The role of education in the self-compilation of asthma control test score in patients with asthma

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Abstract. *Background.* Asthma Control Test (ACT) is a quick and easy tool that allows physicians to estimate the control of asthma symptoms. Previous studies showed that ACT can be self or physician-administered with similar results. AIM. The aim of our study was to evaluate the role of instruction in the self-compilation of ACT and its difference with the physician-administered modality. *Methods.* We enrolled 114 patients with asthma from those attending our outpatient clinic. We divided our population into 3 groups, according to their level of education: 1) low level (primary, middle school; n= 34, age 54.3±11.1), 2) middle level (secondary school; n=44, age 38.2±13.8) and 3) high level (university degree; n=34, age 44.8±14.7). All participants answered the questionnaire in both self- and physician-administered ways. Then, we calculated the parameter ΔACT, defined as the difference between physician-administered and self-administered ACT score. The comparison of ΔACT among groups was assessed by Mann-Whitney U test. Moreover, Spearman correlation was used to assess linear relationship between physician- and self-administered ACT in the three groups. *Results.* Patients with low and middle education level had higher median ΔACT compared to individuals with high education level (2.17 and 2.15 vs 0.75, $p<0.05$ for both analysis). Moreover, the R2 value of the high education group (0.915) was higher than those with middle and low education (0.642 and 0.773, respectively). *Conclusions.* Our data suggest that patients without high education levels tend to overestimate their perception of asthma symptoms. Thus, ACT should always be physician-administered in these asthmatic patients. (www.actabiomedica.it)

Key words: asthma, asthma control test, education

Introduction

The new recommendations of Global Initiative for Asthma (GINA) emphasize the importance of symptoms control in the management and treatment of patients with asthma (1).

At this regard, it is strongly adviced the use of asthma control test (ACT), which is the most widely used test to assess the level of asthma control (2). The ACT is a questionnaire based on five questions which provided a numerical score reflecting subject's degree of symptoms control and ranging from 5 (poor control of asthma) to 25 (complete control of asthma) (3).

Thereby, ACT is a valuable tool for physicians to monitor changes in patients' clinical status over time with relevance for treatment maintenance and adjustment (3).

The ACT was originally conceived to be self-administered although it may also be physician-administered (2). In a recent study, Crimi et al showed that there was no significant difference in ACT total score between self and physician-administered test (4). However, in clinical practice individuals with low educational level or poor health status may be unable to complete the questionnaire by themselves, leading to incorrect scores.

Based on the above, the aim of our study was to evaluate the role of instruction in the self-compilation of ACT among a population of patients with asthma.

Methods

Patients

We enrolled 114 patients with asthma from those attending our outpatient clinic at University hospital Policlinico, Bari, Italy. Inclusion criteria were the following: age ≥18 years, diagnosis of asthma according to GINA criteria 2019 (1), ongoing asthma treatment for at least six months from the diagnosis, absence of other associated pulmonary and/or systemic disease.

We divided our population into 3 groups, according to their level of education: 1) low level (primary, middle school; n= 34, age 54.3±11.1), 2) middle level (secondary school; n=44, age 38.2±13.8) and 3) high level (university degree; n=34, age 44.8±14.7).

Study design

We conducted a single-center observational study. This study was carried out according to the principles of the Declaration of Helsinki, was approved by a regional ethics committee (institutional review board approval N°17/CE/2014), and all recruited patients gave their written informed consent. All measurements were performed during one same outpatient visit. After checking for inclusion criteria and signing their consent, all subjects were carefully interviewed about their level of education. Afterwards, all participants were asked to fill an ACT questionnaire on their own, without the presence of healthcare staff in the room, and to place the sheet in a sealed envelope. Furthermore, patients were asked not to reveal the estimated ACT scores to the physicians. Subsequently, the physician administered a new ACT questionnaire and placed the sheet in a separate sealed envelope.

