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Risk factors for asthma severity among emergency rooms attendees, Palestine

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ABSTRACT

Setting: Emergency Room of Alia Governmental hospital in Hebron district, south of West Bank, Palestine.

Objective: To determine the factors associated with chronic asthma severity among asthma patients attending the emergency rooms in Palestine.

Design: A cross-sectional study using previously validated questionnaires.

Results: Among the 121 patients, 45.5% had moderate/severe asthma. Most days' regular intake of oral theophylline, and using ≥ 5 courses/year of oral steroids were more likely to be associated with moderate/severe asthmatics ($p < 0.05$). Moderate/severe asthmatics compared with mild asthmatics were more likely to use inhaled short B_2-agonists more frequently (most days, 50% vs. 17%; $p < 0.05$) and in higher concentrations (≥ 1 cannister/month, 78% vs. 29%; $p < 0.05$). They were also more likely to get regular treatment ($p < 0.05$) and to report their inability to afford/obtain asthma medicines ($p > 0.05$).

Conclusions: Access to health services doesn't necessarily ensure a good quality of care for asthmatics. The effectiveness of oral theophyline in controlling the more severe asthma symptoms should be reconsidered. We recommend a training program for health professionals and an educational one on self-management for the asthma patients.

1. Introduction

Asthma morbidity and mortality rates are still continued worldwide [1,2]. There is an increased burden on the healthcare systems, families, and patients by this disease and its consequences [3]. In terms of its management, there are both under and over treatment that differ from those recommended by national and international guidelines [4]. Thus, controlling asthma can be conceived as an intervention to strengthen families, and yield not only healthier people but also improved family functioning, enhance workplace productivity, and overall family well-being particularly in developing countries [5,6].

Many factors have been reported to be associated with increased asthma severity. Under-diagnosis [7], non-compliance with prescribed medical regimens [8], inability to use inhaled medications properly [9], under-treatment with anti-inflammatory medications, and an overuse of inhaled B_2-agonist have been shown to be involved [10]. Other factors such as poor understanding of the disease process or lack of disease management have been identified as a major problem for patients with asthma [11,12]. The influence of

personal psycho-social factors was also shown to play a role [12]. However, asthma costs are substantial, and this relates both to treatment costs and the use of health services that lead to a poor disease control [13]. Therefore, the cost of having medical care could also be considered as one of the determinants of asthma morbidity.

Severe chronic asthma was shown to be associated with emergency rooms (ERs) attendance for asthmatics. In Australia, a study of 62 patients attended the ER found that 2/3 of the patients had severe chronic asthma [14]. A study of 1027 patients attending the ER in the United States found that 67% of those patients were persistent asthmatics [15]. Previously we showed that moderate/severe asthmatics were 6.9 times more likely to be frequent ER attendees compared to mild asthmatics in Palestine (Adjusted Odds Ratio, AOR, 6.92; 95% confidence interval, 95% CI, 2.44–19.62). Also, the study showed that asthma severity was a strong predictor for frequent ER attendance for asthmatics in Palestine [16].

The importance of studying asthma in ERs is that patients with asthma appearing in ERs are those who have sub-optimal treatment and are those who depend on the local management of asthma in the community [4]. In a previously published work we presented the determinants for attending the ER of Alia Governmental hospital in Hebron district in Palestine for asthmatics [16]. In this article, we will be presenting the determinants of asthma severity among these attendees. This study is based on principles guiding development of complex interventions.

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2. Materials and methods

The study protocol, methods and sample size estimations were described elsewhere [16]. Briefly, a cross-sectional study with non-random purposive sample of all asthmatic patients ($n = 121$) aged ≥ 5 years old who attended the ER of Alia governmental hospital in Hebron district was investigated. Those patients that visited the ER during a two months period were already had a final history of physician-diagnosis of asthma before their ER attendance. Patients were interviewed to collect information using a questionnaire developed from previously validated ones by the International Union Against Tuberculosis and Lung Diseases (IUATLD) and the European Community Respiratory Health Survey Questionnaire (ECRHSQ) [17]. Diagnosis of chronic asthma severity was based in the context of stable conditions during the previous 3 months as reflected in their self-reported day/night time regular symptoms, and physical activity in that period. These symptoms reflecting the clinical features and control of asthma in that period which is usually considered as a good period to define the level of severity as in Global Initiative for Asthma (GINA) 2002 guidelines [18]. The patients' conditions when arriving to the ER (that depict a condition of acute attack) were not considered in this chronic classification.

