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RESEARCH ARTICLE

The Effect of Patients' Knowledge on Asthma and COPD Diseases to Salbutamol Metered Dose Inhaler (MDI) Technique

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ABSTRACT

Asthma and chronic obstructive pulmonary disease (COPD) patients usually use metered-dose inhaler (MDI) for treatment. MDI device is ineffective if used without correctly used. This study was designed to evaluate patients' knowledge on asthma and COPD diseases and their MDI salbutamol inhalation technique. A set of questionnaire with 15 questions was given to patients with asthma (n=30) and COPD (n=31) at Institut Perubatan Respiratori to test patients' knowledge on their disease and this was followed with evaluation on patients' MDI salbutamol inhalation technique. Descriptive statistics was used to analyse patients' demographic backgrounds, level of patients' knowledge on their disease and level of MDI salbutamol inhalation technique. Chi square test and Pearson correlation coefficient were used to analyze the variables. Result showed asthmatic patients having better knowledge (mean=10.30) than COPD patients (mean=8.39). There was no significant difference (p=0.723) on knowledge between asthmatic and COPD patients. Patients for both diseases had inefficient technique (83.6%) while only 16.4% patients were able to demonstrate efficient technique in using MDI salbutamol. There was a strong correlation between level of knowledge and MDI salbutamol inhalation technique (p<0.001) among patients. These findings established that patients should be properly educated regarding their disease and medicine to achieve the optimum result.

KEYWORDS

Asthma, COPD, MDI Techniques, Knowledge

INTRODUCTION

Asthma is one of the most common chronic diseases in the world. Asthma morbidity and mortality is increasing in a number of developed countries. Based on American Health Interview Survey sample (2009), it has been found that 39.9 million Americans and including 7.1 million children were diagnosed with asthma. Asthma is also common in industrialized nations such as Canada, England, Australia, Germany and New Zealand with higher data of prevalence rate ranges from 2% to 10% of asthma collected from these countries. Factors affecting this disease include urbanization, air pollution, passive smoking, and also allergens[1]. As being reported in a Malaysia's Ministry of Health Second National Health and Morbidity Survey (1997), the prevalence of asthma among adults is 4.1% in the population. In the same study, it was also reported that asthma prevalence is higher in rural area (4.5%) than in urban area (4.0%).

WHO reported that COPD ranked 4th from 136 diseases being assessed with 3 million deaths on that year[2]. This statistics include 6 WHO regions including Africa, America, East

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Mediterranean, Europe, South-East Asia and Western Pacific region. WHO also estimated about 64 million people have moderate to severe COPD. Three million people died from COPD in 2005 and this contributed to 5% of all death throughout the world. In 2006, COPD is the 4th leading cause of death in the U.S., with death rate of 39.9 per 100,000. It was also found that more women (63,006) than men (57,970) died due to COPD[3]. However, in the Po Delta survey been done in Italy, COPD prevalence in males and females were separated according to the severity of disease which are mild, moderate and severe disease[4]. Passive smoking has potentially serious risks especially in children and people exposed chronically to it with increase in risks of 10% to 43% in adults with COPD. As a result of exposure to biomass fuels, 400,000 of COPD patients died per year in certain countries[5].

Meanwhile, Asian countries such as India and China showed the largest increase in tobacco related mortality. Based on COPD Statistical Information[5], it has been estimated that more than 50% of men from these countries smoke translating to COPD being the 4th cause of death in large urban areas but the 1st leading death in rural areas. Regional COPD working group[6] for 12 Asia Pacific Countries and Regions used mathematical model to estimate COPD. Based on the study, the prevalence of combination from all 12 countries and regions showed result of 6.3% and this was higher than WHO data which reported the percentage was 3.8% for the same region. This study also identified 4.1% people in India were having COPD while Japan had the highest number with 10.9% patients. However, for the same year, the prevalence of patients with moderate to severe COPD in Malaysia was 4.7% or 448,000 cases. It was estimated that by 2030, the third leading cause of death worldwide will be caused by COPD[7].

Inhalation Techniques

Poor inhalation technique was found in patients that did not receive any education on inhalation technique. This was proved by a research conducted by Hammerlein et al.[8], where among 781 asthmatic patients who participated in the study, 12.3% patients stated that they had never received any introduction on correct usage of their inhaler. At the baseline, 65% of the patients made errors but after receiving interventions by a qualified pharmacist, only 28.3% of them made errors in using inhalers. This proves that all patients were getting benefit from the intervention regardless of their former training experiences. A proper drug delivery is crucial for effective pharmacological treatment. Proper technique and coordination is required for efficient MDI use and this is the main reason MDI is the most difficult aerosol device to be used[9]. In Malaysia, it was found that asthma and COPD are one of the common conditions treated in health clinics. More than 73% outpatient's attendances in clinics have been treated for respiratory cases including these diseases.

