Original Research

Treatment compliance and associated patient related factors among adult asthmatic patients attending medical clinics at Base Hospital Homagama

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Abstract

Introduction: Asthma affects an estimated 300 million people worldwide. Low rates of compliance with medication pose a major challenge to effective management of the disease. The high medical and social costs of poor compliance and the apparent lack of effective methods for dealing with it have stimulated interest in this complex issue.

Objectives: To describe patient related factors influencing treatment compliance among adult asthmatic patients attending medical clinics in Base Hospital Homagama

Methods: A descriptive cross-sectional study was conducted among 374 adult asthmatic patients between 18 to 80 years, attending medical clinics. Systematic sampling method was applied to select participants. An interviewer-administered questionnaire was used to collect data. Univariate and multivariate analysis was performed.

Results: The mean age of the respondents was 52.3 (SD=11.7) years and comprised mainly females (56%). Good treatment compliance was demonstrated in 65% of the patients. Males were 1.9 times more at risk of poor compliance compared to females (OR=1.9; 95% CI=1.2, 2.9). Being younger (OR=0.3; 95% CI=0.1, 0.9) and attaining a higher educational level (OR=0.5; 95% CI=0.3, 0.9) showed significant protective effect. Clinic attendees with lower income levels were 1.8 times more likely to be less compliant compared to their counterparts (OR=1.8; 95% CI=1.1, 2.8). Perception of easy susceptibility to the disease (p=0.02), belief on severe consequences (p=0.01) and believing therapy is effective (p=0.01) were positively attributed to compliance. Erroneous beliefs of diminished effectiveness (p=0.008) and fear of dependence (p=0.006) with long-term treatment, believing asthma was uncontrollable (p=0.018), contributed to poor compliance. While forgetfulness (35.2%) affected compliance adversely (p=0.023), regular clinic attendance ensured better compliance levels (p=0.01).

Conclusions: Patients' perceptions regarding disease and treatment play a major role in determining treatment compliance. Provision of clear rationale for treatment, consonant with patients' perceptions of their illness and addressing concerns with regards to erroneous beliefs is of paramount importance and a timely need.

Keywords: treatment compliance, asthma, adult asthmatic patients, patients' perceptions and beliefs

Introduction

Asthma is estimated to affect 300 million people worldwide and is a major preventable cause of morbidity and mortality (1). WHO Global Burden of Disease shows that 13.8 million disability adjusted life years (DALYs) are lost annually due to asthma, representing 1.8% of total global disease burden.

Prevalence of bronchial asthma among adults in Sri Lanka is estimated to be 20-25% (2). The annual asthma admissions and deaths in the state sector in Sri Lanka have shown a steady increase over the past decades, with asthma ranked as the second highest cause for hospitalization and admissions of 787.3 asthma cases/ 100,000 population and 529 deaths in 2016, identifying asthma as a major health problem in Sri Lanka (3). However, despite the availability of effective treatment, the disease burden is substantial due to poor compliance to prescribed asthma medications, especially inhaled corticosteroid (ICS) (4). Interestingly, compliance has been implicated as the single most modifiable factor that compromises treatment outcome. Even the best treatment can be rendered ineffective by poor compliance, despite all the best intentions and efforts on the parts of the health care providers.

Noncompliance to asthma medications is a widespread problem of a considerably large magnitude of patients throughout the world. Studies conducted in the USA, United Kingdom, Canada and Australia revealed that 50% of the prescription drugs for the prevention of asthma had not been taken as prescribed (5). Compliance is a complex process determined by several interacting factors. Various studies have implicated patients' beliefs and perceptions on medication as the salient most influence on compliance.

Evidence indicate that patients evaluate and interpret medical advice in the light of their own beliefs (6). What people think, believe and attitudes they hold and how others influence them regarding a prescribed medication have a major bearing on their intention to adhere to a medical prescription (7). Consequently, if patients have beliefs which are incongruent to the physician's prescribed regimen, or if the family or social group have divergent views regarding their illness or treatment, they are less likely to even form a willingness to intend to adhere (7).