2.1. Ethical consideration

The study was approved by AL-Quds University - Faculty of Public Health scientific research committee and graduate studies council. Alia hospital board's approval was obtained. An informed consent was also obtained from all participants or their guardians by signing a consent form before participation.

2.2. Statistical analysis

The dependant variable, i.e. asthma severity in the previous three months; was determined by self-reported day/night time symptoms and physical activity according to GINA 2002 guidelines [18]. Independent variables were: socio-demographic; medications use; health services utilization. Mild intermittent and mild persistent asthma were summed as one category; i.e. "mild asthma". Moderate persistent was summed with severe persistent asthma as one category; i.e. "moderate/severe asthma". This combination was done since several studies showed that classification of asthma severity varies by the reported history of day and/or nighttime symptoms, in particular between mild intermittent and mild persistent symptoms [19]. Also, the number of patients with mild intermittent and severe persistent in this study was not enough to do the proper analysis ($n = 9$, $n = 13$, respectively).

Two-tailed Pearson's χ^2 test was used at the univariate analysis to examine the association between the dependent variable and the independent socio-demographic variables. A p value of less than 0.05 was considered as statistically significant. Multivariate logistic regression was used to evaluate variables associated with chronic asthma severity while controlling for possible confounding variables (age, gender, and occupation). Variables included in the model were only those with a significant level <0.05 in the univariate analysis. The AOR and its 95% CI were used to show the strength of associations. All analyses were conducted using SPSS software, the Statistical Package for Social Science version 12 [20].

3. Results

3.1. Study population's characteristics

The patients' mean age was 47 years (5–83 years, standard deviation 18.5 years, and median 48 years) of whom 44% were in the age group 20–49 years. Of the 121 patients, 47% were females and 77% were married. Half of the patients had 0–6 years of education. Mild asthma was seen in 54.5% of patients ($n = 66$: 9 mild intermittent and 57 mild persistent) while 45.5% of patients had moderate/severe asthma ($n = 55$: 42 moderate persistent and 13 severe persistent). Single and younger patients were more likely to have mild asthma compared to married and older patients ($p < 0.05$) (see Table 1).

3.2. Health services and asthma severity

Regarding compliance with treatment, Table 2 shows that 43% reported their inability to afford or obtain medications. Moderate/severe asthmatics reported to be more unable to afford/obtain their asthma medicines compared to mild patients (AOR, 2.11; 95% CI, 0.51–8.76) as the reason for not taking all their asthma medications. Also, patients with moderate/severe asthma were significantly more likely to get regular treatment (AOR, 8.24; 95% CI, 1.35–50). Moreover, given a letter to the usual carer (referral letter to primary healthcare physician) was significantly more likely to be associated with moderate/severe asthma patients compared to not given a letter (AOR, 7.19; 95% CI, 1.27–40). However, reporting benefit from their physicians in managing their asthma at home was significantly inversely weakly (AOR, 0.04; 95% CI, 0.007–0.3) associated with moderate/severe asthma compared to those who did not benefit from consulting with their physicians.

3.3. Treatment protocol and asthma severity

Fig. 1 shows that, moderate/severe patients were more likely to use oral theophyline most days compared to mild asthmatics (56% vs. 27%, respectively; $p < 0.05$). This association remained

Table 1
Distribution of chronic asthma severity[a] by socio-demographic characteristics.

Socio-demographic characteristics	Mild asthma ($n = 66$)	Moderate/Severe asthma ($n = 55$)	χ^2 significant P value	Total Sample ($n = 121$)
	n (%)	n (%)		n (%)
Sex				
Male	39 (59.1)	25 (45.5)	0.13	64 (52.9)
Female	27 (40.9)	30 (54.5)		57 (47.1)
Place of residence				
City/refugee camp	47 (71.2)	31 (56.4)	0.08	78 (64.5)
Village	19 (28.8)	24 (43.6)		43 (35.5)
Marital status				
Single	16 (24.2)	4 (7.3)	0.032*	20 (16.5)
Married	45 (68.2)	48 (87.3)		93 (76.9)
Widow	5 (7.6)	3 (5.4)		8 (6.6)
Age (years)				
5–19	10 (15.2)	1 (1.8)	0.00*	11 (9.1)
20–49	36 (54.5)	17 (30.9)		53 (43.8)
50–64	11 (16.7)	18 (32.7)		29 (24)
>64	9 (13.6)	19 (34.5)		28 (23.1)
Level of education (years)				
0–6	27 (40.9)	34 (61.8)	0.03*	61 (50.4)
7–9	18 (27.3)	15 (27.3)		33 (27.3)
10–12	12 (18.2)	4 (7.3)		16 (13.2)
>12	9 (13.6)	2 (3.6)		11 (9.1)
Occupation				
House wife	23 (34.8)	26 (47.3)	0.03*	49 (40.5)
General worker	19 (28.8)	13 (23.6)		32 (26.4)
School's student	7 (10.6)	1 (1.8)		8 (6.6)
Monthly based employee	9 (13.6)	2 (3.6)		11 (9.1)
Unemployed	8 (12.1)	13 (23.6)		21 (17.4)

