Perception of the role of inhaled corticosteroids and factors affecting compliance among asthmatic adult patients


ABSTRACT

Objective: To examine the patient characteristics linked with reduced adherence to inhaled corticosteroids (ICS) use.

Methods: A prospective study of adult asthmatic patients who were prescribed with ICS and are under regular follow-up at the pulmonary outpatient clinics between June 1st, and December 31st, 2001, at King Fahad National Guard Hospital in Riyadh. All patients underwent structured interviews with an investigator.

Results: Included in the study were 334 patients. Thirty eight percent (38%) of the patients reported irregular use of ICS. Factors associated with irregular ICS use were a negative perception of the role of ICS (P = 0.03) and less than high school education (P = 0.03). Almost 50% (169/334) of all patients had concerns regarding ICS safety resulting in reduced willingness to use them. These concerns were again significantly related to the level of education and the patient's attitude to ICS. Among the most common fears hindering regular ICS use were “their potential to lead to addiction” (60%) and worry from steroid side effects (41%).

Conclusions: The result of this study raises the importance of patient's education and the importance of treatment of those involved in asthma care to educate the patient and discuss with them the role of asthma medications, particularly ICS, and to correct common fears and misconceptions.
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Misconceptions of the role of ICS and fear of untoward side effects may reduce compliance to therapy, potentially resulting in poor asthma control and increased risk of severe asthma events.\textsuperscript{21-30} To better understand how to provide effective counseling to asthmatic patients, we sought to determine their perception of the role of ICS and understand their fears and concerns regarding these agents.

\textbf{Methods.} Consecutive patients who visited the Adult Pulmonary Clinic at King Fahad National Guard Hospital in Riyadh, between June 1st, and December 31st, 2001 were eligible if they satisfied the following criteria: 1) Had at least 2 visits to the pulmonary clinic in the past year. 2) Physician's recorded diagnosis of bronchial asthma based on clinical criteria (wheezing, cough and shortness of breath) and spirometric criteria of (FEV\textsubscript{1}/FVC ratio <80\% plus increase of 12\% and 200 ml of either FEV\textsubscript{1} or FVC). 3) Prescribed ICS in the past one-year by their physicians. The pulmonary consultants reviewed the chart for satisfaction of inclusion criteria and explained the rationale of the study to the patient. As per our hospital policy, Institutional Review Board (IRB) approval is not required for anonymous questioner. Patient who agreed to be enrolled in the study, were referred to the asthma educator for interview. The data collection was carried out by personal interview (asthma educator) using a structured questionnaire adapted from earlier relevant published studies.\textsuperscript{21-28} This questionnaire was translated into Arabic, and pre-tested in 2 ways. First we reviewed the content with family medicine and pulmonary consultants, and then the revised questionnaire was pre-tested with 30 patients. This process allowed the questionnaire to be checked for proper flow or any potential problem regarding possible misinterpretation or patients misunderstanding. Based on pretest results, necessary adjustments were made to produce the finalized version of the questionnaire to be used in this study. The questionnaire items included: the socio-demographics including age, gender of the participant, marital status, educational level, job status and morbidity related to asthma. The questionnaire also included, items related to the pattern of use, perceived modes of action and side effects of inhaled corticosteroid therapy. We categorized patients as having completed high school (12 years or more of formal education) or not.\textsuperscript{25} Patients were considered having a positive perception of inhaled steroid if he/she answered correctly 3 of the following 5 questions. 1) ICS prevent asthma attack. 2) ICS control asthma symptoms. 3) ICS reduce airway inflammation. 4) ICS is not used as bronchodilator (to open the airway). 5) ICS should not be used only during acute asthma attack.

The data collected was computer-analyzed using EPI INFO 6.04 statistical package. Descriptive statistics such as means and standard deviation were used to summarize the quantitative variables. Proportion and percentages were used to summarize category variables. \textsuperscript{21} Chi-square test was used to test statistical significance of differences between categorical variables, and differences were considered significant if the \textit{p}-value is <0.05.

