

EVALUATION OF KNOWLEDGE, PRACTICE AND ADHERENCE OF GENERAL PRACTITIONERS AND COMMUNITY PHARMACISTS TO ASTHMA GUIDELINES IN MALAYSIA

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ABSTRACT

Asthma is a heterogeneous disease that inflames and narrows the airways. It is identified with respiratory symptoms such as wheezing, shortness of breath, chest tightness and cough. It has also been established that adherence to evidence-based guidelines may raise asthma control to optimal levels in both diagnosis and medical intervention. The objectives are to assess the knowledge, practice and adherence to asthma-management guidelines of general practitioners (GPs) and community pharmacists (CPs) in Pulau Pinang, Malaysia. A cross-sectional study was conducted in Pulau Pinang using a validated self-administered questionnaire. The knowledge, practice and adherence to asthma-management guidelines of GPs and CPs were captured using a 30-item questionnaire that prompted their responses using a mixture of closed-ended and Likert scale techniques. The questionnaires, together with a self-addressed stamped envelope for return, were mailed to 236 CPs and 300 GPs. The knowledge of both CPs and GPs on asthma was slightly above average, and there was no significant difference between the two groups (65.9% for CPs and 67.2% for GPs, $p = 0.933$). Overall, GPs have better practice than CPs, with a mean score of 4 or higher for most practice questions. GPs have a significantly higher tendency to follow the asthma guidelines (71.9%), whereas less than half of the CPs (46.4%) adhere to them. Only 40.6% of GPs and 3.5% of CPs mentioned the name of the guidelines they followed. Our findings show that although CPs and GPs have similar levels of knowledge, GPs have better practice and adherence to guidelines than CPs.

Keywords: General practitioners, Community pharmacists, Knowledge, Practice, Adherence, Guidelines

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INTRODUCTION

Asthma is associated with airway hyper-responsiveness, inflammation, and bronchoconstriction (Global Initiative for Asthma 2017). Asthma was previously stratified by severity; however, in 2006, the GINA guidelines shifted the emphasis from using severity classification to the use of 'asthma control' to guide management. This is because it is challenging to apply the severity classification to a patient who has already commenced treatment. This resulted in the severity-based classification being reserved only for research purposes (Bousquet *et al.* 2010). The American Thoracic Society/European Respiratory Society (ATS/ERS) defined 'asthma control' as the extent to which the various manifestations of asthma have been reduced or removed by treatment (Reddel *et al.* 2009).

Asthma is a common respiratory disease affecting more than 339 million people worldwide in 2016 (Vos *et al.* 2017; World Health Organization (WHO) 2020). There is a significant rise in the prevalence, morbidity, mortality and economic burden associated with asthma, especially in children. A report by the Global Asthma Report (2018) claimed that by 2025, about 400 million people globally would have asthma, consequent to an increase in urbanisation. In Malaysia, the prevalence of asthma is 6.3%, based on the National Health and Morbidity Survey in 2011 (Ministry of Health Malaysia 2017). According to the Malaysian clinical practice guidelines on asthma management, the exacerbation rate of asthma was as high as 68.1% per year (Ministry of Health Malaysia 2017).

The diagnosis of asthma is based on the clinical history and lung function tests, particularly peak expiratory flow (PEF) and spirometry, in addition to the assessment of spontaneous or post-bronchodilator reversibility of airflow limitation (Global Initiative for Asthma 2020; Hogan and Bernstein 2020). Airflow limitation in asthma is recurrent and usually arises due to hyper-responsiveness, bronchoconstriction, airway oedema or remodelling (Hogan and Bernstein 2020).

Management of asthma involves equally important pharmacological and non-pharmacological approaches (Global Initiative for Asthma 2020). Effective asthma management requires a partnership between the patient (and caregiver for children) and the healthcare provider (Global Initiative for Asthma 2020). Excellent communication by healthcare providers is essential for good collaboration and, ultimately, good outcomes (Fletcher *et al.* 2020; Hogan and Bernstein 2020). Evidence supports that pharmacists who work alone or in teams in partnership with general practitioners (GPs) are an accessible asset for effective asthma management and positively influence asthma outcomes (Qazi, Armour and Saini 2020).