*Significant, $P < 0.05$.
[a] Classification according to day/night time symptoms in GINA 2002 guidelines.

Table 2
Multivariate logistic regression analysis model for factors associated with moderate/severe asthma (adjusted for age, gender and occupation).

Variables	Mild asthma ($n = 66$)	Moderate/sever asthma ($n = 55$)	Total Sample ($n = 121$)	AOR (95% CI)[a]
	n (%)	n (%)	n (%)	
Socio-demographic				
Marital status				
Married	45 (68.2)	48 (87.3)	93 (76.9)	6.90 (0.84–56)
Widow	5 (7.6)	3 (5.4)	8 (6.6)	0.15 (0.005–4.39)
Single	16 (24.2)	4 (7.3)	20 (16.5)	1.00
Highest level of education				
7–9 years of schooling	18 (27.3)	15 (27.3)	33 (27.3)	0.58 (0.11–2.95)
10–12 years of schooling	12 (18.2)	4 (7.3)	16 (13.2)	0.11 (0.01–1.46)
>12 years of schooling	9 (13.6)	2 (3.6)	11 (9.1)	0.16 (0.01–2.55)
0–6 years of schooling)	27 (40.9)	34 (61.8)	61 (50.4)	1.00
Health services utilization				
Get regular treatment[b]	16 (24.2)	36 (65.5)	52 (43)	8.24 (1.35–50)*
Followed on regular basis[b]	7 (10.6)	14 (25.5)	21(17.4)	2.59 (0.41–16)
Benefit from doctor in asthma management at home[b]	39 (59.1)	15 (27.3)	54 (44.6)	0.04 (0.007–0.3)*
Patient's usual carer sent a letter[b]	12 (18.2)	19 (34.5)	31(25.6)	7.19 (1.27–40)*
Ever admitted to hospital with asthma[b]				
Yes. <a year ago	17 (25.8)	31 (56.4)	48 (39.7)	1.55 (0.23–10)
Yes. >a year ago	23 (34.8)	16 (29.1)	39 (32.2)	3.24 (0.47–22)
Medications				
Take all asthma medicines[b]	8 (12.1)	18 (32.7)	26 (21.5)	2.08 (0.38–11)
Reasons for not using all asthma medicines				
Can't afford/obtain them	18 (27.3)	34 (61.8)	52 (43)	2.11 (0.51–8.76)
Don't want/need them	48 (72.7)	21 (38.2)	69 (57)	1.00
Use other remedies currently (nonconventional ones)[b]	42 (63.6)	50 (90.9)	92 (76)	6.39 (0.83–49)
Oral theophyline regularly take				
Occasionally	18 (27.3)	13 (23.6)	31 (25.6)	2.50 (0.43–14)
Most days	18 (27.3)	31 (56.4)	49 (40.5)	18.22 (1.93–17)*
None	30 (45.5)	11 (20)	41 (33.9)	1.00
Inhaled steroid regularly take				
Occasionally	21 (31.8)	12 (21.8)	33 (27.3)	0.03 (.003–0.49)*
Most days	6 (9.1)	22 (40)	28 (23.1)	4.20 (0.47–36)
None	39 (59.1)	21 (38.2)	60 (49.6)	1.00
Inhaled short B_2-agonist currently use				
<1 cannister/month	29 (43.9)	6 (10.9)	35 (28.9)	0.49 (0.05–4.74)
≥1 cannister/month	19 (28.8)	43 (78.2)	62 (51.2)	2.00 (0.22–17)
None	18 (27.3)	6 (10.9)	24 (19.8)	1.00

*Significant, $P < 0.05$.
[a] AOR for moderate/severe asthma as compared with mild asthma.
[b] Reference category (AOR $= 1$) is no answer.

significant after adjustment (AOR, 18.22; 95% CI, 1.93–17) (see Table 2).

