International Journal of Pharmacology

Assessment of Inhaler Technique in Patients Attending a Chest Hospital in Riyadh City

M.I. Al-Hassan
Department of Clinical Pharmacy, College of Pharmacy,
King Saud University, P.O. Box 2457, Riyadh-11451, Saudi Arabia

Abstract: The study population consisted of patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD), who were maintained on MDIs. The data was collected through structured questionnaire on demographic data, patient information characteristics and possible factors that might affect proper MDI utilization and scoring system to assess the technique. The results obtained demonstrated defective use of MDIs, which warrants education of the society and public awareness. Health professionals, including pharmacists should be well prepared to train the patients for their correct use. The present study concludes that most patients use the inhalers incorrectly. Thus, education of the society is an important factor that may increase public awareness about medication and therefore improve patient compliance. More studies are needed to assess health professionals' knowledge about use of inhalers and role of pharmacists in teaching patients their proper use.

Key words: Metered dose inhalers, improper use, pharmacists, teaching, public awareness

INTRODUCTION

Metered Dose Inhalers (MDIs) are used to administer medication to patients with reversible diffuse airways obstruction. Their main advantage is that drugs can be delivered directly to the airways avoiding the side effects associated with oral therapy (Dhand and Guntur, 2008; Kleinstreuer et al., 2008). However, in actual pulmonary clinical practice, the majority of patients were unable to use MDIs correctly (Melani, 2007; Self et al., 2007; Khassawneh et al., 2008; Restrepo et al., 2008).

Earlier studies demonstrated that the scope of non-compliance with prescribed medication is rampant in majority of the patients (Bonner and Carr, 2002) that results in drug-related emergencies (Kimberlin et al., 1993). Of the many attributes associated with patient non-compliance and thus drug misuse, misunderstanding of directions by patients has been implicated as a frequent problem. The non-compliance and misuse is observed to be more rampant in case of MDIs. Notwithstanding the importance of MDIs and lack of patient/public awareness on their proper use, this problem has not been studied fully in Saudi population. The aim of this study was to evaluate patients' improper handling of inhaler devices, investigate different factors that might contribute to non-compliance and scope of inducting awareness on proper use by education.

MATERIALS AND METHODS

The study population consisted of all ambulatory patients attending the outpatient clinic in a chest hospital in Riyadh City, during the study period (16 June, 2008 to 30th July 2008). All patients who were diagnosed with Chronic Obstructive Pulmonary Disease (COPD) and maintained on MDIs were included. Data was then collected through a structured questionnaire. A pilot study was performed on 10 patients and the questionnaire was subsequently revised.

The questionnaire consisted of three parts. The first part consisted of demographic data, such as sex, age group, level of education, work, smoking habits, relatives' data on using inhalers and the second part included patient information characteristics and possible factors that might affect proper MDI utilization. The third part consisted of a scoring system to assess the different steps of the use of MDI techniques (Table 1).

Patients were interviewed by a trained pharmacist in the out patient area of the hospital and were asked to demonstrate how they use their inhalers. The administration technique used by each patient was observed and evaluated by the adopted scoring system. Each performed step of the scoring system was

Table 1: Scoring system for assessing inhaler technique

Steps	Inhaler techniques
1	Shake the inhaler before use
2	Hold the inhaler up-right
3	Title head slightly back
4	Place lips tightly over mouth piece
5	Exhale
6	Inhale slowly
7	Actuate inhaler at start of inhalation
8	Hold breath as long as you feel comfortable
9	Leave time before next puff

given a value of one, whereas, non performed step was given a value of zero.

The collected data were analyzed and one way Analysis of Variance (ANOVA) was used to detect statistical differences, if any, between Mean scores of groups and fishers Least Significant Difference (LSD) multiple comparison test was utilized.

RESULTS AND DISCUSSION

One hundred patients were involved in this study (59 males and 41 females) with mean age of 37±14 years (Table 2). Mean score for all patients was 3.2±1.7 out of possible score of 9, with only 20% of patients scored more than 50% of the total score of 9 and no single patient could get full score of 9 (Table 4). Analysis of performance of each individual step, necessary for the proper use of MDI showed low mean score of almost all the 9 steps except steps No. 1, 2 and 3 (shake the inhaler before use, hold the inhaler upright and place lips lightly over mouth piece).

Analysis of variance (One way ANOVA) showed that there is a significant difference between mean scores of patients with different levels of education (p = 0.001). Significantly high mean scores of university and high school graduates was detected by Fishers LSD multiple comparison (p = 0.05). Other factors that might affect the use of MDI showed some difference among mean scores but no statistical significance was obtained (Table 3).

