Original Article

Knowledge about bronchial asthma management in primary health care physicians in Al-Khobar City, Saudi Arabia

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ABSTRACT

Context: The prevalence of bronchial asthma (BA) is increasing in the Kingdom of Saudi Arabia. Primary health care (PHC) centers follow the national protocol, which is based on the severity of the disease for the management of asthma. The Saudi initiative for asthma (SINA) management adopted from the global initiative for asthma guidelines, which was recommended by several recent studies, is based on the control level of asthma. **Aims:** To assess the knowledge of PHC physicians and family medicine (FM) residents in Al-Khobar, about the management of BA. **Methodology:** A cross-sectional study was conducted in all PHC centers and the university FM clinic in Al-Khobar. All PHC physicians and 3rd and 4th year FM residents were included in the study. A self-administered questionnaire developed according to SINA guidelines was used to assess theoretical knowledge of BA, and a predesigned checklist was used to assess the different inhaler techniques. Scoring was established and collected data were analyzed. **Results:** Only 8% of the sample had good theoretical knowledge of BA; 41% had poor knowledge. The knowledge of the residents was better than that of the PHC physicians. The mean knowledge score was significantly better among those using guidelines compared to the rest. About 23% had good knowledge of inhaler techniques. Knowledge of PHC physicians and FM residents about dry powder inhalers was deficient, and PHC physicians had little knowledge of metered dose inhalers with spacers. **Conclusion:** The knowledge of physicians about the management of BA was deficient. The national guidelines based on the level of control for asthma management should be updated and physicians given periodic training.

Key words: Bronchial asthma, devices, primary health care

INTRODUCTION

Bronchial asthma (BA) is a major health issue worldwide. It affects more than 2 million people in Saudi Arabia.[1] Although the major goal in BA is disease control rather than cure, achieving that goal is still a problem. Physicians are firmly committed to educating their patients about the disease and how to control it.[2] The majority of the ambulatory care of BA is provided by primary health care (PHC) physicians. Thus, the knowledge of the systemic nature of the disease of these physicians should be assessed. It is also vital to provide them with continuing postgraduate education about risk factors, diagnosis, management, and control of the disease.[3,4] Physicians' knowledge about different inhalation systems and their techniques is essential for effective patient education. Therefore, it is recommended that primary care doctors be given special training for the handling of inhalation therapy.[5]

Asthma was previously subdivided according to the severity: Intermittent, mild persistent, moderately persistent, or severe persistent. Subdividing the severity of BA is no longer recommended as severity has a limited value when used as an outcome measurement for predicting the treatment to be used and the response to that treatment. Instead, the advice is to manage according to the level of control.[6,7]

A recent survey in Saudi Arabia concluded that asthma control is still of major concern in our population, as only 5% were controlled, 31% were partially controlled, and 64% were uncontrolled.[8] There could be a variety of reasons for this; both doctor-related or patient-related. Several factors help in categorizing asthma control into controlled, partially controlled and uncontrolled. These include the frequency of symptoms, night-time wakefulness, effect on daily activity, relievers use, pulmonary function, and exacerbations. A validated asthma questionnaire like the asthma control test (ACT) helps to categorize asthma control into different levels namely: Controlled, partially controlled, and uncontrolled.[9,10]

Moreover, achieving control and deriving any benefit from medications may be inhibited as a result of poor inhaler technique.[11,12] It was found in the UK that 75% of emergency asthma admissions, that cost the national health service £61 million a year, can be avoided with effective management and routine care. The need to improve inhaler technique has, therefore, been recognized internationally.[13] The wide disparities and inequity of care by physicians to their patients were perhaps the result of the lack of a national protocol to assess inhaler techniques. Consequently, a protocol was developed to help assess inhaler techniques of asthma patients based on the UK national, and international guidelines.[14] Studies showed that most patients failed to use their inhalers correctly even after instruction. Inhaler technique should, therefore, be routinely rechecked.[15-18] Checking and assessing the technique are essential to avoid unnecessary increases in dose and optimize the level of control. This ensures that the maximum amount of drug is deposited in the lungs.[12]

Saudi initiative for asthma (SINA) was found in Saudi Arabia in 2009 based on two existing international guidelines developed by the global initiative for asthma (GINA) and the National Asthma Education and Prevention Program (NAEPP).[7,19-22] SINA is based on the level of asthma control rather than severity.[20] Therefore , the investigators were interested in assessing and comparing the theoretical and practical knowledge of PHC physicians, and 3rd and 4th year family medicine (FM) residents, about BA according to SINA guidelines, and determine the need for training.

