

Frequency of Correct use of Inhaler Technique in Asthmatic Children (5-13 Years) in Order to Improve Asthma Outcomes

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ABSTRACT

OBJECTIVE: To determine the frequency of correct use of metered dose inhaler technique in asthmatic children (5-13 years) in order to improve asthma outcomes.

STUDY DESIGN: An observational cross-sectional study

PLACEAND DURATION: Pediatric Department KRL General Hospital Islamabad from 28th September 2011 to 27th March 2012.

METHODOLOGY: 82 children with persistent asthma attending OPD and Emergency Department of the Hospital and admitted in wards were asked to demonstrate their skill of using inhaler with the help of a placebo. After recording initial baseline socio-demographic data and children were asked to demonstrate their inhaler technique using a placebo and were assessed according to the 10 steps of NAEPP criteria. For each step correctly performed a score of one was given.

RESULTS: Out of total 82 patients, 18.3% performed all 10 steps correctly while 81.7% had an incorrect technique. The technique was better in female patients and improved with increasing age and that the simpler steps were easily performed by most of the patients. Out of 33 male patients only 12.12% performed all 10 steps correctly, while 87.88% had an incorrect technique. Out of 49 female patients 22.45% had a correct technique. It was found out that out of 31 patients aged 5-7 years, none had a correct technique. Of the 25 patients aged 8-10 years only 28% had a correct technique and among 26 patients aged 11-13 years 30.78% had a correct technique. The two steps correctly performed by majority of the patients was removing cap and pressing down inhaler.

CONCLUSION: Asthmatic children have a poor inhaler technique and the inhaler technique improves with increasing age, is better in females and majority of patients know the simple steps like removing cap and pressing down inhaler.

KEY WORDS: Asthma, Child, Metered Dose Inhaler, Technique.

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INTRODUCTION

Inhaled medications are the mainstay of asthma treatment and metered dose inhaler is widely used to administer asthma medications but patient's knowledge and practice towards this inhaler is highly technique dependent¹. Globally approximately 300 million individuals suffer from asthma and it is a leading

cause of preventable emergency room visits¹. It not only results in repeated hospital admissions but also to multiple presentations to the local health centers². In 2013 pediatric asthma was the chief reason for missing school and resulted in a loss of more than 10.5 million school days per annum³. WHO also acknowledges asthma as a notable health issue⁴. Asthma is characterized by repeated episodes of reversible airway obstruction presenting with sporadic episodes of shortness of breath, cough and wheezing⁵.

The prevalence of asthma is increasing, especially in children who have the highest prevalence of asthma of any age group⁶. A methodical survey of the world wide burden of the disease, where the risk of the disease was analyzed by counting the number of years lost due to the disease, demonstrated that respiratory diseases were the sixth major reason of disability globally⁷. The magnitude of this disease is still not specified in Pakistani children. However, study shows that 4% of children with acute respiratory tract illness, attending the outpatient department of Children Hospital, Pakistan Institute of Medical Sciences (PIMS) suffered from asthma⁸. Fortunately, it is possible to attain adequate control of asthma efficaciously. Global Initiative for Asthma (GINA) guidelines denote that two vital aspects of asthma management are control of environmental triggers and asthma medications⁹. Compared to oral or par-enteral treatment, inhalation therapy is preferable

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as it has an advantage of direct delivery of medication to the lungs and low dosage, thus lesser side-effects. However these credits are decreased due to poor compliance associated with deficient inhaler technique as efficient delivery of medicine to the broncho-alveolar tree is highly technique dependant¹⁰. If the medication is used incorrectly, little or none of it reaches the lungs. The National Asthma Education and Prevention Program (NAEPP II) Expert Panel II also suggests that problems with inhaler technique are common in clinical practice ,so it has devised 10 steps that have to be performed correctly in order to achieve optimum asthma control.¹¹

The rationale of this study is to emphasize that inhalation therapy is a complex procedure and a common effort is required in terms of education between physicians, parents and patients, in order to achieve the best results. The physicians and all medical staff who see patients using inhaler should teach the "correct technique" and regularly check that this has been learned. The objective of this study was to determine the frequency of correct use of metered dose inhaler technique in asthmatic children (5-13 years) in order to improve asthma outcomes.

METHODOLOGY

This observational cross-sectional study was conducted at Pediatric Department KRL General Hospital from 28th September 2011 to 27th March 2012 in which 82 children from 5-13 years of age with persistent asthma using inhalers were included in the study. Those children were included who had been using MDI inhalers for past one year and who had been taught the skills of inhaler use by their respective healthcare providers at the time of diagnosis. Sampling technique was consecutive (non-probability sampling).

