Faculty of medicine
Ain Shams University

ASTHMA CONTROL TEST COMPARED WITH SPIROMETRY IN THE ASSESSMENT OF PATIENTS WITH ASTHMA

Thesis

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By
MAHA MOSTAFA HUSSIEN
M.B.B.ch

Supervised by

Prof. Laila Ashour Helala
Professor of chest diseases
Faculty of medicine, Ain Shams University

Dr. Hala Mohamed Mohamed Salem
Lecture of chest diseases
Faculty of medicine, Ain Shams University

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مقارنة اختبار السيطرة على الربو مع وظائف التنفس لتقييم مرضى الربو الشعبى

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تحت إشراف

أ.د.ليلى عاشـــــور هلالة

أستاذ الأمراض الصدرية – كلية الطب

جامعة عين شمس

د. هالـــــة محمـــد محمد سالم

مدرس الأمراض الصدرية – كلية الطب

جامعة عين شمس

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Introduction:-

Asthma is a serious global health problem. People of all ages in countries throughout the world are affected by this chronic airway disorder that when uncontrolled can place severe limits on daily life and is sometimes fatal **(GINA.2006).**

National and international guidelines clearly state that the aim of asthma management is to achieve and maintain, control. Controlled asthma is characterized by minimal or no symptoms during the day and at night, no asthma attacks, no emergency visits to physicians or hospitals, minimal need for reliever medications, no limitations on physical activities and exercise, nearly normal lung function and minimal or no side-effects from medication **(BTS.2003).**

There is evidence, from a 10 years Finish study, that enhancing the delivery of healthcare services, can improve asthma control **(Haahtela et al., 2001).** But, in most countries, poor control remains a significant burden for patients and the healthcare system. An analysis of nine studies conducted in Australia, Canada, France, Sweden, UK and USA showed that around one third of the direct costs of asthma, and three-quarters of the total costs of asthma, were a consequence of uncontrolled disease **(Barnes et al., 1996).**

In 2004 Nathan et al developed an easy assessment of control (Asthma Control Test ,ACT) **(Nathan et al.,2004)**.The ACT contains five items, including asthmatic symptoms, use of rescue medication and limitation of daily activities, which highlight the current guidelines of asthmatic management . Following its use in some countries, ACT has been recognized by many as an effective, patient friendly tool to assess the control of asthma **(Lenoir et al., 2006).**

ACT is a patient centered instrument and can be completed in

a clinic, at home or other locations. It allows patients to monitor their asthmatic condition easily and therefore will improve patients' adherence to medication-noncompliance is a well-known problem in treatment of asthma. Furthermore, using ACT may improve communication between patients and physicians, which will improve physician's performance, patient's satisfaction and therapeutic outcomes (**Irwin and Richardson. 2006)** and **(McDonald and Gibson. 2006).**

Aim of the work:-

The present study aims to compare ACT with spirometry in asthmatic patients to evaluate the role of ACT in assessment of asthma control.

Subjects & Methods

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The study included 100 patients over 12 years old, with non exacerbated asthma and able to complete all the questionnaires. They already had been diagnosed as asthmatic patients according to having a previous positive results in the post-bronchial dilatation test, defined as ≥ 12 % or 200 ml absolute rise in the post bronchodilator forced expiratory volume in first second(FEV1) **(Pllergrino et al..2005).**

They were collected from the out patient clinic of **the National Center for Allergy and Chest Researches (Imbaba)** during their routine visits between April 2008 and August 2008.

All patients were subjected to the following:

(1)- A full medical history, with particular attention to:

- Occupational history.
- Smoking habit.
- Family history of allergic diseases.
- History of other allergic diseases.
- History of other systemic diseases.

(2)- Careful clinical examination (general and local).

(3)- Posteroanterior chest x-ray.

(4)- All patients completed the ACT questionnaire. Each question was rated on a 5-point scale.A total score was obtained by summing of the 5 scores.A total of 25 points indicated complete control, from 20-24 points good control and less than 20 points out of control**(Nathan et al..2004).**

1- In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?