\textbf{Results.} A total of 334 patients satisfied the inclusion criteria and were interviewed in this study. Demographic characteristics of the patients and reported asthma severity are summarized in Table 1. The majority of the patients 257 (77\%) had less than 12 years of formal education and 241 (72\%) were unemployed. Mean age of study subjects was 47 ± 18 years, and the mean duration of asthma was 13 ± 10 years (±SD). At the time of interview the majority of the patients had mild asthma (83\%). As shown in Table 1, 70\% had a history of hospitalization for asthma, including 18\% with previous intensive care unit admission, and 70\% had been treated in an emergency room in the past year. 2) Physician's recorded diagnosis of bronchial asthma based on clinical criteria (wheezing, cough and shortness of breath) and spirometric criteria of (FEV\textsubscript{1}/FVC ratio <80\% plus increase of 12\% and 200 ml of either FEV\textsubscript{1} or FVC). 3) Prescribed ICS in the past one-year by their physicians. The pulmonary consultants reviewed the chart for satisfaction of inclusion criteria and explained the rationale of the study to the patient. As per our hospital policy, Institutional Review Board (IRB) approval is not required for anonymous questioner. Patient who agreed to be enrolled in the study, were referred to the asthma educator for interview. The data collection was carried out by personal interview (asthma educator) using a structured questionnaire adapted from earlier relevant published studies.\textsuperscript{21-28} This questionnaire was translated into Arabic, and pre-tested in 2 ways. First we reviewed the content with family medicine and pulmonary consultants, and then the revised questionnaire was pre-tested with 30 patients. This process allowed the questionnaire to be checked for proper flow or any potential problem regarding possible misinterpretation or patients misunderstanding. Based on pretest results, necessary adjustments were made to produce the finalized version of the questionnaire to be used in this study. The questionnaire items included: the socio-demographics including age, gender of the participant, marital status, educational level, job status and morbidity related to asthma. The questionnaire also included, items related to the pattern of use, perceived modes of action and side effects of inhaled corticosteroid therapy. We categorized patients as having completed high school (12 years or more of formal education) or not.\textsuperscript{25} Patients were considered having a positive perception of inhaled steroid if he/she answered correctly 3 of the following 5 questions. 1) ICS prevent asthma attack. 2) ICS control asthma symptoms. 3) ICS reduce airway inflammation. 4) ICS is not used as bronchodilator (to open the airway). 5) ICS should not be used only during acute asthma attack.

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\begin{table}[h]
\centering
\caption{Patient socio-demographic characteristics and reported asthma severity.}
\begin{tabular}{lccc}
\hline
\textbf{Characteristics} & \textbf{n} & \textbf{(\%)} \\
\hline
\textbf{Age (mean ± SD)} & 47.2 ± 17.9 & \\
\textbf{Gender} & & \\
Male & 122 (36.5) & \\
Female & 212 (63.5) & \\
\textbf{Marital status} & & \\
Married & 286 (85.6) & \\
Single & 48 (14.4) & \\
\textbf{Educational} & & \\
High School or more of education & 77 (23.1) & \\
Male & 34 (79.0) & \\
Female & 43 (21.0) & \\
Less than High School of education & 257 (76.9) & \\
Male & 88 (34.0) & \\
Female & 169 (66.0) & \\
\textbf{Job} & & \\
Employed & 93 (27.8) & \\
Non-employed & 241 (72.2) & \\
\textbf{Reported asthma severity} & & \\
Ever hospitalized for asthma & 232 (69.5) & \\
Ever hospitalized in ICU for asthma & 60 (18.0) & \\
Treated in emergency room for asthma in past 12 mos. & 232 (69.5) & \\
Hospitalized for asthma in past 12 mos. & 117 (35.0) & \\
Missed work or school because of asthma & 56 (16.8) & \\
\textbf{Asthma Severity in the past 4 weeks} & & \\
Mild & 297 (88.9) & \\
Moderate & 30 (9.0) & \\
Severe & 7 (2.1) & \\
\hline
\end{tabular}
\end{table}

\textsuperscript{*As defined by the National Heart, Lung and Blood Institute ICU - intensive care unit.}
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room in the past 12 months. Sixty-two percent (208) had used ICS regularly in the past year as prescribed by their physician while 38% (126) reported irregular use of ICS. Fifty one percent (169) had concerns using ICS, the 2 most common concerns were: believe that ICS cause addiction (60%) and fear of side effects (41%). Table 2 outlines the 5 most frequently quoted reasons for irregular steroid use. The number of patients who were categorized as having a positive perception on ICS use were 173 (52%) while 161 (48%) were categorized as having a negative perception. There was a significant positive correlation between regular use of prescribed ICS and patient’s age, positive perception of ICS use and level of education (p-value 0.013, 0.0002 and 0.03 respectively) but there was no significant difference between regular ICS use and severity and duration of asthma (p =0.7 and 0.45 respectively) these correlations are outlined in Table 3. There is also a clear association between a positive perception of ICS and education of the patients, 83% (64/77) of patients with high school education or more, had positive perceptions, compared to 42% (109/257) of less educated have negative perception (p=0.0001). Table 4 outlines the correlation between reason of irregular ICS use and patients’ perception of inhaled steroid and level of education. The relation between patient’s concerns using ICS, severity and duration of bronchial asthma, and adherence to ICS in relation to patient perception using inhaled steroid and level of education outlined Table 5.