Specific objectives

To assess the theoretical knowledge of PHC physicians and FM residents regarding the management of BA and the techniques used for the different inhalers, and to identify some of the factors associated with knowledge.

METHODOLOGY

Study design and setting

A cross-sectional study was conducted in all eight PHC centers of Al-Khobar and the university FM clinic.

Study population

Fifty PHC physicians and 24 FM residents who had completed their training in internal medicine and pediatrics.

Sampling methods

All male and female general practitioners working in PHC centers in Al-Khobar city and 3rd and 4th year FM residents were included in the study.

Methods of data collection

A self-administered questionnaire was developed according to SINA guidelines[9] to assess the theoretical knowledge of physicians about BA. It included sociodemographic data, work experience, questions about diagnosis, management, inhaler technique, and control of BA. The questionnaire was revised and validated by FM, internal medicine and pediatrics health professionals. Their techniques of handling different inhalers (metered dose inhaler [MDI], MDI with spacers and DPI) were assessed by observing each physician, following a predesigned checklist. The observation of their performance was done before the assessment of their theoretical knowledge. Each correct answer was given a score of 1, and an incorrect answer, a score of 0. The total knowledge score was calculated by summation of scores.

Pilot study

A pilot study was conducted on 1st year FM residents to assess the clarity of the questionnaire and the time needed to complete it, and modifications were made accordingly.

Ethical considerations

Administrative approval was obtained from the Al-Khobar health directorate. Physicians were invited to participate in the study after the objectives were explained. They were reassured of the confidentiality of the collected information.

Data processing and analysis

Collected data were verified and analyzed by statistical package Statistical Package for Social Science (SPSS) Version 16 (SPSS Inc. Released 2007. SPSS for Windows, Chicago). A descriptive analysis of the data was done and presented in tables and figures. For qualitative analysis, the Chi-squared test was used. Fisher's exact P was considered if >25% of the cells had an observed frequency of less than 5. For quantitative analysis, an independent t-test, one-way ANOVA and least significant difference (LSD) were used. The level of significance was taken as $P < 0.05$.

The level of knowledge and performance was considered good if the score was more than 80% of the total, and poor if the score was less than 60%. Scores in between were considered fair. For the performance on inhaling instructions, a score of more than 60% of the total score was considered satisfactory for each device.

RESULTS

Seventy-four physicians were included in the study, giving a response rate of 98.3%; 68% were PHC physicians, and 32% were FM residents. The mean age of the study physicians was 34.5 ± 9.7. About 66% of them were females and majority were Saudi (73%). About 59.9% physicians who had had previous training on different inhalers. About 46% of the study sample did not follow any guidelines in their management, 13.5% followed the national asthma protocol, and only 8% followed SINA. Only 13.5% were asthmatics, and 29.7% had a first degree relative with a history of BA. The mean number of years of experience was 8.3 ± 9.7. The mean number of patients/doctor/day was 34.3 ± 16.6, while the mean number of asthma patients seen in the month before the interview by each physician was 10.7 ± 11.2.

Figure 1 shows that physicians' level of knowledge was considered good in only 8% of the study sample, and 41% had poor knowledge. It was found that the knowledge of the residents was better than that of the PHC physicians. Fifty percent of the PHC physicians had poor knowledge compared to 20.8% of the FM residents, and the difference was statistically significant (Fisher's exact $P = 0.039$).

Table 1 demonstrates that the mean knowledge score of the FM residents was better than the mean knowledge score of the PHC physicians (17 ± 2.8 and 14.5 ± 3.5,
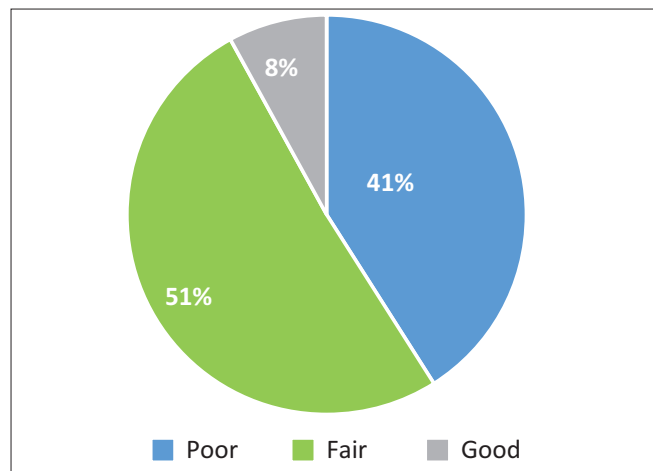
respectively), and the difference was statistically significant. The mean knowledge score was also better in those who used guidelines than those who did not (16.2 ± 3.1 and 14.3 ± 3.6, respectively), and the difference was statistically significant.