Asthma control test (ACT)

The ACT consists of 5-item, patient-completed measure of asthma control with a four-week recall period. The sum of all scores identifies three levels of control: scores from 5 to 19 indicate uncontrolled asthma; scores from 20 to 24 indicate partially-controlled asthma and a score of 25 indicates fully-controlled asthma (2). For this study, we used the validated italian translation of ACT (1).

Statistical analysis

Data analysis was performed by SPSS version 16.0. Continuous variables were expressed as mean±standard deviation, or median (interquartile range) for non-parametrical variables. whereas categorical variables were expressed as frequency and percentage.

We calculated the parameter ΔACT, defined as the difference between physician-administered and self-administered ACT score. The comparison among groups was assessed respectively by ANOVA for age and lung function values and by Mann-Whitney U test for ACT scores and for ΔACT.

Moreover, Spearman correlation was used to assess whether there was a significant linear relationship between physician- and self-administered ACT in the three groups. For all cases, a $p<0.05$ was considered as significant.

Results

Patient demographics and clinical findings are shown in Table 1.

There were no differences among the three groups in terms of age, sex and lung function parameters. Similarly, there were no significant differences in ACT total score obtained by

both administration modes. In detail, median patient-administered ACT score was 16 for low education group, 19 for middle education group and 17.5 for high education group, whereas median physician-administered ACT score was 18 for low education group, 21 for middle education group and 18.2 for high education group. The above data show that all participants to our study had partially uncontrolled asthma.

Notably, patients with low and middle education level had higher median ΔACT compared to individuals with high education level (2.17 and 2.15 vs 0.75, $p<0.05$ for both analysis, Table 1).

Table 1. Clinical characteristics of the studied population.

Parameter	low education	middle education	high education	p
Patients (n)	34	44	34	/
Age (yrs)	44.8±14.7	38.2±13.8	54.3±11.1	ns
Sex (% males)	39	48	41	ns
post BD FEV1%pred	74±28	80±27	79±29	ns
post BD FVC%pred	91±19	93±26	93±18	ns
ACT patient-administered	16 (9)	19 (4)	17.5 (4)	ns
ACT physician-administered	18 (8.5)	21 (3.3)	18.2 (5.5)	ns
ΔACt	2.2 (2.5)	2.1 (2.4)	0.7 (1.1)	<0.05
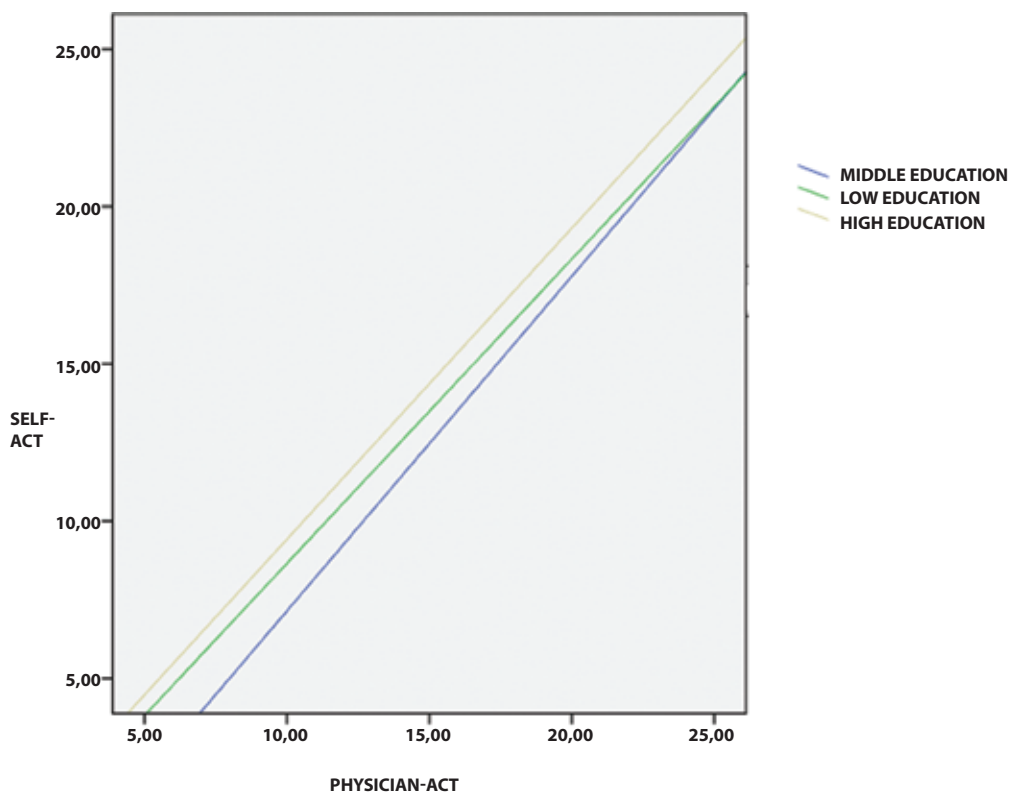
Figure 1. Spearman correlation graph, showing that the R^2 value of high education group (yellow line, 0.915) was higher than those with middle (blue line, 0.642) and low education (green line, 0.773).