In Fig. 1, moderate/severe patients were more likely to use inhaled steroids most days compared to mild patients (40% vs. 9%, respectively; $p < 0.05$). However, in the multivariate model (Table 2), an occasional regular intake of inhaled steroid was significantly inversely weakly associated with moderate/severe asthma compared to none users (AOR, 0.03; 95% CI, 0.003–0.49). Fig. 1 also shows that moderate/severe patients were more likely to use inhaled short B_2-agonist most days compared to mild asthmatics (50% vs. 17%, respectively; $p < 0.05$). They were also using them more frequently and in higher concentrations compared with mild asthmatics (78% vs. 29% used ≥1 cannister/month, respectively; $p < 0.05$) as shown in Fig. 2. Further, it was also found that moderate/severe asthmatics used oral steroids more frequently than mild asthmatics, i.e. 30% of moderate/severe asthmatics used ≥5 courses/year compared to 12% of mild asthmatics; but 31% of mild asthmatics used 1–4 courses/year compared to 20% of moderate/severe ($p < 0.05$) (see Fig. 2).

4. Discussion

This is the first study that investigated the determinants associated with asthma severity for asthma patients attending the

ERs in Palestine. The main findings were that most days' regular intake of oral theophyline, and using ≥5 courses/year of oral steroids which were more likely to be associated with moderate/severe asthmatics. Furthermore, moderate/severe patients used inhaled short B_2-agonist (reliever therapy) more frequently (most days) and in higher concentrations (≥1 cannister/month) compared to mild asthmatics.

4.1. Health services utilization

In GINA 2002 guidelines [18], it is recommended for asthmatic patients at ER to have a close medical follow-up including a letter to the carer. Given a letter to usual carer itself remains a significant predictor of moderate/severe asthma. These results rise up questions regarding the guidelines that are used at the Palestinian ERs for having a follow-up of asthma patients. A possible explanation is that, the quality of primary healthcare services is likely to be poor and that this letter was only a usual written procedure for ER patients without adequate follow-up, or those patients might just find it an easy way to get their regular treatment in the hospital ER rather than consulting their usual carer. Furthermore, 43% of these study patients got regular treatment which was shown to be a very strong factor for the severity (AOR $= 8.24$, 95% CI 1.35–50). Getting regular treatment does not mean by itself
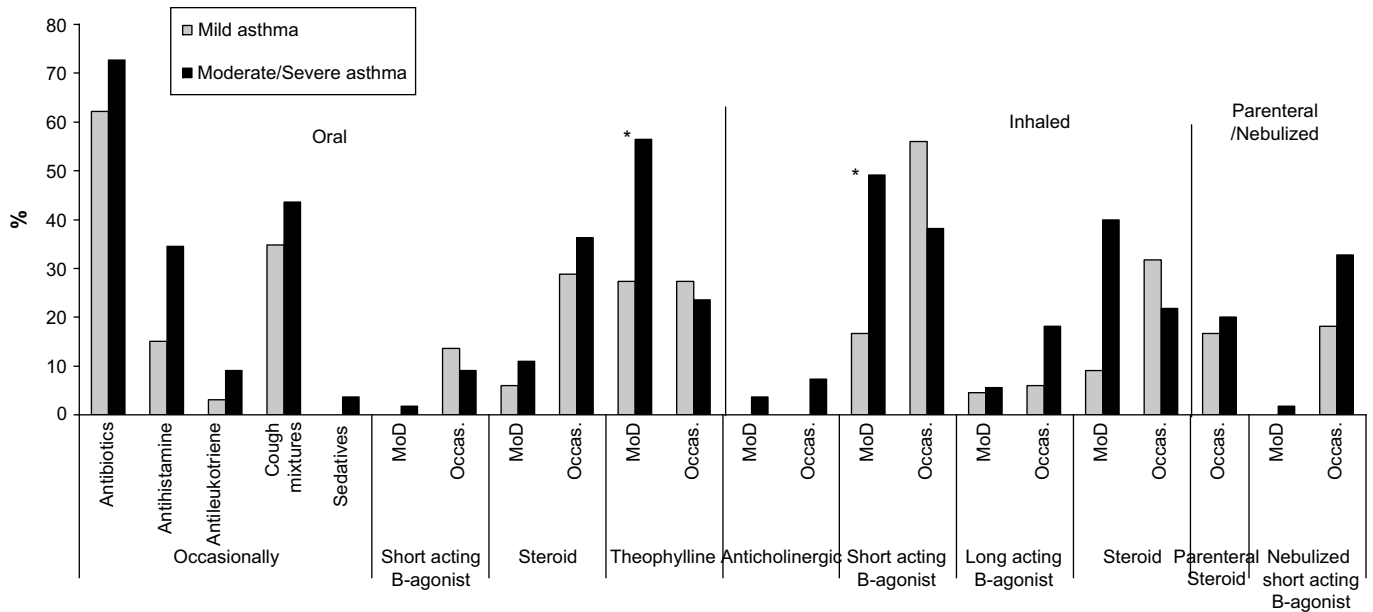
Fig. 1. Distribution of chronic asthma severity in past 3 months by medication regularly taken in the past 3 months. Values are given as percentage for each group. The non-presented data = none. Occas = Occasionally; MoD = Most days. *Significant, P < 0.05.