An application of the well-known Health Belief Model describes that compliance is thought to be determined by the knowledge and attitudes of the patient (8). Patients must believe that they are vulnerable or susceptible to disease and its consequences, that they actually have it and that the consequences of the disease on their wellbeing could be serious. They must believe that by following a particular set of recommendations, the threat or the severity of conditions will be abolished or reduced. Patients have many fears and powerful negative images of medications and if measures are to be taken to improve compliance, these should be primarily based on a closer understanding of the patients' experience of their illness and medication rather than the perception and expectations of health care professionals (8).

A study conducted across five different countries in the Asian Region illustrated a sizable difference in beliefs and behaviour held by differently compliant patients. Compliance was significantly associated with patient's self-reported understanding of the disease (p<0.01), inhaler techniques (p<0.01) and patient's acceptance with inhaler medications in terms of benefit, safety, convenience and cost (p<0.01) (4). It further revealed that compared with patients with high or medium compliance those with low compliance were less likely to report that they understood the disease well (79.2% versus 65.2%) or that they knew how well the inhalers worked (73.7% versus 53.9%) and more likely to believe that herbal medicines are safer than inhalers (12.5%).

Several studies (5, 8-9) have shown that compliance has been closely related with patient's knowledge. Cochrane (1999), however states that noncompliance is not simply due to patients' lack of knowledge, and therefore increasing knowledge only will not improve compliance (6). Additionally, Martini & Pannuici (1996) who studied on 20 health beliefs, discovered that not all who are aware of health measures that are beneficial will comply with it (10). Even though it is apparent that a patient's perception and beliefs are one of the best predictors of treatment compliance, there is paucity of information regarding it locally. Therefore, the objective of this study is to assess patient related factors influencing treatment compliance among adult asthmatic patients attending medical clinic in the Base Hospital (BH) Homagama. Consequently, the results of the study will produce valuable information that will enable to not only

minimize negative clinical and economic outcomes but also to engage in further research to improve the quality of life of adult asthmatic patients in our country.

Methods

A descriptive, cross-sectional study was conducted among adult asthmatic patients attending medical and family medical clinics in BH Homagama. Adult asthmatic patients between 18 to 80 years, diagnosed as asthmatics for ≥6 months by a consultant physician with onset of asthma <40 years of age were included. Asthmatics with other diagnosed diseases with similar overlapping symptoms such as other chronic respiratory diseases including chronic obstructive pulmonary disease (COPD) and heart diseases were excluded by referring to the medical clinic book. The minimum required sample size was 374 based on an expected proportion of clinic patients with treatment non-compliance of 33% (11), 95% confidence limits, 5% precision and 10% non-response (12).

Systematic sampling was applied to select patients from the clinic register. A pre-tested interviewer-administered questionnaire was used to collect data by two trained medical officers from the paediatric ward from the same hospital. Informed written consent was obtained prior to data collection. The questionnaire consisted of sections that gathered information on socio-demographic and economic characteristics, patient related factors influencing treatment compliance that included patients' perceptions and beliefs regarding disease and treatment. The questionnaire which was originally developed in English later was made available in both local languages – Sinhala and Tamil. A panel of experts ensured its judgmental validity. Each individual answer in the questionnaire was presented as percentage frequency to display its effect on compliance.

Treatment compliance was assessed for every patient by comparing the inhaler dosing frequency, as mentioned in the clinic book with the inhaler use frequency as stated by the patient. Patients who claimed to be taking the inhalers as it appears in the prescription were considered to be having good compliance while those who deviated from it were considered to be having poor compliance.

All asthmatic patients attending clinics were prescribed inhaler medications (preventers/ controllers)

to be used on a daily basis, which are ICS and long acting β agonist medications that are prescribed alone or in combination. They were prescribed on a twice-daily regimen. Therefore, these medications were considered to assess compliance.

Data analysis

Data was analysed using Statistical Package for Social Sciences (SPSS) version 20. The association between compliance and associated factors were determined by Chi-squared test.

