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ISAAC written questionnaire versus incorporating videos before the questionnaire for asthma prevalence among middle schools students in Al-Sharkiya Egyptian Governorate

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Abstract

Background: Asthma is the most common chronic respiratory disorder in childhood with worldwide increasing in its prevalence and global burden. The International Study of Asthma and Allergies in Childhood (ISAAC) provides a standardized methodology to describe the prevalence and severity of childhood asthma symptoms all over the world using simple standardized questionnaires that allow comparisons across geographic and linguistic boundaries. This study aimed to find a suitable application of ISAAC asthma questionnaire to improve the perception and response of the middle (preparatory) school students in Al-Sharkiya Governorate as a step to update the Egyptian prevalence of asthma among children through the translation of the ISAAC written questionnaire into Arabic and to compare the student's response to the translated questionnaire with their response to the same questionnaire after showing ISAAC videos.

Results: The percentage of student's positive answers for asthma symptoms in the written questionnaire after watching ISAAC videos was significantly lower when compared to their written questionnaire answers without watching videos with no significant agreement between the student's answers in the two methods.

Conclusion: Using ISAAC videos before filling the written questionnaire improved the students' understanding of and dealing with the written questionnaire.

Keywords: Asthma, Prevalence, ISAAC questionnaire, Videos, Students

Background

Asthma is the most common chronic respiratory disorder in childhood worldwide. Although the symptoms of asthma are readily controlled in most children, it is an important cause of absence from school, restriction of activity, and anxiety for the child and his family [1].

History of asthma symptoms is still considered as the cornerstone of asthma diagnosis. The other limb in diagnosis is through the reversibility and variability of pulmonary function tests (PFTs). However, PFTs require patient's cooperation that is not fully feasible in children [2].

The prevalence of asthma and allergies is increasing in both western and developing countries. Despite a large volume of clinical and epidemiological research within affected populations, the etiology and risk factors of these conditions remain somewhat not well understood [3].

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Until recently, Egypt was classified as an unknown country for asthma prevalence in the international literature [4].

Nationally, in Egypt, many local studies were conducted on children in the age of 11–15 years to determine the prevalence of asthma in this age group but they did not represent the global prevalence of asthma and atopic diseases in Egypt.

The International Study of Asthma and Allergies in Childhood (ISSAC) was established in 1991. It provides a standardized methodology to describe the prevalence and severity of asthma symptoms, rhinoconjunctivitis, and eczema in childhood all over the world using simple standardized questionnaires and rigorous data and methodology checks, to ensure standardized data that allows comparisons across geographic and linguistic boundaries. ISAAC remains the largest collaborative epidemiological study among children globally involving more than 100 countries and nearly two million children in order to form the basis for future interventions [5].

The aim of this work was to translate ISSAC written questionnaire into Arabic to be suitable for our locality and to find the most suitable method of application of ISAAC questionnaire for improving its perception and response by the middle (preparatory) school students in Al-Sharkiya Governorate to determine their prevalence of asthma by comparing the student's response to the translated questionnaire with their response to the same questionnaire after showing ISAAC videos. This was a step to update the Egyptian prevalence of asthma among children.

Methods

Technical design

Study design

The present study was a descriptive study with a cross-sectional design.

Study setting

The study was carried out in six randomly selected middle (preparatory) schools in Zagazig city and El-Qanayat city which were randomly selected from Al-Sharkiya Governorate cities.

Target groups

Middle (preparatory) school students were included because they were able to self-complete the written questionnaires.

Including criteria

The criteria included the children between 13 and 15 years old in middle (preparatory) schools at El-Sharkiya Governorate.

Excluding criteria

The criteria excluded the children under 13 years or above 15 years.