Inadequate and inappropriate asthma management leads to several detrimental consequences, including asthma exacerbation and more frequent hospitalisation. It also causes adverse effects on patients' quality of life and overall performance (Menzies-Gow *et al.* 2018). According to WHO estimates, asthma is underdiagnosed and undertreated, thus creating a considerable burden on individuals and families. Braido *et al.* (2016) concluded that there is a global suboptimal asthma control in many patients despite the availability of effective therapies, thus making the long-term management goals falling short of the ones set in GINA guidelines.

Several studies showed that adherence to evidence-based guidelines in both diagnosis and medical intervention raises asthma control to optimal levels (Agarwal *et al.* 2015; Bateman, Bousquet and Braunstein 2001; Thoonen *et al.* 2003). Primary healthcare settings play a central role in health screening and initial diagnoses. However, because patients with chronic illnesses such as asthma have a limited understanding of

the risks and early symptoms of the disease, they seldom raise these issues to primary healthcare providers (Fathima *et al.* 2013). On the other hand, community pharmacies (CPs) are suitably positioned to provide primary healthcare services, especially to patients who are reluctant to visit hospitals to seek medical support. Extended operating hours and offering consultations without prior appointments are some of the CPs' competitive advantages (Fathima *et al.* 2013). Many studies have confirmed that pharmacist interventions can positively impact clinical, humanistic and economic outcomes in the management of asthma (Adunlin and Mahdavian 2012; Garcia-Cardenas *et al.* 2016). These roles of both GPs and CPs cannot be efficiently accomplished without having sufficient knowledge, ethical practice and adherence to asthma guidelines.

The role of CPs' knowledge and compliance to treatment guidelines has been shown in several studies as a critical factor in achieving positive treatment outcomes. However, most of these studies originate from North America, Europe, the United Kingdom, China, and Japan (Braidó 2013; Chapman *et al.* 2017; Lagerløv *et al.* 2000). There is limited research available from Southeast Asia, including Malaysia (Chokhani *et al.* 2020). This study, therefore, aimed to assess the knowledge, practice, and adherence of GPs and CPs to asthma guidelines in Pulau Pinang, Malaysia.

Asthma guidelines are intended to guide for best practice in asthma management based on established evidence. The guidelines consider asthma diagnosis and treatment of all patients who have been diagnosed with asthma. The recommendations are primarily helpful for general practitioners, consultants and experts in respiratory medicine, nurses, pharmacists and other allied health professionals interested in respiratory health. Guidelines should also benefit people who have asthma, as well as their families and caregivers. National guidelines in Malaysia include clinical practice guidelines management of asthma in adults (Ministry of Health Malaysia 2017) and clinical practice guidelines for managing childhood asthma (Academy of Medicine of Malaysia, Malaysian Thoracic Society and Lung Foundation of Malaysia 2014). Two major guidelines referenced in formulating the Malaysian guidelines are the global strategy for asthma management and prevention (Global Initiative for Asthma 2020) and the British guidelines on asthma management (British Thoracic Society and Scottish Intercollegiate Guidelines Network 2019). Therefore, it is crucial to assess the knowledge of primary health care practitioners on the existence and use of these guidelines.

METHODS

Study Design

The study was a prospective cross-sectional survey conducted among community pharmacists and general practitioners in Pulau Pinang, Malaysia. The study was conducted within three months (January–March 2013). The participants were selected using a purposive sampling method and the data was collected using a self-administered questionnaire.

Instrument Content and Scoring Instructions

The questionnaire was designed to reflect the main aspects of the Malaysian Clinical Practice Guidelines and GINA guidelines for managing asthma. The participants were requested to respond to the questions based on their current knowledge without consulting any reference materials for information.