getting the right treatment, but might reflect getting the same treatment without good follow-up. Since these medications are dispenses on insurance, then in the research opinion it was only for having the prescription from the doctor and not really a regular follow-up.

Studies indicated that non-compliance with prescribed medical regimens is contributing to asthma morbidity [21,22]. Compliance and adherence to asthma medicines were found to be a problem of concern for asthma patients in our study. This was clear in that, not being able to afford/obtain asthma medicines showed nearly

two-fold increased risk for moderate/severe asthma. Some studies reported that half of asthma patients fail to adhere to daily treatment regimens either intentionally, unintentionally, or unknowingly [23]. Others showed that poor understanding of medicines' action, fear of steroids side effects, being an adolescence, or from a low socio-economic class such as poverty [12,24], and/or having some factors that reflect a psychological condition such as loss of hope or depression [23], were shown to be important factors that might contribute to low adherence to asthma medicines and thus to asthma severity. In the Palestinian community, poverty, and types
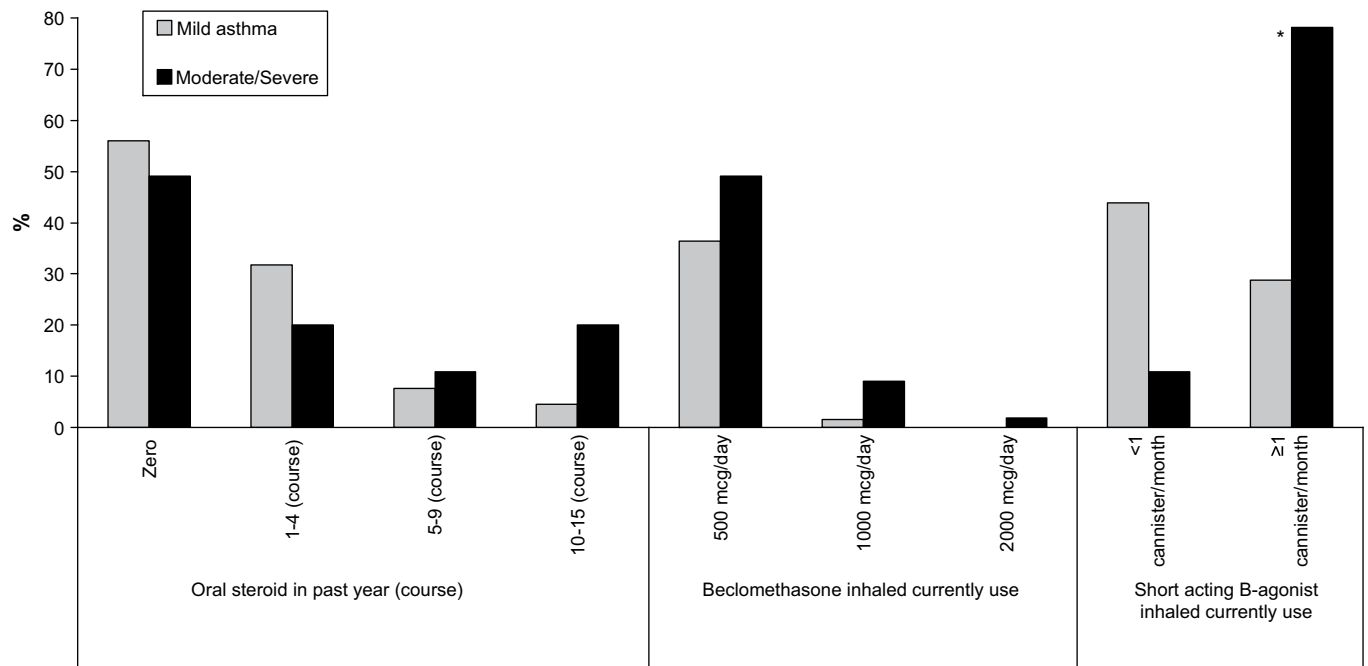