Sample size

By assuming that the total number of middle (preparatory) school children was 56139 students, and the prevalence of asthma is 9.4% with confidence level 95%, the sample size was calculated to be 911 students in Zagazig city and 674 students in Al-Qenayat city; the sample included rural and urban areas. So the total sample is 1585 students by using EPI-version 6. The first pilot involved 11% of the total sample (175 students), and then, a second pilot study was repeated in the same group.

Sample technique

A multistage random sample technique was adopted.

Tools of the study

The data of the study was collected by the following tools:

1. Translated to Arabic and validated ISAAC written questionnaire [6].
2. The ISAAC videos.

The ISAAC asthma written questionnaire

A variety of questions have been developed for this questionnaire, most of which are focused on reported asthma symptoms such as wheezing or coughing and over a definite period of time, usually 12 months [6]. Before the study was started, the ISAAC English questionnaire was translated into the Arabic language. The translation was validated to be suitable for use by the Egyptian students. Also, additional questions were asked about nationality, place of residence, father's occupation, and housing conditions by using El-Gilany questionnaire to detect their social class [7].

The ISAAC videos

The ISAAC videos were shown to the students before they filled the written questionnaire at the second pilot only.

The ISAAC videos consisted of five sequences of young people of different ethnic origins displaying the signs and symptoms of asthma [8].

The scenes depicted are as follows:

1. Moderate wheezing at rest (a Caucasian girl);
2. Wheezing and shortness of breath after exercise (an African boy);
3. Nocturnal wheezing (a Caucasian girl);
4. Nocturnal cough (a Chinese boy);

5. Severe wheezing and shortness of breath at rest (an Indian girl).

Following each scene, we defined the presented symptom to the students, and a question was asked, with the following format: "Has your breathing ever been like this at any time in your life? Yes! No."

This was followed by ISAAC written questionnaire which asked about age, sex, name, and birthday and then asked the following questions:

1. Have you ever had wheezing or whistling in your chest at any time in the past? Yes or No if yes ask about:
2. Have you had wheezing or whistling in your chest in the past 12 months? Yes/or No
3. In the past 12 months, how many times have you had this sound (wheezing or whistling) in the chest? Never, 1-3 times, 4-12 times, or more than 12 times
4. How often, on average, did you wake up from your sleep due to this sound (wheezing or whistling) in the past 12 months? Never, less than one night/week, or more than one night per week
5. In the past 12 months, have you had this sound (wheezing or whistling) on the chest which is severe enough to limit your breaths during talking? Yes/No
6. In the past year, did you suffer from any asthma at any time? Yes/No
7. In the past 12 months, have you had this sound on your chest (wheezing or whistling) during or after exercise? Yes/No
8. In the past 12 months, have you had a dry cough at night without any cough associated with cold or bronchitis? Yes/No

Other questions about socio-economic status have been asked to students (Al-Gelany questionnaire) to calculate the social class.

We asked about the following:

1. Education and cultural domain of both parents to access the highest level of education of both and ways to access to health information. The highest score for this item is (7).
2. Occupation domain for both parent .the highest score of this item is (5)
3. Family domain (residence urban or rural, number of family members, and number of earning family members). The highest score for this item is (3).
4. Home sanitation domain (crowding index and type of house rather owned or rented). The highest score for this item is (4).

5. Health care domain (assess the usual source of health care. The highest score for this item is (5)

Scoring of socio-economic status:

Total scoring of these 5 domains is 57, and the socio-economic level was classified into low (0–28), moderate (29–42), and high levels (43–57) depending on the score calculated.

Operation design

First, and before the study was conducted, it was necessary to translate the ISAAC asthma questionnaire into Arabic and to validate the translated copy to be sure that it was suitable for use with the Egyptian adolescents.

Language validation

For this purpose, the ISAAC questionnaire was translated into Arabic by two people who were fluent in both Arabic and English. It was then translated back from Arabic into English by two different bilingual individuals, to avoid bias. A meeting of the four was then held and it was agreed that the questionnaire had held its meaning in translation. The Arabic translation was next further refined by discussing the questions asked with several local Arabic health care professionals and also with several parents who were not health professionals. They were the parents of asthmatic children attending the asthma outpatient clinics. So, the Arabic questionnaire was clearly understood by the proposed users. The translated questionnaire is presented in Fig. 1.