The questionnaire was generated using three significant steps. The first step involved the review of articles and formulating 43 questions. The second step was a 2-level validation of the questionnaire by evaluating the importance of the questions initially by 10 experienced physicians and subsequently by 10 clinical pharmacists and grading the items on an ordinal scale of 1–5 (ranging from least important to extremely important). The third step involved the refinement and finalisation of the questionnaire. This involved the exclusion of questions with a mean score of < 4, which led to the final version of the questionnaire (consisting of 30 items) used for the survey. The questionnaire was structured into four sections. Section A captures the demographics of the participants.

Section B evaluates the knowledge of the participants about asthma. This section has 18 questions where participants were asked to mark either 'Yes' or 'No' based on their current knowledge. Knowledge related items were scored using the guideline used in the development of the questionnaire. The number of correct answers in each questionnaire was summed up out of the total number of knowledge-related questions then the percentage of correct responses were computed. Besides, the score range, minimum, maximum and mean percentage of correct answers among each group of participants (CPs or GPs) were calculated.

Section C explores the clinical practice of participants towards asthmatic patients. It involves nine 5-point Likert scale questions, which are divided into two groups of items. The first set of questions asks how much the participant tailors the drug schedule to the patient's conditions and everyday life, provides written medication instructions to the patient, and educates the patient about using the inhalers and what to do when symptoms worsen. This section also contains questions about how often the participants communicate with the patient to inquire about the asthma symptoms' causes. There are also two questions on whether asthma control or asthma severity can be used as a basis for drug prescription. The responses to these questions were graded on a scale of 'always' to 'never.' The second set of questions examined the importance of environmental factors as asthma causes. The responses to these questions are graded on a scale of 'extremely important' to 'not at all significant.'

The participants' adherence to recent asthma management guidelines is assessed in Section D. It is made up of three components. The first item indirectly evaluated adherence to the guidelines by asking about the trend of selecting long-acting β_2 -agonists as monotherapy. The GINA and Malaysian guidelines specify that long-acting β_2 -agonists should not be used as controller monotherapy without inhaled corticosteroids in asthma. The second item is a 'yes-or-no' question to whether the participant uses any guidelines in practice. This was reported in percentages. In contrast, the third item is an open-ended question probing for the guidelines that the participants utilise.

Furthermore, the questionnaire's reliability was tested using Cronbach's alpha, which yielded a value of 0.83, suggesting that the questionnaire is reliable.

Data Collection Procedure

The questionnaires were initially mailed to 200 clinics and CPs in an envelope containing both the questionnaire and a self-addressed stamped envelope to return the completed survey. As a result of the low response rate, the researcher sent a reminder email to all the CPs and GPs on the list. The list of CPs and GPs were obtained from the Penang state Health Department and the Malaysian Medical Council, respectively, after providing them with evidence of ethical approval of the study.

Data Analysis

The demographic data and the number of correct or wrong answers in the knowledge and practice category were presented as descriptive statistics. The Pearson's Chi-squared test was used to determine the difference between the two groups of participants regarding their knowledge, practice and adherence to the guidelines. All data were analysed using the statistical package for social sciences (SPSS) version 16.0.

RESULTS

The demographic characteristics of respondents are shown in Table 1. Overall, the response rate was 10.6% ($n = 32$) and 12% ($n = 28$) from the GPs and CPs, respectively. Sixty (61.7%) people who responded were men. In the CPs cluster, more than half respondents were female. All the CPs fall within the age groups of 25–55 years old. Only one of the CPs had a postgraduate degree, 67.9% of CPs have 5–15 years of experience and 82.1% reported managing between 1 and 25 asthma patients each week.

Whereas for the GPs cluster, the majority of the respondents were male. On the contrary, the age group of GPs fall between 41 and 70 years old. Fifty percent of the GPs have a working experience of at least 26 years. Forty-one percent had at least one postgraduate degree. Fifty percent of the GPs stated handling between 1 and 25 asthma patients per week, while the other half managed between 26 and 50 asthma patients per week.

Table 1: Demographic characteristics of participants.