Fig. 2. Distribution of chronic asthma severity in past 3 months by essential (basic) asthma medications. Values are given as percentage for each group. The non-presented data = none. *Significant, P < 0.05.

of job (58% were house wife and unemployed) and low number of schooling years (77% had less than 9 years) that might represent a low socio-economic class were shown to some extent to play a role in asthma severity (Table 1), as these minorities are usually associated with greater financial barriers [25]. Furthermore, asthma morbidity is generally associated with reduced asthma management's knowledge, skills [26] and/or lack of self-management [11,12]. Our finding supports these conclusions as patients reported having a benefit from their doctor's advises and instructions on how to manage their asthma at home were less likely to be moderate/severe asthmatics.

4.2. Asthma treatment protocol

GINA 2002 guidelines recommended the use of inhaled short B_2-agonist as needed but not on daily basis [18]. Our findings showed that patients used currently ≥ 1 cannister/month and/or most days' regular use of inhaled short B_2-agonist were more likely to have moderate/severe asthma. This supports the conclusion that an overuse of inhaled B_2-agonists causes a worsening of asthma control and increased morbidity [11,27,28].

Studies showed that proper use of inhaled steroids has a protective effect against asthma severity [29,30], and that their under treatment lead to poor control of asthma and to increased morbidity [6,28]. Thus, inhaled steroids don't necessarily predict to decrease asthma morbidity unless they are used adequately and delivered in the context of proper dosage. In multivariate analysis, we found that only an occasional regular intake of inhaled steroids was significantly inversely associated with moderate/severe compared to none use. However, although univariate analysis showed that most days' regular use of inhaled steroids to be associated with moderate/severe asthma, the same patients' sample was significantly under-treated by inhaled steroids [16], based on GINA 2002 guidelines [18], and the IUATLD 2005 (the UNION) 4 step approach recommendation for asthma treatment [31]. Moreover, only 60% of the moderate/severe asthmatics used them most days or occasionally which should be 100% according to GINA [18]. GINA 2002 guidelines recommended step up and step down therapy by oral steroids [18]. Using ≥ 5 courses/year of oral steroids was a significant predictor of moderate/severe asthma in our study, which showed that those patients had a high continuous consumption of oral steroids that might be added to the risk of increased asthma severity.

The recent international and national guidelines for asthma management, don't recommend, but further doubt in the effectiveness of oral theophylline in the treatment of asthma if it's not used in combination with other proper medicines [3,18,32]. In our study, most days' regular intake of oral theophyline was shown as a predictor factor for moderate/severe asthma. This raises a question about the effectiveness of this medication in the treatment of asthma. Further conclusion could be wither it has been adequately prescribed by the patient's physician or not, and/or the possibility that patients with severe asthma (who can't afford their proper medications) tried to replace them by a cheaper ones like theophyline by their own decision.

Our results don't represent all patients with asthma in the local community or services at private or nongovernmental hospitals. Therefore, we can't generalize our results. However, those patients represent a highly informative group of treatment failures and most costly in term of economical burden. Our study could also be limited by its cross-sectional design, and being a recall and self-reported, therefore the bias of recalling might have an affect on the outcome. However, since it was an audit (baseline) study, it could enable us to develop and planning an intervention programs for asthma management.

In conclusion, having access to health services doesn't necessarily ensure a good quality of care and proper treatment for asthmatics. The effectiveness of oral theophyline in controlling the more severe asthma should be reconsidered by the physicians. Compliance and adherence to asthma medicines should be addressed. We recommend an ER and/or Primary Healthcare Centre educational intervention program for asthma patients with an integral activity of all health workers concentrated on; (1) proper pharmacotherapy of asthma (2) importance of long-term adherence to asthma medications with an effective follow-up.

Acknowledgments

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