Research Justification and Objective

There was too little amount of research being conducted in Malaysia related to diseases' knowledge and salbutamol MDI technique among asthmatic and COPD patients found. This study was aimed at evaluating patients' knowledge on asthma and COPD diseases and correlate it with salbutamol MDI technique.

MATERIALS AND METHOD

Study Design

This was a cross-sectional study and was done using close-ended questionnaires in 2 versions of languages; English and Bahasa Malaysia version and direct evaluation of salbutamol MDI techniques demonstrated by patients. In the 1st section, patients had to answer the questionnaire consisting of patient's demographic profile such as when they were diagnosed with the disease and more towards inhaler usage itself such as duration and frequency of inhaler use. In 2nd section, patients should answer true or false survey to test their knowledge regarding asthma or COPD disease and this was adopted from a validated and reliability tested questionnaire. Patients were then graded into different categories of knowledge level according to their

score of the questionnaire. The maximum marks for both questionnaires were 15 marks and patients who scored 11 marks and above were categorised having good knowledge. Meanwhile, patients scoring between 8 to 10 marks were classified as having fair knowledge and those who get 7 marks and below were classified as having poor knowledge on their disease. Patients were asked to demonstrate salbutamol MDI technique directly after answered the questionnaire. The record form design was based on a modification of a pre-existing design. The correct use of the inhaler is categorised into 9 steps:

(1) Remove cover

(2) Shake inhaler well

(3) Hold inhaler upright

(4) Exhale gently

(5) Place mouthpiece

(6) Activate canister once at the beginning of inhalation

(7) Inhale slowly and deeply

(8) Hold breath at least 10 seconds

(9) Breathe out slowly

A score of 1 was given for each step performed correctly and 0 for each step performed incorrectly or skipped.

Subjects

This research included patients from the outpatient department with asthma and COPD and using salbutamol MDI without spacer in Institut Perubatan Respiratori (IPR). The patients' age limit was from above 18 years old up and to 80 years old. Patients having both asthma and COPD disease at same time were excluded. The total population with asthma and COPD patients from IPR's outpatient department was 69 patients. Based on the calculation with 95% confidence level and confidence interval of 5, the sample size required to represent IPR was 61 patients. Out of 61 patients, 30 were asthmatic while the other 31 had COPD.

Research Instrument and Procedure

Research ethical approval was obtained on 7th June 2012 from National Medical Research Register (NMRR). This study was conducted between June 2012 and July 2012. The asthma questionnaire was adapted from a published research paper which was a survey on relationship between asthma knowledge, treatment adherence, and treatment outcome in 2002[10]. The original questionnaire consisted of 25 questions but after expert group discussion and further review, only 15 questions relevant for adults with asthma disease were chosen. As for the COPD questionnaire, the questionnaire was adapted from the same survey used with the asthmatic patients. However, only 10 questions from the asthma questionnaire were taken with slight changes to adjust with COPD disease and another 5 COPD questions were taken from 3 different COPD websites. Pilot study was done prior to the distribution of the questionnaire to patients with both diseases at IPR. Content Validation and face validation of the questionnaire were done through expert group discussion and pilot study prior to data collection. The final version of both asthma and COPD disease knowledge consists of 15 questions with choice of yes or no answer. The assessment of MDI technique was adapted from previous study on pharmacist-led intervention study to improve inhalation technique in asthma and COPD patients done in 2009. There were 4 sections being tested but for this research, only 2 sections were taken which were preparation and inhalation sections with nine steps being assessed.

Data Analysis

All patients' knowledge and steps demonstrate the salbutamol MDI technique were assessed based on patients' score obtained in the record form. Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) version 20.0 were used to tabulate results and generate graphs and charts. Descriptive statistics were used to get the frequencies and percentage to assess patient's demographic background in the 1st section of the questionnaire, level of

knowledge and score of inhalation technique for each step. Chi square test was used to assess patients' knowledge on asthma and COPD disease. Pearson correlation coefficient was used to assess the linear association between two variables.

RESULTS AND DISCUSSION

Patient's Demographic Data

A total of 8.2% of the patients were between 22 to 29 years old but majority (41%) patients involved were above 60 years old. There was no association ($p>0.05$) between age and patients' inhaler technique. This was supported by a study performed in Spain where there was no association between incorrect inhaler techniques with actual age of patient[11].