Repeatability of questionnaire answers

This is a pilot study carried out before conducting a larger study representing the middle (preparatory) school students in El-Sharkiya Governorate in order to select the more suitable method for application in this age group and to determine and solve any problems which may arise. This involved the return of 175 questionnaires filled twice by the students in March and April, 2018. In the first pilot study, the students filled the written questionnaire after we explained the questions without the ISAAC videos. Then, we requested ISAAC for the International ISAAC videos, to make it easy for children to understand symptoms of asthma, so we can ask them clearly about asthma. We repeated the questionnaire on the same 175 students, but in the second pilot, we used the international ISAAC videos at first and we used public words to teach our students the meaning of asthma symptoms they watched, and then, we asked them to fill the written questionnaire by themselves and noted that the response of children was excellent in comparison to the first pilot when the results were analyzed.

استبيان الربو (حساسية الصدر)

للطلاب في عمر ١٣ إلى ١٥ سنة

١- هل حدث لك تزييق أو صفير في صدرك في أي وقت مضى؟
إذا قلت اجبتك بلا الرجاء التخطي للسؤال السادس.

لا نعم

٢- هل حدث لك تزييق أو صفير في صدرك خلال ١٢ شهر الماضية؟

لا نعم

٣- خلال ١٢ شهر الماضية كم مرة حدث لك هذا الصوت (تزييق أو صفير) بالصدر؟

ولا مرة
 ١ : ٣
 ٤ : ١٢
 أكثر من ١٢

٤- كم مرة أستيقظت من نومك بسبب هذا الصوت (تزييق أو صفير بالصدر)؟

ولا مرة
 أقل من ليلة واحدة في الأسبوع
 أكثر من ليلة واحدة في الأسبوع

٥- خلال ١٢ شهر الماضية هل حدث لك هذا الصوت (تزييق أو صفير بالصدر) لدرجة شديدة حتى أنها أرت على نفسك أداء التلام؟

لا نعم

٦- بصرف النظر عن العام الماضي هل عانيت من أي أزمات صدرية في أي وقت مضى؟

لا نعم

٧- خلال ١٢ شهر الماضية هل حدث لك هذا الصوت بصدرك (تزييق أو صفير) أثناء أي بعد ممارسة الرياضة

لا نعم

٨- خلال ١٢ شهر الماضية هل حدث لك عحة جائه ليلا بدون أي نزله برد أو التهاب في الشعب الهوائية؟

لا نعم

Fig. 1 Validated Arabic translation of ISAAC written questionnaire

Field work

1. Duration: 2 months; March–April 2018.
2. Activities: each school has had three visits; during the first visit, students were given consent forms to obtain the permission from their parents and explain the nature of the study to them.
3. During the second visit, we collected the consent forms and started the written questionnaire for the first pilot.
4. During the third visit, we completed the questionnaire for the second pilot.

Administration and ethical design

The study protocol was approved from the Institution Review Board (IRB) at Faculty of Medicine, Zagazig University (reference number: ZU-IRB:3658/12-6-2017). The necessary official permissions to carry out the study were obtained from Directorate of Education at El-Sharkiya Governorate; the objectives of this study were explained to them to ensure their cooperation. A written consent was also obtained from parents of the students in the study. They were reassured about the strict confidentiality of any obtained information, and that the study results would be used only for the purpose of research. The study

procedures were free from any harmful effects on the participants as well as the service providers.

Statistical analysis

The collected data were entered and statistically analyzed using Statistical Package for Social Science program (SPSS) version 22.0.

The threshold of significance is fixed at 5% level (*P* value):

1. **P* value of > 0.05 indicates non-significant results.
2. **P* value of < 0.05 indicates significant results.