Results

Of the 374 eligible patients, eight refused to give consent for participation, giving a response rate of 97.9%. Table 1 shows demographic and socio-economic characteristics of clinic patients. Most patients were above 55 years (n=176; 48.1%) and females (n=205; 56%). Mean age of the study population was 52.3 years (SD=11.7). Majority of participants were Sinhalese (n=356; 97.3%), currently married (n=291, 79.5%) and came from nuclear families (n=295; 80.6%). Considering the highest level of education one third of the respondents had passed General Certificate of Education (GCE) Ordinary Level (n=131; 35.8%) and another third had passed GCE Advanced Level (n=123; 33.6%). A considerable number were unemployed (n=84; 23%).

With regards to treatment compliance, patients adhering exactly to the prescribed dosing frequency of inhalers were considered to have good compliance (n=238; 65.0%), which consisted of the greater majority (Figure 1). Table 2 depicts the association of demographic and socioeconomic factors with treatment compliance. Being male increased the risk of poor compliance by 1.9 times compared to females (OR=1.9; 95% CI=1.2, 2.9). An average monthly income level of ≤ Rs. 25,000 was attributed to higher risk of poor compliance by 1.8 times compared to their counterparts (OR=1.8; 95% CI=1.1, 2.8). Being less than 40 years of age (OR=0.3; 95% CI=0.1, 0.9) and attaining an education beyond GCE Ordinary Level (OR=0.5; 95% CI=0.3, 0.9) showed significant protective effect. Table 3 shows the association of patient related factors with treatment compliance.

Table 1. Demographic and socio-economic characteristics of the clinic patients

| Characteristics	No.	%
Age		
<40 years	41	11.2
40-55 years	149	40.7
>55 years	176	48.1
Sex		
Male	161	44.0
Female	205	56.0
Ethnicity		
Sinhala	325	88.8
Tamil	17	84.6
Muslim	24	6.6
Other	0	0.0
Marital status		
Never married	16	4.4
Currently married	291	79.5
Divorced/Separated	2	0.5
Widowed	57	15.6
Type of family		
Nuclear	295	80.6
Extended	71	19.4
Educational level		
No schooling	0	0.0
Year 1 to 5	35	9.6
Year 6 to 11	42	11.5
Passed GCE/ Ordinary Level	131	35.8
Passed GCE/ Advanced Level	123	33.6
Higher education	35	9.6
Average monthly income (Rs.)		
≤10,000	2	5.0
10,001- 15,000	56	15.3
15,001- 25,000	99	27.1
25,001- 35,000	146	39.9
>35,000	63	17.2
Current occupation		
Professional/ technical/ sales/ clerical	10	2.7
Skilled labourers	67	18.3
Unskilled labourers	42	11.5
Self-employed	70	19.1
Unemployed/ housewife	84	23.0
Retired	57	15.6
Students	10	2.7
Total	**366**	**100.0**
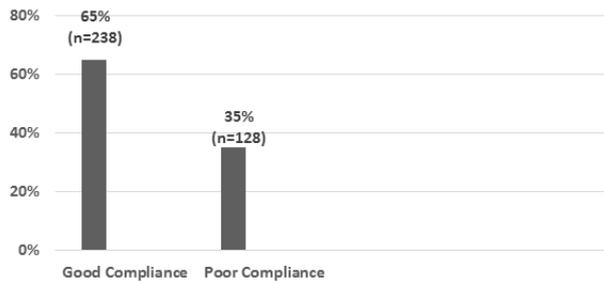
Figure 1. Distribution of patients in relation to the extent of compliance to treatment (N=366)

Considering patients' perceptions and beliefs regarding disease, patients who felt easily affected by asthma (p=0.02) and those who believed that asthma and its complications can pose severe consequences (p=0.01) were more compliant. Similarly, clinic patients who believed asthma was uncontrollable showed poor compliance (p=0.02). Interestingly, compliance was highest among those who were less aware on things that worsens their asthma (p=0.015) as well as on knowing how to avoid things that could worsen their asthmatic condition (p=0.01).