Characteristics	CPs ($N = 28$)	GPs ($N = 32$)
Gender	n (%)	n (%)
Male	13 (46.4)	24 (75)
Female	15 (53.6)	8 (25)
Age groups (years old)	n (%)	n (%)
25–40	18 (64.3)	1 (3.1)
41–55	10 (35.7)	16 (50)
56–70	0 (0)	15 (46.9)
Country of graduation	n (%)	n (%)
Malaysia	20 (71.4)	20 (62.5)
Others	8 (28.6)	12 (37.5)
Postgraduate qualifications	n (%)	n (%)
No	27 (96.4)	19 (59.4)
One	1 (3.6)	12 (37.5)
Two	0 (0)	1 (3.1)

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Table 1: (continued)

Characteristics	CPs (N = 28)	GPs (N = 32)
Years of experience	n (%)	n (%)
5–10	11 (39.3)	3 (9.4)
11–15	8 (28.5)	8 (25)
16–20	6 (21.4)	3 (9.4)
21–25	3 (10.8)	2 (6.2)
26–45	0 (0)	16 (50)
No. of asthma patient seen per week	n (%)	n (%)
1–25	23 (82.1)	16 (50)
26–50	4 (14.3)	16 (50)
51–70	1 (3.6)	0 (0)

Knowledge Assessment

Table 2 shows the number and percentage of respondents (CPs and GPs) who correctly answered the questions in the knowledge assessment domain. Apart from knowledge of spirometry and PEF as a diagnostic method for asthma, whereby CPs had more accurate answers than GPs, there was no substantial difference in the knowledge assessments in both groups.

Table 2: Number and percentage of the participants who answered knowledge questions correctly.

No	Question	CPs n (%)	GPs n (%)	^a p-value
1	Classification of asthma, according to severity, is the most appropriate classification currently.	3 (11)	3 (9)	0.530
2	Diagnostic tool for asthma:			
	a. Medical history	17 (61)	25 (78)	0.145
	b. Chest X-ray	23(82)	31 (97)	0.060
	c. Symptoms	23 (82)	20 (63)	0.095
	d. Spirometry and PEF	21 (75)	12 (38)	0.014
	e. Laboratory examination	25 (82)	32 (100)	0.060
3	Most common symptom of asthma:			
	a. SOB	20 (71)	20 (63)	0.468
	b. Wheezing	26 (93)	27 (84)	0.311
	c. Coloured sputum	23 (82)	31 (97)	0.077
	d. Excessive mucus production	16 (57)	19 (59)	0.862
	e. Limitation of activity	12 (43)	21 (66)	0.116

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Table 2: (continued)

No	Question	CPs n (%)	GPs n (%)	^a p-value
4	The drug of choice for quick relief of symptoms is rapid-acting β 2 agonists.	27 (96)	32 (100)	0.285
5	If the patient does not respond to inhaled rapid-acting β 2 agonists alone, the next step is to add inhaled long-acting β 2 agonists.	16 (57)	18 (56)	0.495
6	The drug of choice for patients with moderate asthma is oral long-acting β 2 agonists.	6 (21)	14 (44)	0.018
7	Leukotriene modifiers are considered an excellent alternative to other therapeutic options.	20 (71)	20 (63)	0.085
8	Oral corticosteroids are considered the treatment of choice for asthma exacerbations.	23 (82)	23 (72)	0.697
9	Spirometry has a more prominent role than PEF in the detection of asthma variability.	4 (14)	15 (47)	0.003
10	Spirometry can be used after the patient starts the treatment regimen to assess the efficacy of the medication.	25 (89)	24 (75)	0.693

Note: ^abold text shows significant result.

Practice

Table 3 revealed the practice of both practitioners. The GPs displayed a better clinical practice as compared to the CPs in terms of asthma management and control. The practice questions revealed that the GPs tailor the medication schedule to match the patient's condition and daily routine ($p < 0.001$) more than the CPs do, thus decreasing the complexity of the regimen. GPs have more experience engaging with patients, identifying their triggering factors for asthma, and providing prescription instructions. GPs are much more likely to prescribe medication based on the severity and management of a patient's asthma, as well as a long-term treatment plan compared to CPs. CPs, on the other hand, is more likely than GPs to identify environmental variables as asthma causes.