Furthermore, according to Spearman correlation, the R^2 value of the high education group (0,915) was higher than those with middle and low education (0,642 and 0,773, respectively), indicating that the absence of high level of scholarship increases the likelihood of a non-concordant score between the two ACT administration modalities (Fig.1).

Discussion

Our study demonstrates that asthmatic subjects without high education levels tend to overestimate their perception of asthma symptoms, as reflected by a higher discrepancy between self- and physician-administered ACT.

The novelty of our study is the comparison of three well-characterized groups of asthmatic subjects with similar characteristics except for their education level. To our knowledge, this is the first study that performs such a formal group-to-group comparison among patients with low, middle and high level of scholarship.

Our data extend those by Crimi et al, who reported that there was no significant difference in ACT total score obtained by self- and physician- administration mode (4). Moreover, responses to ACT single questions showed a statistically significant discrepancy between individuals with lower and higher education levels in ACT questions number 3 and 5 (4).

Notably, it has already been shown that patients' education may affect the results of quality of life (QoL) questionnaires in asthmatic patients (5-8), and previous studies demonstrated a relationship between asthma awareness and patients' education, with a higher education level associated with more understanding of their pathology (9-11).

All of the above might be due to the fact that patients with lower education may not entirely understand the information given by nurses and/or physicians. Therefore, it is likely that that asthmatic subjects with a lower level of scholarship have a reduced perception of their asthma control. The latter is an essential issue to consider, since it may have strong impact on subjects' asthma self-management and quality of life.

The consequences of having biased ACT scores can be critical. Indeed, if a patient reports low scores the physician may be driven to increase the therapy (i.e. inhaled steroids), but if the scores are wrong the increase might be useless or even harmful.

The main strengths of our study is the use of the same validated tool (ACT), administered by the same physician interviewers and filled by patients themselves and the use of worldwide accepted guidelines to characterize our patients population (1).

Conversely, the main limitation is that our study was carried out in a single-center, thus further multi-center investigations with larger populations are mandatory, in order to confirm our findings.

Moreover, we carefully selected our study population of asthmatics and excluded patients with comorbidities. Indeed, one may consider that errors in compilation of ACT questions could not only be due to subjects understanding of the items but also to the presence of comorbidity-related symptoms that might act as confounders (11). Therefore, future studies should also include groups of asthmatics with different comorbidities for assessing their relevance in influencing ACT scores.

In conclusion, according to our findings, ACT self-administration in asthmatic subjects with middle and low education level is characterized by a relevant percentage of compilation errors. For such individuals it is advisable to perform physician-administered ACT, due to its higher accuracy. Moreover, it is essential to highlight the importance of knowing the personal history of each patient including education level before the first outpatient visit. At this regard, we suggest the presence of a dedicated nurse, who could also ensure that the patient correctly understands all the questions.

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Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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