Table 2 shows that the mean knowledge score of the physicians who followed the GINA guidelines was higher (17.37) than those who followed the national protocol (15.3).

Table 3 reveals that more years of experience led to better knowledge (LSD between good and poor knowledge = 0.013 and between good and fair knowledge = 0.031). Physicians with good knowledge had about 17.3 years of experience, while those with fair and poor knowledge had about 8.3 and 6.6 years of experience, respectively. The difference was statistically significant.

Table 1: Mean knowledge score of physicians by background

Background information	Physicians (n=74)				
	Number	%	Mean	SD	*T*-test *P*
Gender					
Male	25	33.8	15.52	3.831	0.696
Female	49	66.2	15.18	3.302	
Doctors physicians					
Primary health care	50	67.6	14.50	3.507	0.004
FM residents	24	32.4	16.96	2.774	
Previous training about inhaler use					
Yes	44	59.5	15.82	3.425	0.118
No	30	40.5	14.53	3.441	
Guideline use					
Yes	40	54.1	16.15	3.126	0.021
No	34	45.9	14.29	3.623	
Personal history of BA					
Yes	10	13.5	15.30	3.020	0.998
No	64	86.5	15.30	3.553	
First degree relative with history of BA					
Yes	22	30	14.73	3.820	0.361
No	52	70	15.54	3.316	

SD: Standard deviation; BA: Bronchial asthma; FM: Family medicine

Table 2: Mean knowledge score of physicians by use of BA guidelines

Guideline	Number	Mean	SD	One-way ANOVA *P*
SINA	6	13.67	2.733	0.053
GINA	19	17.37	3.148	
National protocol	10	15.30	2.669	
Others	5	16.20	2.683	
Total	40	16.15	3.126	

SINA: Saudi initiative for asthma; GINA: Global initiative for asthma; BA: Bronchial asthma

Figure 1: Level of physiciansæ knowledge about bronchial asthma

The mean knowledge score of FM residents was better than that of PHC physicians on the management of BA especially on the use of short-acting inhaled β2 agonists, use of long-acting inhaled β2 agonists, asthma control medications, and salbutamol pediatric dose [Table 4]. The mean knowledge score of FM residents on BA control was better than that of PHC physicians. Knowledge was deficient on the components of ACT, assessment of asthma control level by means of the ACT, long-term management for asthma patients without symptoms between attacks, and influenza vaccination for asthmatics.

Table 3: Mean age, years of experience and number of patients by level of physician's knowledge

	Number	Mean	SD	One-way ANOVA *P*
Age (years)				
Poor	30	33.13	8.697	0.069
Fair	38	34.18	8.825	
Good	6	43.00	15.723	
Experience after internship (years)				
Poor	30	6.6333	8.57968	0.045
Fair	38	8.2632	8.70965	
Good	6	17.3333	16.39105	
Average number of patients/doctor/day				
Poor	30	38.37	16.633	0.193
Fair	38	31.97	16.970	
Good	6	28.33	11.255	
Number of asthmatics seen last month				
Poor	30	11.97	12.104	0.121
Fair	38	8.53	9.282	
Good	6	17.83	15.753	

SD: Standard deviation

Table 4: Mean knowledge scores of PHC physicians and FM residents

	PHC and residents	Number	Mean	SD	*P* of *t*-test
Total knowledge score	PHC	50	14.50	3.507	0.004
	Residents	24	16.96	2.774	
Diagnosis score	PHC	50	2.02	0.714	0.064
	Residents	24	2.33	0.565	
Management score	PHC	50	6.04	2.010	0.031
	Residents	24	7.08	1.666	
Knowledge about inhaler use score	PHC	50	3.12	1.507	0.170
	Residents	24	3.62	1.377	
Control score	PHC	50	3.32	1.203	0.048
	Residents	24	3.92	1.176	

PHC: Primary health care; FM: Family medicine; SD: Standard deviation

Figure 2 illustrates that the performance of 57% of the study sample in giving instructions for different inhalers was poor. However, only 23% of the physicians showed good performance.

Figure 3 shows that residents were better than PHC physicians in giving instructions for the use of all types of inhalers (83.3% and 24%, respectively). However, both groups were deficient in giving instructions on the use of DPI, as less than 60% of the physicians used DPI satisfactorily.