The results of this study showed that the mean total score of the whole study population was 3.2±1.7 out of total possible score of nine i.e., around 30% of the total possible score of 9 could be reached, indicating poor compliance among patients using MDI. These results highlight a problem in disease management, because correct use of MDI is particularly important as therapy can be suboptimal if the patient inhaler technique is poor (Self *et al.*, 2007; Mickle *et al.*, 1990; Kritikos *et al.*, 2007). These results are supports the observation of Khassawneh *et al.* (2008).

All steps necessary for proper inhaler use were performed poorly with less than 60% of patients successfully performing each step. The only exception was step 8 with 90% of patients successfully holding inhaler in upright position. This demonstrates overall failure to use the inhaler correctly and hence the majority of the users are deprived of maximal benefits from inhaler therapy, as reported in the literature by Melani (2007) and Self *et al.* (2007).

The most important factor that significantly affected proper use of inhalers was level of education, where

Table 2: Patients demographics

Description	No. of patients	Mean score±SD
Sex		
Male	59	3.4±1.7
Female	41	2.9±1.8
Age group		
15-25 years	20	3.8±1.9
26-40 years	45	2.8±1.3
41-60 years	30	3.4±1.7
>60 years	5	4.5±1.1
Level of education		
University graduate	12	4.2±2.1*
High school graduate	24	4.0±1.8*
Can read	29	2.7±1.2
Cannot read	35	2.7±1.4
Work		
Professional	19	4.4±2.3
Employee	32	2.9±1.2
House wife	30	2.7±1.4
Self employed	8	2.3±1.0
Student	11	3.7±1.8
Smoking		
Yes	5	4.2±2.4
No	95	3.1±1.6
Have relative using inhalers		
Yes	23	3.6±1.9
No	77	3.1±1.6

*Significant difference (p = 0.05). n = 100

Table 3: Patient characteristics related to use of inhalers

Description	Percentage of patients	Mean score±SD
Duration of the use of inhalers		
<1 year	38	3.5±1.8
1-5 years	35	3.0±1.2
6-10 years	20	3.1±2.1
>10 years	7	3.0±1.3
Learning how to use inhalers		
Yes	62	3.5±1.7
No	38	2.8±1.5
Way of learning		
Demonstration	89	3.4±1.7
Leaflet	11	4.2±1.5
Taught by		
Pharmacist	14	4.1±1.4
Physician	79	3.3±1.8
Others	7	3.2±1.6

n = 100

Table 4: Summary of total score and percent of patients

Total score	Percentage of patients
0	1
1	12
2	29
3	28
4	17
5	11
6	4
7	4
8	1
9	0

n = 100

university and high school graduates having highest scores. This finding emphasizes the role of general education to increase public health awareness and to improve compliance towards medication. This observation is restricted to the present study as compared to the reports in the literature on proper use of MDIs.

Consequently, professionals and students, scored higher than other groups as they are supposedly receiving higher education than others. Also, females who were unfortunate to receive as much education as males had lower mean score than their male counterparts. To improve patient awareness and quality of asthma care delivery, the health care professionals must be included in continuing medical education programs and various methods of communications with patients should be used, as reported in the literature by Gupta and Gupta (2001).

Age did not have much impact on mean score, however, it was surprising to find that patients over 60 years old scoring better than all other age groups (4.5±1.1), while patients aged 25-40 years, scored lowest among other groups (2.8±1.3). This might reflect careless attitude towards medication among middle aged patients, while elderly are careful to use inhalers the right way due to severe illness. This might also be applied to smokers who scored better than non smokers. This observation contradicts clinical evaluation done by Allen and Ragab (2002), who found older patients in the age group of 76-94 years are unable to learn to use a MDIs, possibly because of dyspraxia or unrecognized cognitive impairment.

Interestingly, patients who have relatives using inhalers scored better than those who don't have relatives using inhalers. This probably reflects some characteristics of the Saudi society where strong family ties and interpersonal counseling among family members have an impact on patient compliance.

Although, 62% of patients claimed to have learned the proper use of MDIs by health professionals, the mean total score of 3.5±1.7 out of 9 is still a low score. This suggests that health professionals should be absolutely sure that they are teaching MDI technique correctly. This hypothesis might be supported by the observation that 89% of patients population learned the use of inhalers by demonstration and unexpectedly, mean score was low (3.4±1.7) compared by learning inhalers use by leaflets (mean score of 4.2±1.5). Earlier studies Madueno Caro *et al.* (2000) also showed that practical experience concerning inhalation systems is much better than theoretical knowledge.