Results

The study included 175 students who were asked to complete the ISAAC asthma questionnaire by the two methods (the first one used ISAAC written questionnaire only and the second one watched ISAAC videos before filling written questionnaire). Their demographic characteristics are shown in Table 1.

The percentage of positive answers was significantly lower in the second method than the first one as shown in Table 2.

There was no significant agreement between the results of the written questionnaire alone and the results of the questionnaire after showing videos as shown in Table 3.

Table 1 Demographic data of the studied group

Variable	(n = 175)	
Age (year)		
<i>Mean ± SD</i>	13.71 ± 0.79	
<i>Range</i>	13 - 15	
Variable	No	%
Age		
13–	73	41.7
14–	70	40
15	32	18.3
Sex		
<i>Male</i>	72	41.1
<i>Female</i>	103	58.9
Residence		
<i>Urban</i>	84	48
<i>Rural</i>	91	52
Social class		
<i>Low class</i>	58	33.1
<i>Moderate</i>	81	46.3
<i>High</i>	36	20.6

Discussion

The ISAAC program has provided a worldwide assessment of asthma symptoms prevalence by standard methods. Despite the use of standard questionnaires and validated study protocols, including those for the use and translation of questionnaires, difficulties in the comparability of information may unavoidably influence the results to some degree. For example, the questionnaires were translated into 39 languages, some of which had no colloquial terms for symptoms such as wheezing. For that reason, the video questionnaire has been shown to be more reproducible than the written questionnaire [9].

The aim of the current study was to translate ISSAC written questionnaire into Arabic and to find a suitable method of application of ISAAC asthma questionnaire to improve the perception and response of the middle (preparatory) school students in Al-Sharkiya Governorate as a step to update the Egyptian prevalence of asthma among children.

We conducted the study at hand on 175 students who were randomly selected from 6 middle (preparatory) schools in El-Sharkiya Governorate during March–April 2018, and we considered it as a pilot study to select the more suitable method to be applied on larger samples representing all the governorates. The age of the studied group ranged from 13 to 15 years with a mean of 13.71 years. Forty-one percent of the studied students were males, and 58.9% were females. Forty-eight percent of them lived in urban areas while 52% lived in rural areas, and the social class of the studied students according to Al-Gelany questionnaire was mostly moderate (46.3%) (Table 1).

Written questionnaire (WQ) only and written questionnaire preceded by ISAAC videos

We analyzed the students’ answers of the ISAAC asthma questionnaire, and we found that 40% of the studied group reported wheezy chest at any time in the past (first question) by using written questionnaire only, which decreased to 11.4% of students by using videos before filling written questionnaire (Table 2). The prevalence of lifetime asthma was 11.5% and 7.7% in Thessa Loniki and Athens regions of Greece, respectively [10]; 8.3% in Lebanon; and 11.3% in Cyprus [11], and that was in agreement with our result when we used videos before WQ.

Studying of the construct validity of the ISAAC written questionnaire as regards bronchial hyper-responsiveness symptoms demonstrated that the question regarding wheezing within the last 12 months (second question) had the highest sensitivity, specificity, and positive and negative predictive values, underscoring the idea that it was the key question for diagnosis and detecting the prevalence of current asthma [12]. Accordingly, we considered

Table 2 Bronchial asthma questionnaire results among the studied group in the 1st and 2nd pilot