Children with chronic diseases like bronchiectasis, tuberculosis, cardiac disease were excluded from the study because of possible difficulty in complying with instructions due to ill health.

After approval from hospital ethical committee and consent from the parents eligible children were asked to demonstrate their inhalation technique using a placebo. Their inhalation technique was evaluated for accurate steps taken according to NAEPP criteria .One score was given for each step correctly performed and a score of zero was given for incorrect step done. The steps were as follows i) shake vigorously ii)remove cap iii)hold upright iv)breathe out all the way v)start breathing in slowly and deeply vi)press down inhaler vii)continue slow inhalation viii)no aerosol loss is visible xi)hold breath for ten seconds x)next dose after 15-30 seconds. Results were entered into the proforma by myself. Data was analyzed by computer software SPSS version 10.Mean and standard deviation was calculated for numerical variables i.e. age, scores for NAEPP criteria. Frequency and percentages were presented for categorical variables i.e. gender, correct use of inhaler.

RESULTS

During the study period 82 patients were enrolled at KRL

General Hospital among them, 33(40.2%) patients were male and 49,(59.8%) were female. 31(37.8%) patient's ages ranged from 5-7 years,25(30.5%) from 8-10 years,26(31.7%) from 11-13 years .The mean age with standard deviation was 8.75 (± 2.7)years.

Out of total 82 patients, 15(18.3%) performed all 10 steps correctly while 67(81.7%) had an incorrect technique. The steps carried out correctly were as follows:

78.05% shook inhaler vigorously before use,81.71% removed cap,79.27% held the inhaler upright (the rest held it upside down or inclined).Only 30.49% patients breathed out all the way before pressing down the inhaler,64.63% started breathing in slowly and deeply,81.71% pressed down inhaler,73.17% continued slow inhalation,52.44% made a tight seal with mouth so that no aerosol loss was visible,41.46% held breath for 10 seconds,41.46% patients knew that the next dose was to be taken after 15-30 seconds. We analyzed our data by dividing our patients in age groups of 5-7years,8-10years,11-13years to find whether the technique improved with increasing age.It was found out that out of 31 patients aged 5-7 years,none had a correct technique.Of the 25 patients aged 8-10 years only 7 had a correct technique and among 26 patients aged 11-13 years 8 had a correct technique.

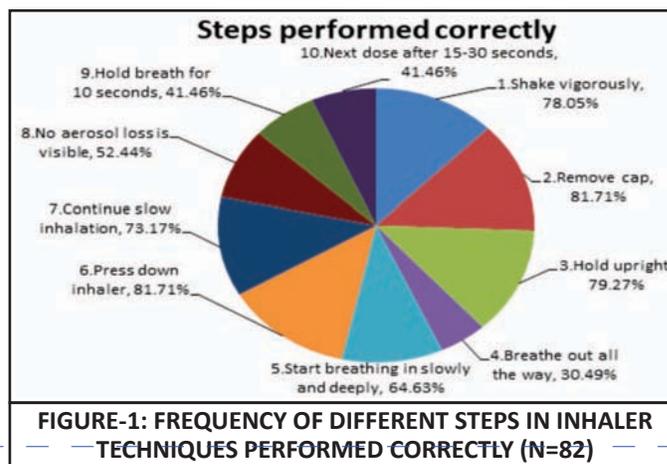
Out of 33 male patients only 4 performed all 10 steps correctly,while 29 had an incorrect technique.Out of 49 female patients 11 had a correct technique.

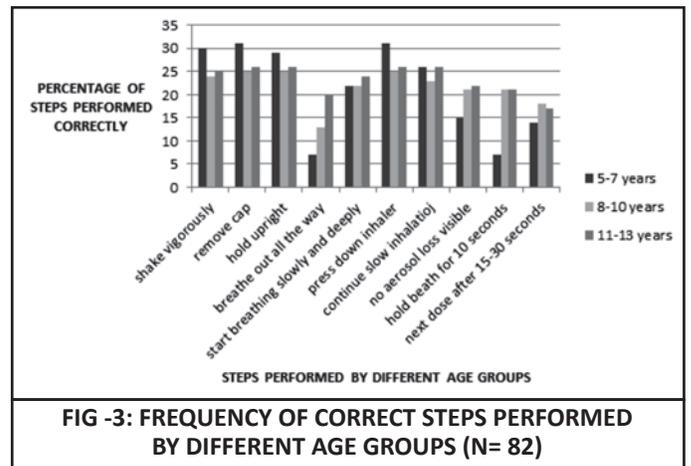
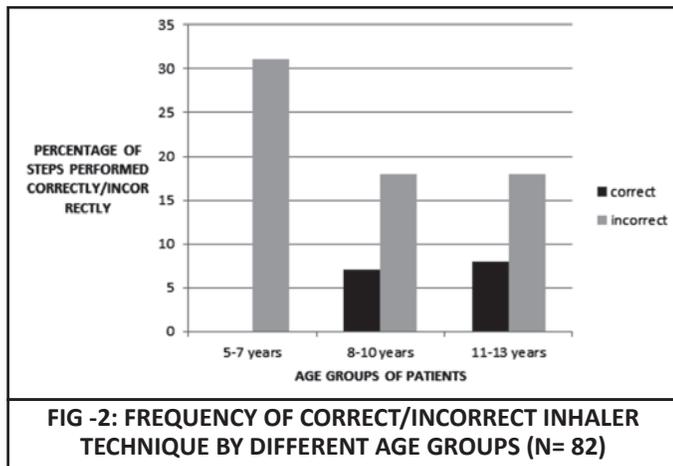
TABLE - I: GENDER AND AGE GROUPS OF PATIENTS (N= 82)