Table 2. Demographic and socioeconomic factors associated with treatment compliance

Characteristic	Good No. (%)	Poor No. (%)	Unadjusted OR[1] (95%CI)	Adjusted OR[1] (95% CI)
Age (in years)				
<40 years	34 (82.9)	7 (17.1)	**0.4 (0.2-0.8)**	**0.3 (0.1-0.9)**
40-55 years	93 (62.4)	56 (37.6)	1.0 (0.7-1.7)	0.9 (0.6-1.6)
>55 years	111 (63.1)	65 (36.9)	1.0	1.0
Sex				
Male	95 (59.0)	66 (41.0)	**1.6 (1.0-2.4)**	**1.9 (1.2-2.9)**
Female	143 (69.8)	62 (30.2)	1.0	1.0
Ethnicity				
Sinhala	217 (66.8)	108 (33.2)	0.5 (0.2-1.3)	0.4 (0.2-1.2)
Tamil	7 (41.2)	10 (58.8)	1.0 (0.2-0.4)	1.2 (0.3-5.2)
Muslim	14 (58.3)	10 (41.7)	1.0	1.0
Marital status				
Married	190 (65.3)	101 (34.7)	0.9 (0.5-1.6)	1.0 (0.6-1.9)
Others	48 (64.0)	27 (36.0)	1.0	1.0
Highest level of education				
>GCE Ordinary Level	115 (72.8)	43 (27.2)	**0.6 (0.4-0.9)**	**0.5 (0.3-0.9)**
≤GCE Ordinary Level	123 (59.1)	85 (40.9)	1.0	1.0
Current occupation				
Employed	143 (66.5)	72 (33.5)	1.2 (0.3-4.7)	0.6 (0.1-3.1)
Unemployed	50 (59.5)	34 (40.5)	1.6 (0.4-6.6)	1.2 (0.3-5.2)
Retired	38 (66.7)	19 (33.3)	1.2 (0.3-0.5)	1.2 (0.3-5.2)
Student	7 (70.0)	3 (30.0)	1.0	1.0
Average monthly income (Rs.)				
≤25,000	92 (58.6)	65 (41.4)	**1.6 (1.1-2.5)**	**1.8 (1.1-2.8)**
>25,000	146 (69.9)	63 (30.1)	1.0	1.0

[1] Significance at 0.05 level

Concerning patients' perceptions and beliefs related to treatment; patients who believed that treatment can relieve and control symptoms were, expectantly, more compliant with inhaler medications (p=0.01). Even though compliance was higher among those who were aware of the need to use inhalers during asymptomatic period to prevent further attacks of exacerbation, this association failed to show statistical significance (p=0.7). However, those who perceived the need to use the inhaler medications on a regular basis showed statistically significant association with treatment compliance (p=0.02). Similarly, those who were less forgetful to take medication (p=0.02) and those who attended regular clinics (p=0.02) showed better treatment compliance.

Respondents who felt that long-term use of medications would reduce the effect of medications as well as make them dependent, had lower compliance. The difference in both the instances showed strong statistical significance (p=0.008) and (p=0.006), respectively (Table 3).

Table 3. Patients related factors associated with treatment compliance

Characteristics	Good No. (%)	Poor No. (%)	Significance
Patients' knowledge, perceptions and beliefs regarding disease			
a) Feel easily affected by asthma			
Yes	183 (67.5)	88 (32.8)	χ^2=5.319; df=1
No	55 (57.9)	40 (42.1)	***p=0.02***
b) Believing asthma and its complications pose severe consequences			
Yes	154 (70.0)	66 (30.0)	χ^2=5.997; df=1
No	84 (57.5)	62 (42.5)	***p=0.01***
c) Know things worsening asthma			
Yes	208 (63.0)	122 (37.0)	χ^2=5.883; df=1
No	30 (83.3)	6 (16.7)	***p=0.01***
d) Know how to avoid things worsening asthma			
Yes	205 (63.0)	120 (36.9)	χ^2= 6.101; df=1
No	30 (80.5)	8 (19.5)	***p=0.01***
e) Believe asthma is not controllable			
Yes	37 (52.9)	33 (47.1)	χ^2=5.637; df=1
No	201 (67.0)	95 (32.1)	***p=0.02***
Patients' knowledge, perceptions and beliefs regarding treatment			
a) Believe treatment can relieve and control symptoms			
Yes	202 (68.0)	95 (32.0)	χ^2=6.177; df=1
No	36 (52.2)	33 (47.8)	***p=0.01***
b) Know the need to use inhalers during asymptomatic period			
Yes	199 (65.5)	105 (34.5)	χ^2=0.148; df=1
No	39 (62.9)	23 (37.1)	***p=0.7***