Variable		1st pilot		2nd pilot		P value
		(n = 175)		(n = 175)		
		No	%	No	%	
Had wheeze in the chest at any time before	No	105	60	155	88.6	< 0.001 ^a
	Yes	70	40	20	11.4	
Had wheeze in the last 12 months	No	120	68.6	166	94.9	< 0.001 ^a
	Yes	55	31.4	9	5.1	
Frequency of wheeze	1–3 times	43	24.6	7	4	< 0.001 ^b
	4–12 times	9	5.1	0	0	
	> 12 times	3	1.7	2	1.1	
Wheeze cause awakening from sleep	No	140	80	167	95.4	< 0.001 ^a
	< 1 night/week	28	16	6	3.4	
	≥ 1 night/week	7	4	2	1.1	
Wheeze affect talking	No	129	73.7	169	96.6	< 0.001 ^a
	Yes	46	26.3	6	3.4	
Had asthma any time before	No	104	59.4	154	88	< 0.001 ^a
	Yes	71	40.6	21	12	
Had wheeze in the last 12 months after exercise:	No	84	48	154	88	< 0.001 ^a
	Yes	91	52	21	12	
Had dry cough in the last 12 months	No	79	45.1	159	90.9	< 0.001 ^a
	Yes	96	54.9	16	9.1	

^aMcNemar test^bWilcoxon-signed rank test

the question for wheezing in the last 12 months (the second question) as the diagnostic one for current asthma and denoting its prevalence.

In our study, and by analyzing the students' answers, 31.4% of the studied group reported wheezes in the last 12 months (current wheezy) by using WQ only, and the percentage of positive answers decreased to 5.1% when we used videos before WQ and we consider this result as our prevalence of asthma.

In comparison with our results, other Egyptian studies estimated the prevalence of the questionnaire diagnosed

current asthma and revealed that the overall prevalence of childhood asthma was 7.7% in the Nile Delta region of Egypt [12], while in Cairo, 2006, it was 14.7% [13].

On the other hand, the prevalence records of current wheeze (the answers of question no. 2 in asthma questionnaire) among 13–15-year-old children in other countries of the Mediterranean, Middle East, and North Africa who participated in the ISAAC phase 3 were 14.5% in Malta, 10.4% in Morocco, 8.7% in Algeria, 13.2% in the Islamic Republic of Iran, 11.7% in Pakistan, 7.6% in Kuwait [14], 8.7% in Cyprus [11], and ranged from 3.9 to 6.5% in different Syrian centers [15].

According to the results of the second pilot (videos before WQ), we found that the prevalence of wheeze in the last 12 months was approximately the same as that in countries with low prevalence and approximately as half to that in countries with high prevalence, but according to the results of the first pilot (WQ only), the prevalence of wheeze in the last 12 months was three times higher than that of countries with high prevalence and approximately ten times higher than that of countries with low prevalence.

By analyzing the results of answers about asthma frequency (question no. 3) and severity (questions no. 4 and 5), the most common frequency of wheeze was from 1 to 3 times in the last 12 months (24.6% and 4% in the

Table 3 Agreement between the written and video questionnaires

Variable	Kappa	P value
Had wheeze in the chest at any time before	0.03	0.63 NS
Had wheeze in the last 12 months	0.006	0.90 NS
Frequency of wheeze	0.10	0.07 NS
Wheeze cause awakening from sleep	0.01	0.74 NS
Wheeze affect talking	0.05	0.23 NS
Had asthma any time before	0.01	0.81 NS
Had wheeze in the last 12 months after exercise	0.07	0.15 NS
Had dry cough in the last 12 months	0.07	0.09 NS

NS non-significant

two pilots respectively). Sixteen percent and 3.4% of the studied students reported wheezes causing awakening from sleep less than one night per week in the two pilots, respectively, and the wheeze was severe enough to affect talking in 26.3% and 3.4% of them in the two pilots, respectively. In agreement with our results in the second pilot study, in the Syrian Arab Republic, the prevalence of severe speech-limiting wheeze ranged from 2.0–3.5% in 13–14-year-olds [15].

In our study, 40.6% and 12% of the studied students answered positively for self-reported asthma diagnosis by history (question no. 6) in the two pilots, respectively. Fifty-two percent and 12% reported wheezes after exercise (question no. 7) in the two pilots, respectively. Also, the answers showed that 54.9% and 9.1% of the students reported dry cough in the last 12 months (question no. 8) in the two pilots, respectively (Table 2).