Majority of patients were educated to use their MDIs by physicians (79%), while pharmacists were involved in only 14%. However, patients instructed by pharmacist were slightly better in using their inhalers (mean score of 4.1±1.4) compared to physicians (3.3±1.8) and other health professionals (3.2±1.6). This suggests that pharmacists should get more involvement in patient counseling. Nevertheless, Chopra *et al.* (2002) showed that medical personnel responsible for teaching the correct use of inhalation devices are lacking in basic knowledge and user skills. This observation supports earlier studies of Guidry *et al.* (1992), who reported that respiratory therapists and nurses are better than physicians in playing a prominent role to instruct patients for the correct use of MDIs. Thus, overall poor performance of patient population suggests that more attention should be paid to instructing health professionals and making sure they are teaching MDI technique correctly.

Number of inhalers didn't have an effect on the proper use of inhalers, however, patients who were using inhalers for more than a year scored lower than those who were newly initiated on inhalers therapy. These observations emphasize the need for continuous check and follow up by health professionals for the right use of inhalers by patients.

The present study concludes that most patients use their inhalers incorrectly. Thus education of the society is an important factor that may increase public awareness about medication and therefore improves patient compliance. It is also concluded from the present study that currently pharmacists are poorly involved in patient education about inhalers use and more involvement by pharmacists is needed to improve patient compliance. Furthermore, health professionals should be well prepared to instruct patients and they should make sure that they are teaching inhaler technique correctly. Hence, continuous follow up by health professionals and checking of inhalers technique is extremely important. Finally, more studies are needed to assess health professionals' knowledge about use of inhalers and the role of pharmacist in teaching patients the proper use of inhalers should be assessed.

REFERENCES

Allen, S.C. and S. Ragab, 2002. Ability to learn inhaler technique in relation to cognitive scores and tests of praxis in old age. Postgrad. Med. J., 78: 37-39.

Bonner, C.J. and B. Carr, 2002. Medication compliance problems in general practice: Detection and intervention by pharmacists and doctors. Aust. J. Rural Health, 10: 33-38.

Chopra, N., N. Oprescu and J. Oppenheimer, 2002. Does introduction of new easy to use inhalational devices improve medical personnel's knowledge of their proper use? Ann. Allergy Asthma Immunol., 88: 395-400.

Dhand, R. and V.P. Guntur, 2008. How best to deliver aerosol medications to mechanically ventilated patients. Clin. Chest Med., 29: 277-296.

Guidry, G.G., W.D. Brown, S.W. Stogner and R.B. George, 1992. Incorrect use of metered dose inhalers by medical personnel. Chest, 101: 31-33.

Gupta, P.P. and K.B. Gupta, 2001. Awareness about the disease in asthma patients receiving treatment from physicians at different levels. Indian J. Chest Dis. Allied Sci., 43: 91-95.

Khassawneh, B.Y., M.K. Al-Ali, K.H. Alzoubi, M.Z. Batarseh, S.A. Al-Safi, A.M. Sharara and H.M. Alnasr, 2008. Handling of inhaler devices in actual pulmonary practice: Metered-dose inhaler versus dry powder inhalers. Respir. Care, 53: 314-315.

Kimberlin, C.L., D.H. Berardo, J.F. Pendergast and L.C. McKenzie, 1993. Effects of an education program for community pharmacists on detecting drug-related problems in elderly patients. Med. Care, 31: 451-468.

Kleinstreuer, C., Z. Zhang and J.F. Donohue, 2008. Targeted drug-aerosol delivery in the human respiratory system. Ann. Rev. Biomed. Eng., 10: 195-220.

Kritikos, V., C.L. Armour and S.Z. Bosnic-Anticevich, 2007. Interactive small-group asthma education in the community pharmacy setting: A pilot study. J. Asthma, 44: 57-64.

Madueno Caro, A.J., P.J. Martin Olmedo, E. Garcia Marti and E. Benitez Rodriguez, 2000. Evaluation of theory-practice knowledge on inhalation systems in primary care physicians, post-graduates in training and undergraduates. Aten. Primaria, 31: 639-643.

Melani, A.S., 2007. Inhalatorty therapy training: A priority challenge for the physician. Acta Biomed., 78: 233-245.

Mickle, T.R., T.H. Self, G.E. Farr, D.T. Bess, S.J. Tsiu and F.L. Caldwell, 1990. Evaluation of pharmacists' practice in patient education when dispensing a metered-dose inhaler. DICP., 24: 927-630.

Restrepo, R.D., M.T. Alvarez, L.D. Wittnebel, H. Sorenson and R. Wettstein, 2008. Medication adherence issues in patients treated for COPD. Int. J. Chron. Obstruct. Pulmon. Dis., 3: 371-384.

Self, T.H., L.B. Arnold, L.M. Czosnowski, J.M. Swanson and H. Swanson, 2007. Inadequate skill of healthcare professionals in using asthma inhalation devices. J. Asthma, 44: 593-598.