Among the patients, 11.5% did not have any proper education in school, while majority of them (52.5%) received secondary school education. This is due to compulsory schooling of Malaysians until secondary level, but there were also some situations where poor people cannot afford to get proper education in school or stop in the middle of schooling. This study population was supported by statistics produced by World Education Indicators (WEI)[12] which was conducted to see the distribution of highest level of education among adults population between 25 to 64 years old. Based on the statistics, 7.3 per millions Malaysian did not have proper schooling but 31.8 per million Malaysian had completed education until upper secondary level.

It was found out that, 9.8% patients had been using salbutamol inhaler between 6 to 10 years while almost half of the patients (49.2%) had been using inhaler less than 5 years. The reason for this high percentage of the result is they might be newly prescribed with salbutamol MDI even though they were diagnosed with the diseases before or physicians prescribed them with other type of medication before changed to salbutamol MDI. A study in Karachi discovered that the duration of having disease and length of inhaler usage does not give any significant effect upon inhalation technique[13] and was supported by a study conducted in Australian Asthma Council (2008) where 75% of the patients failed to demonstrate correct inhalation technique even though they had used it for 2 to 3 years time. Most of the patients might have poor control of their disease as 55.7% of the patients used salbutamol inhaler every day.

Respondents' profile on disease and salbutamol MDI usage can be seen as tabulated in Table 1.

Table 1: Profile of Disease (Asthma and COPD) and Salbutamol MDI Usage

Characteristics	Frequency	
	%	n
Disease Duration		
- < 1 year		
- 1 – 5 years	9.8	6
- 6 – 10 years	19.7	12
- > 10 years	21.3	13
	49.2	30
Using Salbutamol MDI Duration		
- < 5 years	49.2	30
- 6 – 10 years	9.8	6
- > 10 years	41.0	25
Frequency of Salbutamol MDI Usage	55.7	34
- Every day	19.7	12
- 2 – 3 times/week	16.4	10
- 2 – 3 times/month	8.2	5
- 2 – 3 times/year	44.3	27
- When getting attack		

Knowledge Level on Disease among Patients

The mean score for asthma and COPD knowledge were 10.30 and 8.39 respectively (Table 2). Majority of the patients had fair knowledge on their disease (50.8%) and this was followed by 31.1% patients having good knowledge on the diseases and only small percentage of them (18%) had poor knowledge on the diseases. There was no significance difference ($p=0.723$) between these two diseases with the patients' knowledge level.

Table 2: Patients' mean knowledge level on their disease

Diseases (n)	Knowledge Level (Mean)	p value*
Asthma(30)	10.30	0.723
COPD(31)	8.39	

* Chi square for Relatedness

The reason for this finding might be due to patients' knowledge being affected by patients' educational level and this was supported by a study[14]. According to the study, patients with better disease knowledge which were asthmatic patients had the respiratory symptoms for many years and they had higher educational background. Based on the same study, both patients with asthma and COPD diseases had already received information on their diseases either from doctors or nurses but only a few of them had participated in formal education (in group). As a result, asthmatic patients had better education compared to COPD but asthma group still wanted to learn more regarding management of their disease compared to COPD patients. There was also evidence found where patients with asthma disease had better knowledge on the disease as compared to COPD due to asthmatic patients having the disease longer than COPD patients[15].

It was believed that patients' knowledge on their diseases may increase if patients received education from their healthcare providers. Asthma education programs can lead to better knowledge, increase self management abilities and this indirectly will reduce asthma morbidity rate[15]. However, there was a study on education program for patients in 2 types of sessions, which are in group and individual sessions on asthma and COPD patients conducted in Norway. The study concluded that the education program improved health and quality of life for asthmatic patients with mild to moderate asthma but there was no improvement in COPD patients[16].

There was also an intervention by clinical pharmacists towards COPD patients regarding knowledge, attitude and practice (KAP) of the disease. At the beginning of the study, the KAP analysis found that patients had poor perception on COPD disease. For example, patients only had fair idea on symptoms of COPD, whether it is contagious or not and this research also revealed that more than half of patients thought that COPD is completely curable. However, after patients received proper education and counselling during follow ups, it was observed that patients education can enhance their knowledge. This was reflected by higher percentage of correct answer to the same questions as given before[17].

Patients' Inhalation Technique

Patients' inhalation technique (Figure 1) was classified into 2 categorised based on 5 out of 9 steps being assessed earlier. The 5 steps are removing inhaler's cap, shaking well the inhaler before use, close lips tightly around inhaler's mouthpiece, activate canister simultaneously with inhalation and holding breath after inhalation for at least 5 to 10 seconds after inhalation.