Guideline Adherence

Represented in Figure 1, the GPs (71.1%) adhered to practice guidelines better than the CPs (46.4%). Despite this, only 57% of the 23 GPs who claimed to refer to guidelines were able to state which guidelines they were using in practice. The Global Initiative for Asthma guidelines are followed by most of the GPs, as shown in Table 4.

Table 3: Response of respondents to questions on practice domain.

No	Item	Group	Never n (%)	Rarely n (%)	Occasionally n (%)	Very often n (%)	Always n (%)	Mean	Sig ^a
1	Do you tailor the medication schedule to the patient's conditions and daily routine, thus decreasing the complexity of the regimen?	CPs	2 (1.7)	6 (21.4)	11 (39.3)	7 (25)	2 (7.1)	3.04	p < 0.001
		GPs	0 (0)	0 (0)	6 (18.8)	19 (59.4)	7 (21.9)	4.03	
2	Do you give written instructions to the patient about his/her medications?	CPs	3 (10.7)	4 (14.3)	10 (35.7)	5 (17.9)	6 (21.4)	3.25	<i>p</i> = 0.27
		GPs	0 (0)	4 (12.5)	12 (37.5)	8 (25)	8 (25)	3.63	
3	Do you educate the patient on how to use the inhalers?	CPs	0 (0)	1 (3.6)	2 (7.1)	11 (39.3)	14 (50)	4.36	<i>p</i> = 0.26
		GPs	0 (0)	0 (0)	1 (3.1)	11 (34.4)	20 (62.5)	4.59	
4	Do you communicate with the patient to find out the triggers of his/her asthma symptoms?	CPs	0 (0)	0 (0)	10 (35.7)	13 (46.4)	5 (17.9)	3.82	p < 0.05
		GPs	0 (0)	0 (0)	6 (18.8)	13 (40.6)	13 (40.6)	4.22	
5	Do you give instructions to the patient on what to do when his/her symptoms worsen?	CPs	0 (0)	1 (3.6)	4 (14.3)	15 (53.6)	8 (28.6)	4.07	p < 0.05
		GPs	0 (0)	0 (0)	2 (6.2)	10 (31.2)	20 (62.5)	4.56	
6	Do you prescribe medications according to the degree of asthma control?	CPs	4 (14.3)	2 (7.1)	6 (21.4)	11 (39.3)	5 (17.9)	3.39	p < 0.001
		GPs	0 (0)	0 (0)	2 (6.2)	10 (31.2)	19 (59.4)	4.50	
7	Do you prescribe medications according to the degree of asthma severity?	CPs	4 (14.3)	3 (10.7)	6 (21.4)	9 (32.1)	6 (21.4)	3.36	p < 0.001
		GPs	0 (0)	0 (0)	2 (6.2)	12 (37.5)	18 (56.2)	4.50	
8	Do you have a long-term therapeutic plan for the patient?	CPs	4 (14.3)	7 (25)	9 (32.1)	6 (21.4)	2 (7.1)	2.82	p < 0.001
		GPs	1 (3.1)	0 (0)	8 (25)	15 (46.9)	8 (25)	3.94	
9	How significant: Are environmental factors as triggers of asthma symptoms?	CPs	Not at All significant	Barely significant	Moderately significant	Very significant	Extremely significant		p < 0.05
		GPs	0 (0)	0 (0)	1 (3.6)	18 (64.3)	9 (32.1)	4.29	
			0 (0)	0 (0)	11 (34.4)	7 (53.1)	4 (12.5)	3.78	

Note: ^abold text shown significance result.