(Continued)

Table 3 *(Continued)*

Characteristics	Good No. (%)	Poor No. (%)	Significance
c) Feel the need to use inhalers regularly			
Yes	156 (69.6)	68 (30.4)	χ^2=5.408; df=1
No	82 (57.7)	60 (52.3)	**p=0.02**
d) Feel long term use reduces effects of medication			
Yes	30 (53.6)	26 (46.6)	χ^2=6.533; df=1
No	208 (67.1)	102 (32.9)	**p=0.008**
e) Feel long term use makes one dependent			
Yes	29 (51.8)	27 (48.2)	χ^2=6.596; df=1
No	209 (67.4)	101 (32.6)	**p=0.006**
f) Placing more trust on local medications			
Yes	10 (58.9)	7 (41.1)	χ^2=.242; df=1
No	228 (65.3)	121 (34.7)	**p=0.622**
Practices			
a) Ever smoked cigarettes			
Yes	29 (63.0)	17 (37.0)	χ^2=0.91; df= 1
No	209 (65.3)	111 (34.7)	**p=0.76**
b) Forgotten to take medications in past 2 weeks			
Yes	74 (54.4)	5 (42.6)	χ^2=5.144; df= 1
No	164 (69.2)	3 (38.8)	**p=0.02**
c) Regular clinic attendance (monthly attendance)			
Yes	195 (67.2)	31 (40.8)	χ^2=5.385; df= 1
No	45 (59.2)	95 (32.8)	**p=0.02**

Significance at 0.05 level

Discussion

The current study revealed that 65% of adult asthmatics have displayed 'good' treatment compliance. This higher level of compliance was observed, as the study was conducted in a clinic setting among patients who have asthma of significant severity requiring clinic follow-up in a secondary care level facility, as opposed to asthmatics in the community who may or may not be on medication with less severe asthma and not on clinic follow up. Therefore, generalizing the result to the entire country is limited. A study conducted in Egypt among 143 asthmatics at an outpatient clinic yielded compliance of 49% similar to what the WHO recorded as treatment compliance for chronic diseases (50%) (13). Nevertheless, this lower level may have been observed due to the fact that this study was conducted in a primary care level centre, and therefore among patients with less severe asthma. However, the present study results are in line with another study conducted locally at a clinic setting in a tertiary care hospital where the proportion of the study group with good compliance was 67% (11).

Patients' age showed an inverse relationship with treatment compliance. Even though several studies (1, 5, 13), have shown a higher compliance in the elderly category, the current study showed highest compliance in the age group less than 40 years (82.9%) and lowest in the group above 55 years (63.1%). Several plausible explanations to poorer compliance among elderly patients include problems of vision and memory and the presence of other chronic illnesses, addition to, difficulty in mastering the inhaler technique among the elderly compared to the younger group (5). Females showed better compliance which can be attributed to

their higher health seeking behaviour which is consistent with the results of a postal survey in USA (1). Significant association of good compliance with educational level above GCE Ordinary Level (p=0.17) observed in our study is in line with many other studies (5, 8, 14). Gaude (2011) from India found that patients with higher education had regular compliance with therapy and did not default a single time (14). Those with secondary education had a default rate of 60% while patients with primary education level had a default rate as high as 71.4%.

The present study revealed that a monthly income level of less than Rs 25,000 was significantly associated with poor compliance (p=0.025). Even though a vast majority received inhaler medications from a hospital pharmacy, regularly free of charge (99.5%), clinic patients had to bear additional expenses for travelling and meals. Further, some elderly clinic attendees had to bear an additional expense of payment made for those accompanying them to clinics. Thus, even though medications were provided free of charge, the additional miscellaneous expenses incurred may have discouraged regular clinic attendance, resulting in underuse of medication contributing to poor compliance consistent with similar findings seen in another study conducted in Connecticut (15).