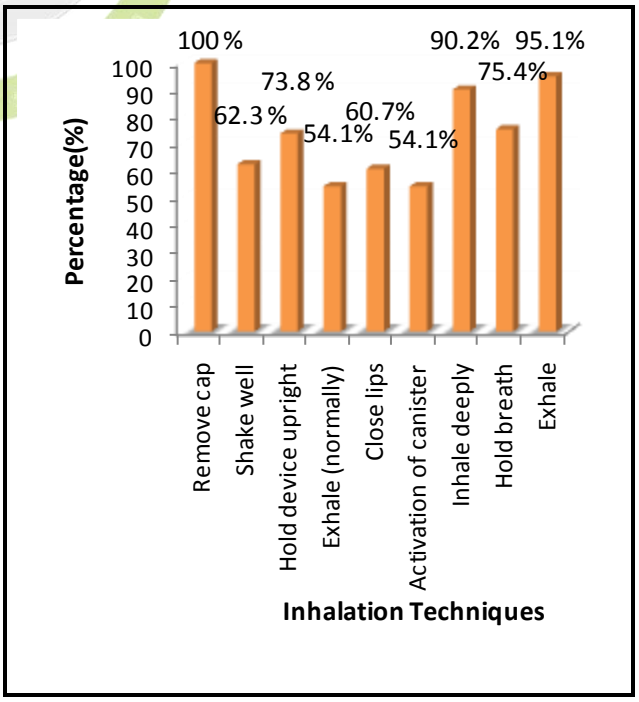

Figure 1: Patients' salbutamol MDI inhalation technique

Those 5 steps were chosen as they were considered for proper delivery of inhaled medications while others were classified as recommended for optimal delivery but they were not essential[18]. Patients who scored full marks of 5 were classified practicing efficient technique and only 16.4% of them were classified into this group. Meanwhile, patients with 4 marks and below were classified had inefficient technique and almost all of them (83.6%) were categorised in this category.

MDI is frequently used for management of airway disease. The improper use of MDI may affect the results of therapy and this may be correctable with proper counselling provided[19]. In this study, there were 9 steps of inhalation technique assessed for both groups of patients. Based on the result, it was found that all patients removed inhaler's cap before using the inhaler. However, based on the outcome, the most common mistakes patients did were being unable to exhale before inhalation (45.9%) and failed to actuate canister once at the beginning of inhalation (45.9%). These results obtained contraindicated with findings done by other researchers[20,21]. From the studies, most patients did not perform correct technique on exhale upon inhalation but only few of the patients from both studies were unable to perform correct actuation steps.

There was an evaluation among asthma and COPD patients that found the majority of patients will make at least one mistake in performing inhalation technique[22]. A study conducted that using exactly same all 9 techniques with this study also highlighted that majority of patients only could performed less than 6 steps correctly[19]. This might be due to majority of the patients are elderly and this may be related to their cognitive abilities. Age is important factor in proper inhalation technique as many older patients shown having poor inhalation technique and stated that this problem only being documented with MDI where only 60% of elderly reported to have adequate MDI technique[23]. Elderly had been found as the most common population demonstrating incorrect technique as they might having other factors affecting such as arthritis, weakness, low mental scores or even poor vision[13].

Correlation between Patients' Knowledge and Inhaler Technique

There was a strong correlation between patients' knowledge on their disease and salbutamol MDI technique and this was analysed using Pearson correlation coefficient. There was a significance difference found ($p<0.001$) between diseases' knowledge level and inhalation technique. This was reflected by only 19 patients having good knowledge on their disease and only ten patients can perform efficient technique in using salbutamol inhaler. This is probably because usually patients having adequate knowledge on their disease indicate that they were really concerned and aware of their disease and therefore practicing good inhaler technique. There was no study found to support the correlation between knowledge of both diseases and salbutamol MDI technique as they were focused more on patients' knowledge on inhalation technique only.

CONCLUSION

Overall, it was observed that most patients with asthma and COPD in Malaysia had fair knowledge on their disease regardless which healthcare providers provide counselling to them. However, asthmatic patients had more understanding on the disease compared to COPD patients. This might be due to the patients' duration of with asthma disease was longer than COPD patients. Regardless of the disease, it was found that patients had poor inhalation technique and this was quite serious as patients may not received desired effect from their salbutamol MDI. In conclusion, all healthcare providers including doctors, nurses and pharmacists have to ensure that their patients are practicing correct inhalation technique by re-evaluating patients' inhalation technique and monitor their technique from time to time.

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