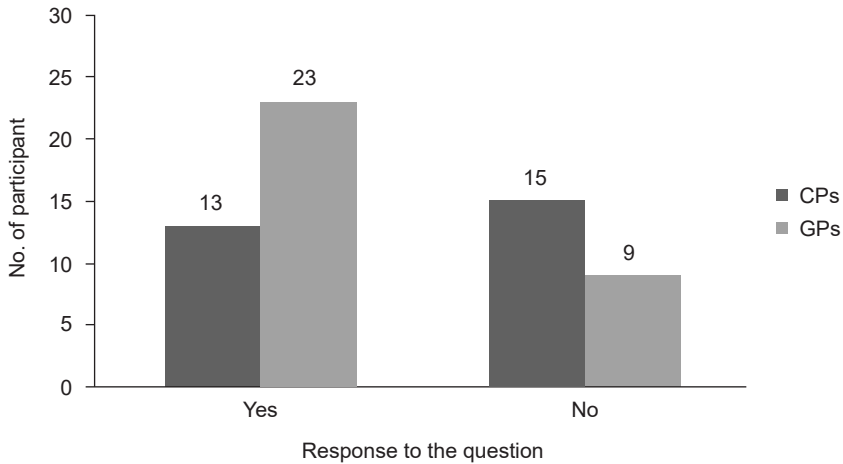


Figure 1: Participants response regarding adherence to a guideline.

Table 4: The number and percentage of respondents who were able to identify the guideline to which they claimed to adhere correctly.

	CPs n (%)	GPs n (%)
Malaysian guidelines	1 (7.7)	4 (17.4)
Global Initiative for Asthma guidelines	0 (0)	7 (30.4)
Others	0 (0)	2 (8.7)
Not mentioned	12 (92.3)	10 (43.5)

DISCUSSION

The study has revealed the knowledge, practice and adherence to guidelines of both CPs and GPs. The findings from this study indicate that most CPs and GPs were either not aware of or non-adherent to the Global Initiative for Asthma guidelines because they were more inclined to the classification of asthma patients based on severity rather than clinical control. The Global Initiative for Asthma Executive Committee recommended revising the Global Strategy for Asthma Management and Prevention to emphasise asthma management based on clinical control, rather than the classification of the patient by using severity (Bateman *et al.* 2008; Global Initiative for Asthma 2007; Koshak 2007).

In this study, the majority of both participants (82% of CPs and 97% of GPs) displayed excellent knowledge that X-ray is not an essential tool for the diagnosis of asthma. This is good because an accurate diagnosis of asthma is the most crucial step towards achieving proper treatment or control. On the contrary, a study in Iran regarding Paediatricians' Knowledge on Asthma Management in children (Gharagozlou *et al.* 2008) revealed poor knowledge. The majority of them reported using chest X-ray as a primary diagnostic tool. Attempting to diagnose with unsuitable medical equipment is a waste of time and resources.

Measuring lung function using spirometry and PEF is vital for the initial diagnosis and monitoring of asthmatic patients. These are recommended by both Global Initiative for Asthma (2010) and British Guidelines (2009) to be used as the first step directly after the identification of main asthma symptoms in patients (Global Initiative for Asthma 2010; Levy *et al.* 2009). The majority (75%) of the CPs accepted using spirometry and PEF as a primary diagnostic tool. Surprisingly, most GPs (62%) claimed that using spirometry and PEF in asthmatic patients is not an essential diagnostic tool. Lack of knowledge of such critical diagnostic details would almost certainly result in inadequate asthma control.

Understanding the central role of lung function tests is the initial step for optimal utilisation of this tool to get the best in patient diagnosis and monitoring. Spirometry is the recommended method of measuring airflow limitation and reversibility to establish a diagnosis of asthma (Pellegrino *et al.* 2005). PEF measurement is also an essential aid in both diagnosis and monitoring of asthma patients. It is performed using a PEF meter to detect the variability of lung function (Reddel, Marks and Jenkins 2004). We found that both CPs and GPs showed insufficient knowledge about the fundamental role of both spirometry and peak expiratory flow. Only 14% of CPs and 45% of GPs knew the correct answer. This indicates the need to increase the level of knowledge of the healthcare team regarding the use of spirometry to improve patient diagnosis and monitoring.