Discussion. This study demonstrates that knowledge of asthma medicine by asthmatic patients is often poor with many false beliefs and misconceptions. Furthermore, these fears and misconceptions are related to the level of education and attitude towards ICS use. The advantage of this study is that all our patients has a confirmed diagnosis of bronchial asthma, and all receive asthma education by a qualified asthma educator at tertiary care center and are followed up by pulmonologists. Furthermore, most of our patients have a history of significant asthma as outlined in Table 2. Interestingly, 89% of patients had mild asthma according to National Asthma Education and Prevention Program (NAEPP) classification of asthma severity (in the month preceding the enrollment in the study).1 This could be explained by the nature of asthma, which tends to wax and wane over time, seasonal variation of symptoms, or as the patients’ compliance tends to improve just before clinic visits. Compliance with asthma treatment is reported to vary between 20-70%.18-27 In our study, compliance with ICS was reasonably high (62%), which may be a reflection of the fact that most of our patients had significant asthma and are followed up at tertiary care rather than at a primary care setting. The limitation of the study could be that compliance or noncompliance was self reported. However, even studies where tablets were counted or medication was weighted the compliance were only 50%.31 Seventy percent of our patients were not educated; this may be due to over presentation of women but it is clear from this study and other studies that education was also contributory to patient’s false belief, about ICS side effects, concerns and negative perception on ICS role in management of bronchial asthma. Economic factor is a known contributing factor for non-compliance.35,34 All patients at our institute enjoy free dispensing of medication and free access to health care. Therefore, economic factors are non-contributory to non-compliance in our patients. There is a clear association between the perception of ICS use and severity of asthma (p=0.0004). Thirty eight percent (126/334) of the patients did not take ICS regularly as they thought that they ought to use

Table 2 - Six most common reason for irregular use of inhaled steroid.

<table>
<thead>
<tr>
<th>Reason</th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use it only when I need it</td>
<td>74</td>
<td>(59)</td>
</tr>
<tr>
<td>Sometimes I forget to use it</td>
<td>48</td>
<td>(38)</td>
</tr>
<tr>
<td>I’m too lazy</td>
<td>43</td>
<td>(34)</td>
</tr>
<tr>
<td>I feel fine</td>
<td>32</td>
<td>(25)</td>
</tr>
<tr>
<td>I feel better with bronchodilator</td>
<td>26</td>
<td>(21)</td>
</tr>
<tr>
<td>It doesn’t help me feel better</td>
<td>20</td>
<td>(16)</td>
</tr>
</tbody>
</table>

Total number of patients who have irregular use 126.

Table 3 - Factors affecting compliance with inhaled corticosteroid.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Regular use</th>
<th>Irregular use</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=208</td>
<td>n=126</td>
<td></td>
</tr>
<tr>
<td>Age (mean ± SD)</td>
<td>45 ± 18</td>
<td>50 ± 18</td>
<td>0.013</td>
</tr>
<tr>
<td>Severity of asthma in the past 4 weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate to Severe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perfusion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>124 (60)</td>
<td>49 (39)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Negative</td>
<td>84 (40)</td>
<td>77 (61)</td>
<td></td>
</tr>
<tr>
<td>Education of patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or more</td>
<td>56 (27)</td>
<td>21 (17)</td>
<td>0.03</td>
</tr>
<tr>
<td>Less than high school</td>
<td>152 (73)</td>
<td>105 (83)</td>
<td></td>
</tr>
<tr>
<td>Duration of asthma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤1 year</td>
<td>18 (9)</td>
<td>8 (6)</td>
<td>0.45</td>
</tr>
<tr>
<td>&gt;1 year</td>
<td>190 (91)</td>
<td>118 (94)</td>
<td></td>
</tr>
</tbody>
</table>

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Table 4 - Correlation between reasons of irregular ICS use and level of education and perception of ICS.

<table>
<thead>
<tr>
<th>†Reason for not using ICS regularly</th>
<th>*Positive perception</th>
<th>*Negative perception</th>
<th>P-value</th>
<th>*High school education or more</th>
<th>*Less than high school education</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use it only when needed</td>
<td>28</td>
<td>46</td>
<td>0.003</td>
<td>11</td>
<td>63</td>
<td>0.018</td>
</tr>
<tr>
<td>Sometimes I forgot to use it</td>
<td>17</td>
<td>31</td>
<td>0.01</td>
<td>3</td>
<td>45</td>
<td>0.0009</td>
</tr>
<tr>
<td>I am too lazy</td>
<td>12</td>
<td>31</td>
<td>0.0005</td>
<td>3</td>
<td>40</td>
<td>0.003</td>
</tr>
<tr>
<td>I feel fine</td>
<td>10</td>
<td>22</td>
<td>0.012</td>
<td>5</td>
<td>27</td>
<td>0.201</td>
</tr>
<tr>
<td>I feel better with bronchodilator</td>
<td>13</td>
<td>13</td>
<td>0.83</td>
<td>6</td>
<td>20</td>
<td>0.84</td>
</tr>
<tr>
<td>It doesn’t help me feel better</td>
<td>3</td>
<td>17</td>
<td>0.0005</td>
<td>2</td>
<td>18</td>
<td>0.11</td>
</tr>
</tbody>
</table>

