ORIGINAL PROF-756

METERED DOSE INHALERS;
ERRORS IN THE USE IN ASTHMA AND COPD

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ABSTRACT ... drmasood60@yahoo.com Metered dose inhalers are the most effective, cheaper and safer method of delivering drug to the patients with asthma and COPD. Errors in inhalatioinal technique compromise their use and efficacy. In the study 400 consecutive patients coming to outdoor of Allied Hospital Faisalabad, who ever had used MDIs were asked to perform inhalational technique and most common errors were observed. They were followed up for 8 weeks and those who remain untrained after 8 visits were declared non trainable and accessory devices (spacer device) were added to MDIs. Errors were observed in every age group but generally speaking, percentage of error was more in old people and more in females. It was observed that it is difficult to train old patients and females. Moreover it was observed that patient education and demonstration of inhalational technique is corner stone in proper use of MDIs.

INTRODUCTION

The goals of Treating COPD are: to prevent disease progression, to reverse acute complications and for patients with established but stable disease to optimize pulmonary function status. Therapy should attempt to prolong life whenever possible[1]. Reversible air flow obstruction is treated effectively by topical deposition of drops in lungs. Aerosolized drugs may produce an ideal therapeutic ratio, optimal therapy with minimal side effects[2].

Meter dose inhalers (MDIs) are the cheapest, most effective and safe way of drug delivery to the lungs in respiratory diseases like asthma and COPD. Errors in the use of MDIs not only compromise their efficacy, they also increase cost of treatment and ultimately lead to non compliance and treatment failure.

This clinical study is concerned with errors in the use of MDIs. Number of errors, the most common error, the least common error along with the number of patients trained after four weeks follow up and number of patients declared untrainable after 8 week

follow up, in whom spacer device was added, are given in the study.

OBJECTIVE

For MDIs proper technique is important to ensure adequate administration. Volume spacer devices or dry power inhalers are preferred as many patients with COPD struggle to use MDIs effectively[3].

Purpose of the study was to know the incidence and % of errors in the use of MDIs in patients with COPD and asthma who had ever used MDIs. So that the problem can be defined, their solutions can be recommended and be submitted to heighten the awareness among the doctors.

MATERIAL & METHODS

Four hundred consecutive patients coming to the outpatient department with the diagnosis of asthma or COPD who has ever been prescribed metered dose inhalers of any of the drugs; B2 agonists, steroids, ipratropium bromide and cromolyn in the past were asked to demonstrate their technique and common errors were observed.

1. Poor hand lung co-ordination.
2. Failure to use meter dose inhalers in proper position; that is inverted.
3. Failure to exhale completely before activation.
4. Swallowing instead of inhaling.
5. Failure to hold the breath for an adequate period.
6. Failure to give adequate breathing interval between two doses.
7. A small no. of patients are not trainable even after all the efforts due to age limitations, too young or too old, dyspnea or dementia. This group of patients needs addition of spacer device to meter dose inhalers thus bypassing the hand lung coordination.

Our unit, (MUI) caters for outdoor patients twice weekly. For the purpose of study all the eligible patients were channelized to my out patient office, where the patients were evaluated according to a submitted scheme.

Pts were divided into 5 groups according to the age.

1. G I 11 years - 20 years
2. G II. 21 years - 30 years
3. G III. 31 years - 40 years
4. G IV. 41 years - 50 years
5. G V . 51 years - 60 years

And following observations were made i.e. M/F, smoker, commonest error, least common error, trainable after 4 weeks.

The patients were closely observed while using MDIs and errors were noted and accordingly each patient was given a thorough explanation and demonstration of proper inhaler technique by myself and my team and was asked to return at weekly intervals. At each subsequent visit patients were asked to again demonstrate inhaler technique and any error was corrected. The patient was declared non trainable if he/she failed to learn proper technique after 8 weeks.

Each patient's biodata, relevant history, physical examination and performance was recorded in prescribed proforma and %age of errors was calculated and efficacy of patient education given was assessed by calculating the number and percentage of patients who were trained after 4 weeks.

Inclusion Criteria:

1. Established diagnosis of asthma or COPD.
2. Previous use of MDIs
3. Age between 10 to 60 years.

Exclusion Criteria:

1. Age<10 and > 60 years
2. Mentally handicapped pts e.g. dementia.
3. Physically handicapped.
4. Cor pulmonale, Resp failure.

STUDY DESIGN

It is an analytic interventional study. As percentage of

errors was calculated and patient's education was done by demontrating proper inhaler technique and errors calculated again.

RESULTS

Out of 400 (195 males + 205 females) patients involved in this study, only 46 (29 males + 17 female) were found to be already trained in inhaler technique and no error was observed in their technique. this forms 11.90% of the studied population. Tables 1 presents no. of patients, sex, smoker/nonsmoker, commonest error, least common error and patients trainable after four weeks period, according to different age groups.

