be the result of disturbed sleep, increased fatigue, behavioral and mood disturbances, cognitive impairment, and poorer academic performance.(29,30)

CONCLUSION

The results of this study provide essential baseline data regarding the prevalence of asthma symptoms among school children in Baghdad based on the GAN classification. The frequency of asthma among school children is close to the global average while the prevalence of current wheeze was very high compared to the global prevalence. Unfortunately, limited studies have been conducted for years to examine the prevalence of asthma using the same standardized questionaries and protocols from GAN. Further epidemiological studies are required to study the factors influencing asthma, mainly air pollution and dust storms.

ACKNOWLEDGEMENTS

Ministry of Education for their corporation.

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TABLES

Table1: Prevalence of asthma symptoms(wheezing) and severity of wheeze among current wheezers by gender.

		Boys		Girls		Total		P-value
		No.	%	No.	%	No.	%	
Ever had wheezing in the chest at any time in the past	Yes	143	9.9	140	10.9	283	10.4	0.267
wheezing in the chest in the past 12 months (current wheezing)	Yes	66	46.6	63	46.4	129	46.5	0.562
Severity of wheeze among current wheezers								
1- Wheezing episodes	Never	10	15.8	9	13.4	19	14.6	0.974
	1 - 3 times	35	52.3	34	57.0	69	54.6	
	4 - 12 times	8	12.1	9	12.7	17	12.4	
	> 12 times	13	19.8	11	16.9	24	18.4	
2- Sleep disturbance due to wheezing	Never	25	36.2	29	47.2	54	41.6	0.643
	Less than one night per week	19	29.4	16	24.0	35	26.8	
	One or more nights per week	22	34.4	18	28.8	40	31.7	
3- Speech limiting to one or two words only each time between breaths due to wheezing	Yes	34	51.5	41	65.1	75	58.1	0.119

Table 2 : Prevalence of ever asthma and the need for medical care in the past 12 months

		Boys	%	Girls	%	Total	%	P-value
Ever had asthma	Yes	135	8.3	129	9.8	264	9.3	0.39
The number of emergencies visit to doctor due to breathing difficulties without hospitalization.	Never	99	73.4	100	78.7	199	76.1	0.88
	1 - 3 times	28	21.6	23	16.8	51	19.1	
	4 - 12 times	3	1.5	2	1.9	5	1.7	
	> 12 times	5	3.5	4	2.6	9	3.0	
The number of emergency department visits for breathing difficulties without hospitalization.	Never	114	85	110	85.6	224	85.3	0.64
	1 - 3 times	14	9.7	16	12.1	30	10.9	
	4 - 12 times	2	1.7	1	0.7	3	1.2	
	> 12 times	5	3.6	2	1.7	7	2.6	
The number of hospitalizations is urgent because for breathing difficulties.	Never	115	86	124	96.6	239	91.4	0.02
	1 time	12	8.7	2	1.1	14	4.9	
	2 times	4	2.8	1	1.0	5	1.9	
	> 2 times	4	2.5	2	1.3	6	1.9	
School missed days because of breathing difficulties.	Never	114	85.4	103	80.0	217	82.7	0.001
	1 - 3 times	15	10.9	18	14.2	33	12.6	
	4 - 12 times	2	1.2	5	3.1	7	2.1	
	> 12 times	4	2.5	3	2.8	7	2.6	

Abbreviations: ISAAC: International Study of Asthma and Allergies in Childhood, GAN :Global Asthma Network