†Total number of patient who have irregular use (126), *Indicates number of the patients, ICS - inhaled corticosteroids

Table 5 - Correlation between patients concerns using ICS, asthma severity, duration, level of education and perception of ICS.

<table>
<thead>
<tr>
<th>†Patients concerns using ICS</th>
<th>*Regular</th>
<th>*Irregular</th>
<th>P-value</th>
<th>*High school education or more</th>
<th>*Less than high school education</th>
<th>P-value</th>
<th>*Positive perception</th>
<th>*Negative perception</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause addiction</td>
<td>56</td>
<td>45</td>
<td>0.11</td>
<td>11</td>
<td>90</td>
<td>0.003</td>
<td>38</td>
<td>63</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Fear of side effects (in general)</td>
<td>30</td>
<td>39</td>
<td>0.0003</td>
<td>9</td>
<td>60</td>
<td>0.028</td>
<td>25</td>
<td>44</td>
<td>0.001</td>
</tr>
<tr>
<td>It cause sore throat and hoarseness of voice</td>
<td>20</td>
<td>25</td>
<td>0.0098</td>
<td>6</td>
<td>39</td>
<td>0.107</td>
<td>24</td>
<td>21</td>
<td>0.94</td>
</tr>
<tr>
<td>Causing weight gain</td>
<td>22</td>
<td>9</td>
<td>0.24</td>
<td>14</td>
<td>17</td>
<td>0.001</td>
<td>22</td>
<td>9</td>
<td>0.03</td>
</tr>
<tr>
<td>Causing diabetes mellitus</td>
<td>20</td>
<td>10</td>
<td>0.526</td>
<td>5</td>
<td>25</td>
<td>0.42</td>
<td>11</td>
<td>19</td>
<td>0.058</td>
</tr>
</tbody>
</table>

†Total number of patient who have concern using ICS was 169, *Indicate number of the patients, ICS - inhaled corticosteroids

It only when needed (59%), are feeling well (25%), or as bronchodilators quickly relieved their symptoms (21%). This again reflects poor knowledge in the part of the patients, regarding the role of steroid in prevention of asthma and the need of prolonged use of anti-inflammatory medications even after the relieve of symptoms. There were good correlation between the perception of the role of ICS and pattern of use. In our study, 72% (124/173) of the patients who had a positive perception of the role of ICS actually were using it regularly, while 61% (77/126) of patients who were using ICS irregularly had a negative perception (p=0.0387). Our study clearly showed that the 44% (148/334) of our patients and despite having chronic symptoms as reflected by their long asthma history; have significant fears and misconceptions regarding asthma therapy. This is probably because most of the patients are not educated; asthma education they received did not address these concerns specifically or because of their own interpretation of the drug effect. The misconception that the ICS cause addiction or dependence has been reported. This misconception is quite common in our patients 60%; this may be related to the level of education, 66% (67/101) who responded positively to this question were non-educated (p=0.007). Other understandable concerns about ICS expressed by our patients are diabetes mellitus [18% (30/169)], weight gain [18% (31/169)] and osteoporosis [12% (10/87)]. These concerns were more common in the educated group, weight gain concern was 77% (24/31) in the educated patients (p=0.0161). Such concern is uncommon with low dose of ICS. Patient's regular use of ICS will definitely improve if the health care provider explained to the patients the relation between...
ICS dose and the above side effects, the morbidity, and long-term consequences of untreated asthma.5,17

In conclusion, this study reveals that a large proportion of asthmatic patients do not understand the role of their medications and have many fears and misconceptions on ICS treatment reducing their willingness to use these agents. This study stresses the need for asthma caregivers to break down those barriers to effective therapy and ensure proper patient education and counseling in order to optimize compliance with therapy and, it is hoped, to reduce the untoward consequences of asthma.

References

33. Bender BG, Bender SE. Patient-identified barriers to asthma treatment adherence: responses to interviews, focus groups, and questionnaires. *Inhalation Toxicology and Expectations 2005; 25: 107-130.*