Table 5 shows that all physicians were deficient in giving instructions on all the steps of using DPI, standing up to use MDI, as well as checking expiry date.

Moreover, PHC physicians were deficient in instructing patients to breathe out gently away from the MDI inhaler prior to using it, and hold the breath for up to 10 s after using it. They were also deficient in giving instructions on all the steps for using MDI with spacer. The difference between PHC physicians and FM residents was statistically significant.

DISCUSSION

In a survey done in Saudi Arabia in 2008 about level of asthma control, it was found that only 5% were controlled, 31% were partially controlled, and 64% were uncontrolled.[8] A comparison of these results to the level of control in 5 European countries, revealed that in 2010, the proportion of treated asthma patients assessed as not being well-controlled was 53.5%.[23] In a recent Polish study in 2012, an assessment of the level of asthma control among asthma patients using the ACT showed that the condition was fully controlled in 9% of the patients, 34% were partially controlled and 57% were uncontrolled.[24]
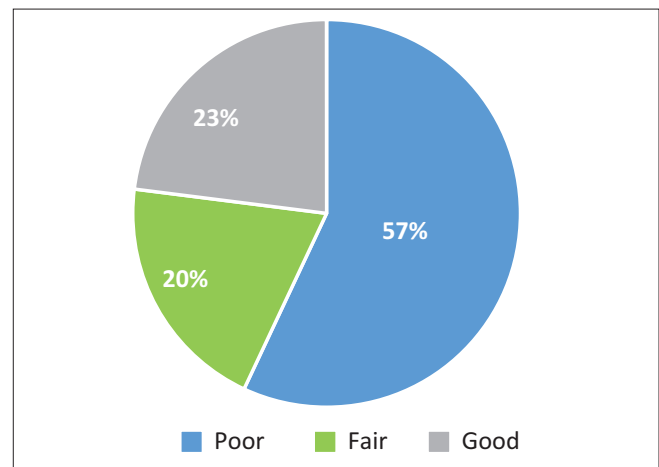

Figure 2: Physicians' performance in giving instructions for inhalers

Table 5: Distribution of correct instructions for inhaler use by PHC physicians/FM residents

Steps of inhaler use	Correct instructions (%)		Total number (%)	Chi-square *P*
	PHC number	Residents number		
MDI				
Checking expiry date	4 (8)	10 (41.7)	14 (18.9)	0.001
Standing up	7 (14)	14 (58.3)	21 (28.4)	0.000
Removing cap and shaking the inhaler	37 (74)	23 (95.8)	60 (81.1)	0.028
Gently breathing out away from inhaler	24 (48)	24 (100)	48 (64.9)	0.000
Sealing lips tightly around the inhaler mouthpiece	39 (78)	24 (100)	63 (85.1)	0.013
Pressing the inhaler and at the same time beginning to take a slow deep breath	44 (88)	24 (100)	68 (91.9)	0.168
Holding breath for up to 10 s after using the inhaler	26 (52)	23 (95.8)	49 (66.2)	0.000
Metered dose inhaler with spacer				
Shaking the inhaler five or 6 times	10 (20)	23 (95.8)	33 (44.6)	0.000
Removing mouthpiece cover and placing the spacer over the mouthpiece at the end of the inhaler	29 (58)	23 (95.8)	52 (70.3)	0.001
Placing the mask over the child's nose and mouth so that it makes a seal with the face	25 (50)	23 (95.8)	48 (64.9)	0.000
Squeezing the top of the canister once	27 (54)	23 (95.8)	50 (67.6)	0.000
Holding the mask in place and allowing the child to breathe in and out slowly for 10 s or six breaths	16 (32)	22 (91.7)	38 (51.4)	0.000
DPI				
Twisting the cover off	19 (38)	14 (58.3)	33 (44.6)	0.100
Twisting the base grip to the right as far as it will go	17 (34)	14 (58.3)	31 (41.9)	0.047
Twisting it back to the left till a click is heard	16 (32)	14 (58.3)	30 (40.5)	0.031
Bringing the inhaler to the lips in a horizontal position	19 (38)	13 (54.2)	32 (43.2)	0.189
Putting the lips over the tube and taking a quick deep breath	19 (38)	12 (50)	31 (41.9)	0.327

