Respiratory Medicine 122 (2017) 51–57

Contents lists available at ScienceDirect

Respiratory Medicine

journal homepage: www.elsevier.com/locate/rmed

Validation of asthma control questionnaire and risk factors affecting uncontrolled asthma among the Lebanese children's population

Souheil Hallit [a, b, c, *], Chantal Raherison [d, e], Mirna Waked [f], Pascale Salameh [g]

[a] Lebanese University, School of Pharmacy, Beirut, Lebanon
[b] Universite Saint Joseph, School of Pharmacy, Beirut, Lebanon
[c] Universite Saint Esprit Kaslik, School of Medicine, Kaslik, Lebanon
[d] Department of Pneumology, University Hospital, Bordeaux, France
[e] Occupational Health Environment Research Team, U1219 BPH Bordeaux Population Health Research Center Inserm - Université de Bordeaux, France
[f] Balamand University, Faculty of Medicine, Beirut, Lebanon
[g] Lebanese University, Faculty of Medicine, Beirut, Lebanon

ARTICLE INFO

Article history:
Received 29 September 2016
Received in revised form
21 November 2016
Accepted 22 November 2016
Available online 24 November 2016

Keywords:
Cigarette
Waterpipe
Pregnancy
Asthma control
Educational level
Breastfeeding

ABSTRACT

Objectives: To validate the Arabic version of the Asthma Control Test (ACT) in asthmatic children in Lebanon and identify risk factors that might affect asthma control in these children.
Methods: This study, conducted between December 2015 and April 2016, included 300 children.
Results: A high Cronbach's alpha was found for the full scale (0.959). The correlation factors between each item of the ACT scale and the whole scale ranged between 0.710 and 0.775($p < 0.001$ for all items). Low mother's educational level as well as the history of asthma in the mother and the father would significantly increase the risk of uncontrolled asthma ($p = 0.001$; Beta = 1.862; $p < 0.001$; Beta = 3.534; $p < 0.001$; Beta = 1.885respectively). Cigarette smoking during breastfeeding and waterpipe smoking by the mother during pregnancy were both significantly associated with uncontrolled asthma ($p = 0.005$; Beta = 2.105 and $p = 0.041$; Beta = 2.325 respectively). The high mother's level of education was significantly associated with more asthma control ($p = 0.008$; Beta = −0.715).
Conclusion: The Arabic version of the asthma control questionnaire is a valid tool to use in pediatric patients in the Lebanese population to assess asthma control. Waterpipe smoking during pregnancy and cigarette smoking during breastfeeding, as well as the lower education level are risk factors for uncontrolled asthma. Spreading awareness among health care professionals, as well as reinforcing health education seem to be an important step toward a better asthma control.

1. Introduction

Bronchial asthma is a chronic inflammatory syndrome that is highly prevalent worldwide, affecting approximately 300 million individuals of all ages and accounts for 250,000 deaths annually worldwide [1]. According to international guidelines, the primary goal of asthma management is to achieve and maintain asthma control defined as 'no daytime symptoms, no limitations of daily activities, no nocturnal symptoms or awakening, no need for reliever treatment, normal or near-normal lung function results [2] and thus reduce the risk of life-threatening exacerbations and long-term morbidity [3–6]. Nonetheless, in everyday practice, asthma remains poorly controlled in a large proportion of patients [7–10]. Several studies have recognized the profits and advantages of good asthma control on a variety of consequences such as reduced loss of work/school days, a normal and even better quality of life, and reduced risk of exacerbations [11]. Furthermore, several other impacts on children may also be associated with uncontrolled asthma such as a reduced daily activity and a negative impact on cognitive and intellectual functions [11]. Asthma control can be difficult to assess in clinical practice; this might be due to its variation over time and its duplicitous. In an attempt to facilitate this assessment, several simple and easy to use tests have been developed such as the Asthma Control Test (ACT) [12], the Test for Respiratory and Asthma Control in Kids (TRACK) [13] and the Childhood ACT (C-ACT) [14]. The ACT is intended to be used for

* Corresponding author. Hallit building, 1st floor, Biakout, Mount Lebanon, Lebanon.
E-mail address: souheilhallit@hotmail.com (S. Hallit).

http://dx.doi.org/10.1016/j.rmed.2016.11.018
0954-6111/

patients 12 years and above [15], while the C-ACT should be used for patients 4–11 years of age [14]. The C-ACT and ACT are 7- and 5-item questionnaires respectively, that assess asthma control (eg, symptom frequency) over the prior month [14,15]. Since the various tests use the same symptoms of asthma (day and night symptoms, limitation of activities and use of rescue medication), the results of these tests are assumed to correlate to some extent with each other and with the GINA definition of asthma control [16]. A study comparing the C-ACT and the ACT tests showed a good agreement between them when detecting poor asthma controlled, as compared to the GINA criteria [17].

Asthma symptoms are influenced by the children's level of perception and the children's daily activities, including sports and social life events and activities. Hence, physical activity is one of the most important causes of symptoms and reliever use in children [18,19]. Furthermore, the risk of future disease- and treatment-related complications, including exacerbations, accelerated decline in pulmonary function, and adverse effects of drugs, should also be considered [2].