Agreement between the written and video questionnaires

According to the ISAAC study group, the video and written questionnaires were completed approximately by 317,000 children in the 13–14-year age group in 38 countries. In general, the prevalence of wheeze in the last 12 months was higher in the WQ than that in the VQ and there were large variations in the prevalence of asthma symptoms between the WQ and VQ throughout the world [16]. There is also a wide variation in the agreement between WQ and VQ among regions. The kappa value for the wheeze in the last 12 months was between 0.4 and 0.66 (moderate agreement) in only 20 centers, and in the other 79 centers that performed the study, it was less than 0.4 (poor agreement). The overall proportion of agreement (ρ) was high, ranging from 0.77 to 0.98, with a good negative agreement (0.8–0.99) but poor positive agreement (0.06–0.67). Agreement tended to be higher for English-speaking centers, with less variation in agreement than for other languages [16]. In our study, the kappa value of the agreement for answers of question 2 (current asthma) was 0.006 indicating very poor agreement between the answers of WQ alone and the answers of WQ after showing VQ. These results are closely correlated with those of phase 1 of the ISAAC study group [16].

It was clear that the previous knowledge and experience about the asthma symptoms affected the agreement between the two methods of applying the questionnaire. Some of the studied children at first answered positively to the written questions, but then gave negative answers to the video. These children probably did not understand the written questions but recognized the symptom when they watched the video [17].

Other study reported similar result, but they differently explained it as some children may interpret the video sequence as being more severe than their

experience of wheezing, by giving a positive answer to the written question and a negative answer to the video, and explained those who responded negatively to the written questionnaire but positively to the video were uncertain about the meaning of the written term wheezing but recognized the symptom when it was shown to them audio-visually [16].

From our observation, we preferred showing video scenes before WQ as in the second pilot and that was opposite to the ISAAC methods which stated that the video questionnaire must always be shown after the written questionnaire [6].

Conclusion

Using the video questionnaire before the written questionnaire improved the understanding of the students and provided better dealing with the questionnaire. We recommend other studies using the same methodology to detect the prevalence of asthma in other Egyptian Governorates to get an updated Egyptian prevalence and fill the gap between the international and national prevalence of asthma in our locality.

Abbreviations

IRB: Institution Review Board; ISAAC: International Study of Asthma and Allergies in Childhood; PFTs: Pulmonary function tests; SPSS: Package for Social Science program; VQ: Video questionnaire; WQ: Written questionnaire

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Authors' contributions

O.T.A.: idea of the study, designed the study, critically reviewed the manuscript and approved the final version. H.M.R.: designed the study, calculated the sample size, and reviewed the results. S.M.B.: designed the study and supervised the field work of the study, manuscript revision, and editing. S.E., M.G., A.F., S.H., E.M., H.Y.: performed the field work of the study and performed the statistical analysis, literature search, and drafted the work. D.T.S.: designed the study; supervised the field work of the study, definition of intellectual content, literature search, analysis and interpretation of data; and a major contributor in the writing and submission of the manuscript (corresponding author). The authors read and approved the final manuscript.

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Availability of data and materials

Authors can confirm that all relevant data are included in the article and/or its supplementary information files.

Ethics approval and consent to participate

The study protocol was approved by the Institution Review Board (IRB) at the Faculty of Medicine, Zagazig University (reference number: ZU-IRB #3658/12-6-2017). The necessary official permissions to carry out the study were obtained from the Directorate of Education at El-Sharkiya Governorate; the objectives of this study were explained to them to ensure their cooperation. A written consent was also obtained from the parents of the students in the study. They were reassured about the strict confidentiality of any obtained information and that the study results would be used only for the purpose of research.

The study procedures were free from any harmful effects on the participants as well as the service providers.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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