DPI: Dry powder inhaler; MDI: Metered dose inhaler; PHC: Primary health care; FM: Family medicine
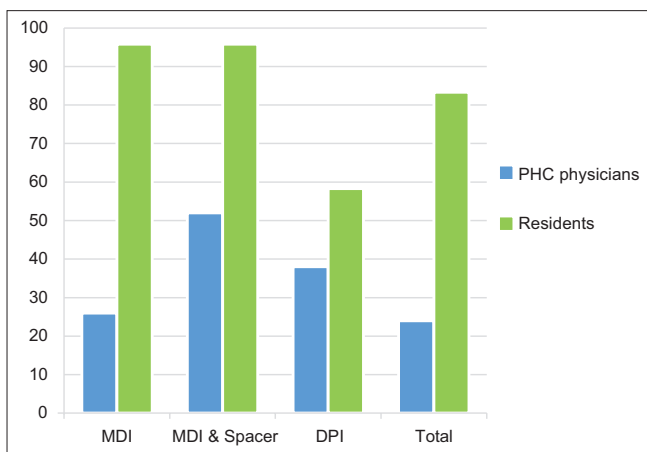

Figure 3: Satisfactory performance of physicians in giving instructions for each asthma device

In Saudi Arabia, the current (latest edition 2003) recommended asthma protocol by the Ministry of Health (national protocol for the management of asthma) is based on severity classification.[25]

Global initiative for asthma, first published in 2002, subdivided asthma by severity into four subcategories (intermittent, mild persistent, moderate persistent, and severe persistent). In 2006, there was an important shift in asthma management in the GINA guidelines. The approach, which was more practical, was to place an emphasis on assessing, treating, and monitoring asthma patients based on their level of control rather than on the severity.[26]

In 2009, the establishment of the SINA guideline was based on two existing guidelines, GINA and NAEPP, and customized to the current setting in Saudi Arabia and local literature.[7,20,21,22] The management of asthma according to SINA guidelines is, therefore, based on the level of control, not on severity.[20] In the current study, only 8.1% of the study sample used the SINA guidelines. Regarding the level of knowledge, 8% had good knowledge of the management of BA. The knowledge of the physicians who used the GINA guidelines was found to be better than those who used the national protocol for the management of asthma.

Good knowledge of inhaler techniques was noticed in 23% of the study physicians. All physicians were noted to be deficient in giving instructions on all steps of DPI use since this medication is not commonly prescribed in the primary care set-up [Table 5]. In addition, FM residents had a better knowledge score on the instructions for MDI with spacer than the PHC physicians. The reason for this may be the unavailability of spacers in the primary care centers. In comparison, in 2011, a Turkish study using a

different method of assessment concluded that only 18.5% of the physicians involved had adequate knowledge of inhaler devices and proper administration techniques.[27] Another study in Spain assessed the physicians' techniques of handling different systems of inhalation (pressurized cartridge, pressurized cartridge with spacing chamber, Turbuhaler, and Accuhaler) and concluded that only 9.7% of practicing primary care doctors and 4.8% of family and community residents performed the techniques of the four systems correctly.[5]

In-service training had no significant effect on the theoretical knowledge of the study physicians in comparison with physicians who had had no in-service training. This result could be because the physicians were being trained according to the national protocol for the management of asthma while the current study knowledge assessment is based on SINA guidelines. However, it was found that those who had had in-service training on the management of BA had better knowledge score about inhaler use, especially on the steps in using MDI with spacers. This may be the fact that the national protocol for asthma management includes instructions on the use of inhalers. The mean knowledge score of FM residents was better than that of PHC physician on the management of BA. A possible reason is that FM residents had mandatory additional training in internal medicine and pediatrics during their postgraduate residency program. The mean knowledge score of FM residents on BA control was better than that of PHC physicians. This could be due to the fact that the assessment of asthma management was based on the level of control that follows SINA guidelines rather than the national protocol used by the Ministry of Health [Table 4].

CONCLUSION

The primary care physicians have very poor knowledge about the management of bronchial asthma. Only 33.7% of the study physicians used either SINA or GINA in which the management is based on the level of asthma control since the Ministry of Health currently recommends the national protocol, based on severity of disease for asthma management. Performance of both PHC physicians and FM residents on the use of dry powder inhaler was unsatisfactory. Furthermore, the performance of PHC physicians on the use of MDI with spacer was unsatisfactory.

Recommendations

A national asthma education program for physicians is highly recommended to improve their knowledge about BA. Since many reviews have indicated that guidelines based on control assessment are more reliable than those based on the assessment of severity, we advocate the adoption of these guidelines. A national guideline which is annually and routinely updated according to our physicians and patients needs should be established or adapted from SINA and the national protocol for asthma management. Periodic assessment of inhaler techniques of physicians is also recommended.

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