On the other hand, multiple socioeconomic and environmental factors contribute to the exacerbation of asthma symptoms. Among these factors, we have the sustainable exposure to triggers and lower educational status [20,21]. One of the most important triggers that the child might be exposed to is tobacco smoking. In particular, household cigarette smoke exposure was the single most significant factor in predicting poor control according to McGhan et al. [22]. In fact, each hour per week of smoke exposure increased the likelihood of poor control by 33% [22]. Additionally, in Lebanon, the prevalence of waterpipe smoking is dramatically increasing, reaching 36.9%, the highest among countries in the region [23]. On the basis of smoking machine data, the amount of water pipe tobacco used in a single smoking session was reported to produce 100-fold more tar, 4-fold more nicotine, 11-fold more CO, and 2- to 5-fold more polycyclic aromatic hydrocarbons than did a single cigarette [24]. Furthermore, a recent study conducted in Lebanon evaluated the acute and chronic effect of 45 min session of waterpipe on the respiratory functions (% Forced Expiratory Volume (FEV) 1, %FEV6 and %FEV1/FEV6). The results showed that there was no statistically significant difference for all the respiratory functions between cigarette and waterpipe tobacco smoking [25]. In addition, Shafagoj and colleagues found that the waterpipe smokers had about 2-fold higher expired CO levels and about 3-fold higher plasma nicotine levels than cigarette smokers [26].

Thus, the objectives of the current study were to use the Arabic version of the ACT in asthmatic children in Lebanon, to check its validity compared to other versions of the questionnaire, as well as identify risk factors that might affect the asthma control in these children.

2. Methods

2.1. Study design

This study was conducted between December 2015 and April 2016. Cases were chosen from a specialized center for the treatment of asthma in children, the Asthma Center, located in Hazmieh, Lebanon. The latter welcomes children, coming from all districts of Lebanon, with respiratory diseases only and are examined by specialized pediatricians free of charge. After the administration's approval, the questionnaire was distributed in the Asthma Center to asthmatic children's parents after a written informed consent was obtained from all parents. Patients included in the study were those with a physician's diagnosis of asthma, whose parents were capable to understand and to complete the questionnaire. The questionnaire was administered at all the study visits to children in those aged 12–16 and to their parents if they were aged 3–11 years, a method similar to the study of Perez et al. [27].

The Lebanese University waived approval of the study since it is an observational non-invasive study that respects participants' autonomy and anonymity; the study followed principles of the Declaration of Helsinki for such types of studies [28].

2.2. Questionnaire and variables

The questionnaire assessed the socio-demographic characteristics, including age, gender, region, number of rooms and the number of persons living in the house, the level of education for both parents, the family history of asthma. The validated questionnaire in Arabic was sent to us by Professor Elizabeth Juniper (Department of Clinical Epidemiology and Biostatistics, McMaster University) to be used in our study.

We decided to choose to use the ACT in our study since the purpose of the study is to check asthma control in all school children from all ages; we could not use the childhood version of this test for children aged more than 11 years. Furthermore, children's parents would be answering the test questions for younger children (4–11 years).

The asthma control questionnaire was composed of 7 questions, asking about the frequency of awakening at night because of the disease (0 for never and 7 unable to sleep because of asthma), the severity of the symptoms upon waking up the next morning (0 for no symptoms and 7 for very severe symptoms), the limitations of the activity due to asthma during the last month (0 for no limitation of activity and 7 for severe limitation), the frequency of shortness of breath (0 for never and 7 for very high frequency) and wheezing (0 for never and 7 for all the time), as well as the number of puffs of a short-acting bronchodilator the patient had to use in the last week because of the disease (0 for never and 7 for more than 16 puffs most of the days) [12]. The answers varied between 0 and 6, with 0 being the answer to no bothering or no symptoms at all and 6 being the answer to very severe symptoms. In addition, the percentage of Forced Expiratory Volume (%FEV) was recorded by a staff member from the Asthma Center, which was categorized into 6 categories according to the original ACT [12]: category 0 refers to an FEV>95%, category 1 between 90 and 95%, category 2 between 80 and 89%, category 3 between 70 and 79%, category 4 between 60 and 69%, category 5 between 50 and 59% and category 6 for less than 50%.

2.3. Sample size calculation

Using the Epi info program for the calculation of the minimal sample size needed for our study, with an acceptable margin of error of 5% and an expected frequency of asthmatic children of 11.7% [29] for a 4 million inhabitants in Lebanon, the results showed that we need 296 cases to be enrolled in the study [30].

2.4. Statistical analysis

Data analysis was performed on SPSS software, version 22. To confirm the asthma quality of life and asthma control questionnaires construct validity in the Lebanese population, a factor analysis was launched for the 15 and 6 items of the two questionnaires respectively, using the principal component analysis technique, with a promax rotation since the extracted factors were found to be significantly correlated. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were ensured to be adequate. The retained number of factors corresponded to Eigen values higher than one. Moreover, Cronbach's alpha was recorded for reliability analysis for the total score and for subscale factors.