Gender	Frequency
Male	33 (40.2%)
Female	49 (59.8%)
Age Groups	
5-7 years	31 (37.8%)
8-10 years	25 (30.5%)
11-13 years	26 (31.7%)

TABLE - II: FREQUENCY OF CORRECT INHALER TECHNIQUE AMONG THE PATIENTS (N=82)

	Frequency
Correct	15 (18.29%)
Incorrect	67 (81.71%)





Count	Correct / incorrect use of inhaler		Total	
	correct	incorrect		
Gender of patient	Male	4	29	33
	Female	11	38	49
Total	15	67	82	

FIG -3: FREQUENCY OF CORRECT STEPS PERFORMED BY DIFFERENT AGE GROUPS (N= 82)

patients but also to check their skill on every follow up visit. Unfortunately most of the health care workers fail to do so. A study conducted in Saudi Arabia showed that 40 percent of the patients did not receive any formal education by any health care professional regarding the proper use of inhaler devices¹⁶. Another study conducted in Singapore showed that significant improvement in inhaler technique was observed after performance feedback and reinforcement during follow-up appointments¹⁷.

It is imperative that standard steps must be taken in order to refine the quality of care delivered to children. There are ongoing changes in the physiology and anatomy of child as he grows, which effects the pharmacokinetics and pharmacodynamics of the drugs¹⁸. So there is a need that the health care workers must educate the children and keep checking their technique on every visit as prescribing the inhaler is futile if the drug does not reach the bronchial tree¹⁹⁻²⁰.

CONCLUSION

Asthmatic children have a poor inhaler technique and the inhaler technique improves with increasing age , is better in females and majority of patients know the simple steps like removing cap and pressing down inhaler.

RECOMENDATIONS

In order to improve inhalation technique in children with asthma it is recommended that:

- The health care provider gives appropriate and repeated instruction to the parents and children.
- The inhalation technique should be clearly explained and well demonstrated.
- Inhaler technique should be checked again during follow-up appointments to correct mistakes.

Contribution of Author:

Haroon S: Conceived Idea, Designed Methodology, Data Collection, Data Interpretation Manuscript Writing, Manuscript final reading.

Wahid S: Data Analysis

Bashir H: Data Collection

Rapid economic progress in Pakistan has resulted in increased prevalence of asthma because of surge in pollution due to the modernization of cities¹². However with correct treatment and avoidance of exposure to environmental allergens and irritants that are known to exacerbate asthma, children can achieve optimum control of asthma and lead normal and healthy lives. Asthma control and rescue therapies are effectively delivered by inhalation¹³. However insufficient knowledge of the use of inhaler is one of the prime hurdles in acquiring adequate asthma control¹⁴. This study assesses the skill among asthmatic children regarding inhaler technique and appropriateness of its use.

In this study, persistent asthma was classified according to the GINA (Global Initiative for Asthma) guidelines symptom criteria for asthma severity¹⁵. Patients who were on inhalers were assessed for their technique. Although correct use of an inhaler looks simple, our study showed that a large proportion of children do not use these devices correctly.

Our study shows that only 18.29 % of 82 children used their inhalers correctly following all the mandatory steps. The most common error found in this study was to breathe out all the way before pumping in inhaler. One of the reasons being poor coordination abilities in young children, and the reduced strength and expertise of their fingers to actuate the aerosol. We found that many children did not shake their inhaler. On the other hand, many children did not know that it is recommended to activate the inhaler for every dose.

Research shows that it is mandatory not only to give an elaborate demonstration of the inhaler technique to the

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