All of the time (1) Most of the time (2)
Some of the time (3) A little of the time (4)
None of the time (5)

2- During the past 4 weeks, how often have you had shortness of breath?

More than once a day (1) Once a day (2)
3to6 times a week (3)
Once or twice a week (4) Not at all (5)

3- During the past 4 weeks, how often did your asthmati symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlierthan usual in the morning?

4 or more nights a week (1)
2 or 3 nights a week (2) Once a week (3)
Once or twice (4) Not at all (5)

4-During the past 4 weeks, how often have you used your rescue inhaleror nebulizer medication (such a albuterol)?

3 or more times per day (1)
1 or 2 times per day (2) 2 or 3 times per week (3)
Once a week or less (4) Not at all (5)

5- How would you rate your asthma control during the past 4 weeks?

Not controlled at all (1) Poorly controlled (2)
Somewhat controlled (3) Well controlled (4)
Completely controlled (5)

TOTAL = ( )

The 5 questions of ACT in Arabic:

السؤال ١ : فى خلال ٤ أسابيع الماضية، كم مره منعتك الازمة من الذهاب إلى المدرسة، العمل، أو القيام بالأعمال المنزلية؟

- طول الوقت (١) - معظم الوقت (٢)
- بعض الوقت (٣) - اقل من الوقت (٤) - و لا مره (٥)

السؤال ٢: فى خلال ٤ أسابيع الماضية، كم مره أصيبت بصعوبة فى التنفس؟

- اكثر من مره فى اليوم (١) - مره فى اليوم (٢)
- ٣إلى ٦ مرات فى الآسبوع (٣)
- مره إلى مرتين فى الآسبوع (٤) - و لا مره (٥)

السؤال ٣: فى خلال ٤ أسابيع الماضيه، كم مره أيقظتك الاعراض الربويه مثل (الصفير-الكحه- صعوبة التنفس- ضيق الصدر- الألم) من النوم ليلا أو فى الصباح الباكر عن المعتاد؟

- ٤أو اكثر من ليله فى الاسبوع (١)
- ٢ إلى ٣ ليالى فى الاسبوع (٢) - مره فى الاسبوع (٣)
- مره أو مرتين (٤) و لا مره (٥)

السؤال ٤: فى خلال ٤ أسابيع الماضيه، كم مره استخدمت بخاختك أو جهاز الاستنشاق؟

- ٣ أو اكثر من مره فى اليوم (١) - مره أو مرتين فى اليوم (٢)
- ٢ إلى ٣ مرات فى الآسبوع (٣)
- مره او اقل فى الآسبوع (٤) - و لا مره (٥)

السؤال ٥: كيف تُقيم سيطرتك على مرض الربو خلال ٤ أسابيع الماضيه؟

- خارج السيطرة تماما (١) - سيئة السيطرة (٢)
- مسيطرة إلى حد ما (٣) - جيدة السيطرة (٤)
- تامة السيطرة (٥)

(5)- Spirometric studies were done after the completion of ACT questionnaire using a device: **FERRARIS Cardio Respiratory: ZAN 530. GERMANY** This was done in accordance with **ATS** criteria 1979, as follows;-

1. Explanation of the procedure was carefully given to the patient.

2. It was ensured that the patient was standing or sitting erect with feet firmly on the floor.
3. Applying a nasal clip to the patient's nose.
4. Urging the patient to breathe in fully.
5. Sealing the lips of the patient around the mouth piece.
6. Asking the patient to forcefully breathe air out as fast and as far as he/she could until the lungs were completely empty.
7. Asking the patient to breathe again as forcibly and fully as possible.

At least three technically accepted maneuvers were done.

Then spirometric results particularly FEV1, FVC, FEV1/FVC, PEF, MEF25-75 % were compared with ACT.