Considering perceptions and beliefs regarding disease and treatment that influence compliance, those who felt easily affected by asthma (p=0.024) and those who believed that asthma and its complications can pose severe consequences (p=0.014) were significantly associated with good compliance to asthma medication. These observations were commonly seen in a fairly large number of other studies (1, 5, 13, 16-17).

Interestingly, compliance was higher among those who were less aware regarding factors that cause their asthma to exacerbate (p=0.015) and how to avoid factors that make asthma worse compared to those who knew better (p=0.011). Even though studies assessing the association of knowledge about disease with compliance have repeatedly implicated higher levels of compliance with better knowledge (8-9), our study showed that the opposite was true. Being aware about factors that exacerbate asthma and knowing how to avoid factors worsening asthma make one less susceptible to the disease, and therefore experience less frequent attacks of asthma exacerbation. Thus,

patients with less frequent asthma attacks tend to take asthma medications less often than prescribed, leading to poor compliance. On the contrary, those who are less aware about the triggering factors and about how to avoid an attack tend to experience more frequent exacerbations, therefore adhering to the prescribed regimen thus showing higher levels of compliance.

Patients who worried that long-term use of medications would reduce effect of medications (p=0.08) as well as those who felt that it would make them dependent (p=0.06) displayed poor compliance with statistically significant association. A study discovered that if patients were worried about diminishing effectiveness of medication over time, they were less likely to be compliant (16). Similarly, a prospective cohort study conducted among 85 adult asthmatics in Philadelphia concluded that in patients with chronic disease, the fear of dependence on long-term medications might be a negative contributory factor for compliance confirming our findings (17).

The proportion of patients who were aware regarding the use of inhaler medication during asymptomatic period was higher and their level of compliance was greater than those who were less aware. However, this difference observed was not statistically significant (p=0.7). Interestingly, the proportion of respondents who perceived the need of using inhalers regularly were greater in number and displayed higher compliance. However, in contrast, this difference indeed achieved statistical significance (p=0.02). The two factors are interlinked. Even though a girth of studies has found correlation between increasing knowledge regarding treatment need and improved compliance (5), the current study revealed that being aware of the need of the treatment solely does not motivate a patient to adhere to the prescribed therapy. Rather, it was their perception of the need of using inhaler medications that ensured compliance to the prescribed regimen. This is in line with Becker's Health Belief Model, which stresses patients with stronger beliefs about the necessity of the particular treatment are likely to have higher compliance (10) similar to Martini & Pannuici (1996) who found that not all who are aware of the measures that are beneficial for their health will comply with these measures (10). In addition, perception of the need to use regular inhalers was reflected in their practice of regular monthly attendance to clinic.

Forgetfulness is a widely reported factor that causes noncompliance with medication (5, 18). The current study too discovered that forgetting to take medications was statistically significant with treatment compliance (p=0.02) with one third of patients forgetting to take medications in the past two weeks (n=129; 35.2%).

There were some limitations of this study. The study was conducted in a clinic setting and therefore included patients of asthma with greater severity requiring regular clinic follow up. Moreover, had the study been done in the community, patients, to some degree, may have displayed better levels of compliance by attending clinic itself compared to patients who may not have been attending clinics at all or were not on regular treatments. Even though self-reporting of compliance was objectively assessed by crosschecking with clinic records, having to rely on self-reporting to an extent was a limitation. Another limitation is inclusion of other diseases, which share similar symptoms despite adequate cautions taken.

Conclusions & Recommendations

A considerably large proportion of respondents showed good compliance to treatment (65%). Younger age, being female and a higher level of education and higher average monthly income were some of the socio-demographic and economic factors that were attributed to good treatment compliance. Patient perceptions and beliefs regarding disease and treatment critically influence compliance to asthma medications. Thus, coordinated efforts directed at providing patients with clear rationale for treatment that is consonant with their perception of the illness as well as addressing concerns borne by erroneous beliefs is of paramount importance, while compliance is highest (19).

Public Health Implications

Patients' perceptions regarding disease and treatment play a major role in determining treatment compliance. Focus on development and implementation of an effective behaviour change communication model to improve compliance to treatment is therefore a timely need.

Author Declarations

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