Clinical diagnosis of asthma is greatly influenced by symptoms like breathlessness, wheezing, cough and chest tightness (Global Initiative for Asthma 2017). The knowledge of the main symptoms of asthma by the two leading healthcare team members is crucial. Knowing the main diagnostic signs is essential, not only in the initial diagnosis of previously undiagnosed patients but also in monitoring the effectiveness of their treatment.

Almost half of the participants (43% of CPs and 41% of GPs) in this study asserted that excessive sputum production is an essential symptom of asthma. However, excessive mucus production is not considered a necessary symptom of asthma (Juniper *et al.* 1999; Luppi *et al.* 2009). But instead, it is mainly associated with chronic obstructive pulmonary disease, while asthma is primarily combined with a dry cough.

In this study, 50% of the CPs and 66% of GPs did not identify activity limitation as an essential symptom of asthma. The findings of this study are not consistent with the research conducted by Juniper *et al.* (1999), where the asthma clinicians ranked limitation of patient activity as the second most prominent symptom. In addition, the Global Initiative for Asthma (2010) mentioned that limitation of daily patient activity is one of the main signs of uncontrolled asthma, which indicates that the patient will need more treatment. It is clear that CPs and GPs who answered this questionnaire seem to know the most prominent asthma symptoms, but they do not know the level of importance of each symptom. Some symptoms are crucial during the initial diagnosis and detection of the level of asthma control, while other symptoms are not crucial at this stage.

To evaluate the adherence of participants to asthma treatment guideline, the trend of the selection of monotherapy as first-line treatment was assessed. Some (43%) of the pharmacists and GPs (44%) chose long-acting B₂ agonists as initial monotherapy. This is contrary to the recommendations of Global Initiative for Asthma (2017), which recommends starting therapy with an as-needed short-acting β -2 agonist. This signifies that nearly half of the participants may place their patients on the wrong initial treatment. This may be a

reason for the reported number of suboptimal asthma control in many patients worldwide, despite the availability of effective therapies, as mentioned in WHO reports and several other studies (Chapman *et al.* 2008; FitzGerald *et al.* 2006; Rabe *et al.* 2004).

Patient education is a critical factor in the use and misuse of medication inhalers. Inhalers represent advanced technology that is considered the route of administering medications used in asthma treatment (Price *et al.* 2013). Even though inhalers are easy to use, many patients and clinicians do not receive adequate training (Fink and Rubin 2005) on their use. Inappropriate use of inhalers may be one of the leading causes of inadequate treatment, leading to worsening of the patient's asthma. In this study, most (91%) of the participants always provide adequate patient education.

Most (75%) of GPs always provide their patients with a therapeutic plan that entails detailed instructions, while most CPs occasionally or never do that. It is clearly shown that the contribution of both CPs and GPs in formulating a written therapeutic plan for asthmatic patients markedly increases the level of asthma control and enhances patient compliance (Gibson *et al.* 2002; Saini *et al.* 2008).

Limitations of this study may include the relatively small sample size due to the low response rate, the cross-sectional design, the short time through which the research was conducted, and the response being taken by mail instead of a direct interview or email. Future studies should either use direct interviews or self-collect filled questionnaires rather than use self-returned couriers to achieve a better response rate. Other possible ways to improve the response rate in future may include the use of online surveys.

It is also worth noting that because GPs and CPs self-report their adherence rates, they may not reflect real practitioner adherence or non-adherence to the guidelines. The findings of this study will facilitate the development of an asthma management education module for professionals.

CONCLUSION

In conclusion, the participants' knowledge level and clinical practice demonstrate that most of them were not strictly adhering to the most recent guidelines upon which the questionnaire was constructed. This, in turn, may lead to suboptimal asthma control. Therefore, there is a need to provide the primary healthcare team members, handling asthma patients, with educational programmes to raise their level of knowledge, improve their practice and increase their understanding of the importance of guidelines adherence.

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