(6)- Asthma severity was classified according to the Global Initiative for Asthma **(GINA. 2006**) criteria.Thus, asthmatic patients were subdivided into 4 categories based on the level of symptoms, airflow limitation, and lung function variability: intermittent, mild persistent, moderate persistent and severe persistent.

(7)- Asthma control of each patient was rated according to the **GINA** guidelines **(GINA. 2006)** on a 3 point scale as: controlled, partially controlled, and uncontrolled.Then this rating was compared with patients' self rating of their asthmatic control [as the fifth question of ACT referred to patient's self rating of its asthma control].

Statistical analysis:

The collected data was organized, tabulated using the statistically package for social science, version 11, for windows xp.

For quantitative data, the mean and standard deviation were calculated.The difference between two means was statistically analyzed using the students (t) test.

For qualitative data the number and percent distribution was calculated. Chi (X2) square was used as a test of significance.

A cutoff point of < 0.05 was chosen to describe whether the p- value was significant or not and the level of the significance is as following:-

(1) p-value > 0·05 non significant
(2) p-value < = 0·05 significant
(3) p-value < = 0·01 highly significant
(4) p-value < = 0·001 very highly significant

Results

Results

A total of 100 asthmatic patients with a mean (SD) age of 39·93 ± 11·79 years ranged from (17 to 65 years) with the appropriate criteria for inclusion participated in the study. They were predominantly females (61 % females to 39 % males), with 39 % had positive family history of bronchial asthma, and 42 % had positive history of other allergic diseases.

Only 32 % of patients had an ACT score of 20 or greater (controlled asthma). However, 34 % of the patients believed that their asthma was well or totally controlled (ACT question 5 score 4 or 5) while doctor found 18 % of patients were controlled according to the **GINA (2006**) criteria.

The mean (SD) of the spirometric results as a percentage of predicted values were: FEV1 76·33 ± 15·65 %, FVC 81·93 ± 13·49 %, FEV1/FVC 79·35 ± 12·92 %, PEF 49·82 ± 19·3 %, MEF25-75 % 59·08 ± 22·65 %. It was found that 11 % of asthmatic patients had a FEV1 of less than 60 % of the predicted value.

Regarding asthma severity, patients were classified into 16 % intermittent, 22 % mild persistent, 50 % moderate persistent, 12 % severe persistent according to the **GINA (2006**) criteria.

According to FEV1% value patients were classified into two groups: controlled group (n: 38) patients had FEV1 ≥ 80 % and uncontrolled group (n: 62) patients had FEV1 < 80 %. The two groups showed a highly significant statistical difference regarding ACT and doctor's rating.

Comparison between controlled (n:38) and uncontrolled (n:62) patients using chi-square test regarding ACT taking 20 as a cutoff value (Nathan et al.,2004), it was found a highly significance statistical difference between them (χ^2 = 22·92)), the test showed sensitivity 60·53 % , specificity 85 ·48 %, positive predicted value: 71·88 % and negative predicted value: 77·94 %.

Total scores of ACT were compared across groups of patients

with varied levels of the percentage of the predicted FEV1 [<60, 60-79,80-99, ≥100 %], it was showed a highly significance statistical difference between them (χ^2 = 23·102). It showed that almost all 11 patients with FEV1 less than 60 % of the predicted value had ACT total score less than 20 (uncontrolled asthma).

Using chi-square test, there was a highly significance statistical difference between patient's self rating and doctor's rating (χ^2 = 93·213).

Correlation coefficients (p) among the ACT, the spirometric measures, and doctor's rating showed that there was a highly significance positive correlation between ACT and [FEV1, FEV1/FVC, PEF, MEF25-75 %] [r value = 0·514, 0·495, 0·470, 0·524 respectively]. However, there was no significance correlation between ACT and FVC% [r value = 0·126; p value = 0·213].

Also, it showed that the correlation between ACT and doctor's rating was higher than correlation between ACT and FEV1%.

Regarding ACT and asthma severity, there was a high and inverse correlation between them [r value = -0·842, - 0·62 respectively]. Thus, more severe patients tended to have worse control of their asthma.