Table-I. Age group 51-60 years,

Sex	No of Pts.	Smokers	Commonest error	Less common error	Trainable after 4 weeks
Male	32	25	3,4	6,7	26
Female	54	8	1,3,5	7	28
Age group 41-50 years					
Male	64	48	6	1,7	36
Female	80	16	3,6	7	43
Age group 31-40 years,					
Male	32	20	5	2,7	20
Female	48	3	5	7	46
Age group 21-30 years					
Male	50	32	4	7	24
Female	14	1	3,4	7	8
Age group 11-20 years					
Male	17	12	4	7	11
Female	9	0	3	7	5

Table-II. Presents frequency of errors in group 1 to 5.

Error	51-60 yrs	41-50 yrs	31-40 yrs	21-30 yrs	11-20 yrs
1	64	10	43	0	0
2	16	32	18	17	0
3	80	97	51	31	11
4	66	36	15	62	37
5	64	114	83	34	13
6	32	135	0	16	36
7	0	3	0	0	0
8	9	13	8	4	2

Similarly the frequency of errors are given in table II for comparison. The common errors were observed in all the subjects. A lost of common errors as described in material and methods were observed and noted in table III.

So the commonest error was error no.5 i.e. failure to hold breath for an adequate period and the least common error was error no. 7 i.e. failure to replace canister after it has exhausted its drug supply.

Table-III. Calculated figures in total study population

Error	% age	No. of Pts.
1	29.25%	117
2	20.75%	83
3	67.5%	270
4	54%	216
5	77%	308
6	54.75%	219
7	0.75%	3

Table-IV. Percentages of patients trainable and un-trainable after four weeks

Age Group	trainable	un-trainable
51-60 yrs	53.6%	46.4%
41-50 yrs	58.9%	41.1%
31-40 yrs	65.7%	34.3%
21-30 yrs	61.60%	38.4%
11-20 yrs	76.19%	23.81%

Patients Declared non-trainable:

Thirty six patients were declared non-trainable and the spacer device was added to meter dose inhaler. Out of these 11 were male and 24 female and no. of patients 13 declared un-trainable and were in age group 41-50 years. The results are shown in table IV.

DISCUSSION

Medication through inhalation route is a most effective way of delivering drug to the specific site of action and achieving the maximum concentration of drug. This has rapid onset of action and least systemic side effects. Oral administration requires 20-80 times the inhaled dose to achieve a similar effect[4]. The MDIs are currently the most prescribed method of delivering drug to the lungs all over the world.

Inhalation is simple with meter dose inhalers (in children, even less then two years of age) and small inhalation chambers with low or no static charges and a mask over mouth and nose. According to some studies meter dose inhalers are preferred to wet nebulizers and a spacer device is recommended for severe asthma.

MDIs provide essential therapy for a large proportion of the 70 million people in the world affected by asthma. In UK MDIs is the cheapest type of device on the market and is usually the method of choice for those who are able to use them[5].

Though meter dose inhalers are effective and cheaper but they need a certain grade of co ordination. Proper inhaler technique is the most important factor to get maximum benefit from inhalation therapy[6].

Patient education programs are necessary to get optimal results. Different studies show that patients using MDIs are not aware of proper technique hence does not achieve maximum benefits.

In this study conducted in outdoor department of medicine Faisalabad, it was concluded that only 11.5% of the patients were trained at their first visit. But this study also signified the fact that patient education plays a tremendous role in this aspect as at 4th visit 61.7% patients were trained. Patients and doctors both need education in this field while prescribing inhaler. A doctors must explain the inhalation technique completely to the patient. Each step of inhalation technique should be demonstrated completely.

Error should be observed and corrected. There should be weekly follow- ups for at least two months. Inhalational techniques should be checked at every follow up and where necessary spacer device should be added to MDI to provide optimal benefit to the patient.

Some other fact enlightened during this study was that errors are present in all age groups but percentage is higher in persons above 40 years. Moreover, errors are more prevalent in females as compared to males. I observed another fact that it is more difficult to teach older people then younger patients.

Females were difficult to comply with instructions. Hand lung coordination was poor in older age group and again it was more compromised in females. An other fact was that almost 30% of the patients with diagnosis of asthma and COPD i.e. 144 were smokers but the most interesting fact was that smokers were easily trained due to better hand coordination and better inhalation rates.

Media can play a vital roll by telecasting and printing about asthma, roll of inhalation therapy and advantages of inhalational medication. Inhalational techniques can be taught. All these efforts will produce awareness among doctors and community about inhalation therapy as the cheapest and effective method of delivering drugs and better inhalational skill can provide optimal results and less withdrawal from metered dose inhalers.

All these facts and suggestions conclude that patients's guidance is required in every step. Moreover spacer devices should be added with old age, poor hand lung coordination, unable to hold breath for an adequate period.

CONCLUSION

The conclusion drawn from this study was that only a few patients were trained in inhalational technique. But after continuos education about inhalational technique, a significant number of patients can learn proper inhalational technique. It is strongly recommended that doctors should be aware of this fact while prescribing inhalation therapy. Doctors should be trained in inhalation skills and should train their patients by complete demonstration of inhalation technique and regular follow ups.

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