



Comparative Analysis of Metered Dose Inhaler (MDI) and Dry Powder Inhaler (DPI) at Rural Bangladesh Perspective

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Abstract

Metered Door Inhaler and Dry powder inhaler are both used to treat the symptoms, such as: wheezing, coughs etc. of pulmonary disease in a Patient. The main objective of this study is to find out the comparative analysis of pMDI & DPI in asthma medication at rural area of Bangladesh. A cross sectional study including survey and interview was completed at in the outpatients department (OPD) of Patuakhali 250 Bed Sadar Hospital, Patuakhali. The sample was 120 Asthma patients studied over a period of six months from January 2019 to July 2019. The measurements of FEV1 & VC demonstrate airflow obstruction and following the administration of a bronchodilator, confirm the diagnosis when a 15% (and 200ml) improvement in FEV1 is noted. Subsequent follow-up were done by Peak Flow Meter. Medications were used as single maintenance & reliever therapy using Budesonide (ICS) & Formeterol (LABA). Devices that were used for the study are Pressurized Metered Dose Inhaler (pMDI) and Dry Powder inhaler (DPI) eg: Aerolizer. Proper inhalation techniques of the inhaler were demonstrated to the patients by the health care staffs from the hospital.

pMDI and DPI (Aerolizer) have no significant differences in compliance issue in patient's points of view in terms of rural Bangladesh perspective. DPIs are flow dependent and require minimal patient to device co-ordination. pMDI requires patient to device co-ordination.

Keywords: MDI, SMART, DPI, In-Check DIAL,

Introduction

Asthma is progressively regular in young men yet after pubescence increasingly basic in females. Poor control of asthma prompts days lost from school or work, medical clinic affirmation and unexpected passing in certain patients mirrors the financial effects. Aviation routes of asthmatics are exceptionally touchy to specific things, which don't trouble individuals without asthma. These

things are called – triggers-when an asthmatic comes in contact to them, an asthma episode begins. The airways become swollen, produce a lot of mucus and are fixed up. The accurate etiology is as yet obscure. Hereditarily inclined newborn child, presentation to bronchiolitis firmly correspond the improvement of asthma in future. The aviation routes of the asthmatics are observed to be inflamed and hyper responsive, a few triggers

instigate an asthma attack if the inflamed airways are presented to them. The pervasiveness of asthma expanded relentlessly. Present estimation proposes that 300 million individuals overall experience the ill effects of asthma and by 2025 extra 100 million assume to diagnose as asthma. ^[1]

Basic triggers of asthma are allergens (outdoor, indoor and food eg: dander or pieces, insects, molds, house dust parasites, hamburger, hilsha, prawn), irritants (eg: tobacco smoke: wood smoke: air pollutants) upper respiratory tract infection, exercise: certain drugs (B blocker, aspirin, NSAID).^[2,3] Among the inhaler devices accessible are pressurized metered dose inhaler (pMDI), dry powder inhaler (DPI) which incorporate aerolizer, diskus, handihaler, rotahaler and so forth ^[4,5,6]

Objective of the study

Main

The core objective of the study is to make a comparative analysis between pMDI & DPI in asthma medication at rural area of Bangladesh.

Specific

- To identify the effectiveness of the pMDI inhaler
- To identify the effectiveness of the DPI inhaler
- To identify the variation in the results or impacts

Methods

A cross sectional study was completed at the *in the outpatients department (OPD) of Patuakhali 250 Bed Sadar Hospital, Patuakhali*. A mixed method was applied for the study. A survey and interview was done on 120 Asthma patients over a period of six months from January 2019 to July 2019.

Inclusion Criteria

Most of the cases the basic selection criteria of Astma patients as sample were,

- either DPI user or MDI user,
- were diagnosed as Asthma patients by typical symptoms, and
- the patients had the ability to consent

Results

The table 1 shows the age distribution of the studied samples and table 2 shows the gender distribution of said samples or patients.

Table 1: Age group of the Asthma patient

Age group	Percent	Valid Percent	Cumulative Percent
20-44	52.0	52.0	51.0
45-69	48.0	48.0	100.0
Total	100.0	100.0	

Table 2: Gender of the Asthma patient

Gender	Percent	Valid Percent	Cumulative Percent
Male	79.0	79.0	79.0
Female	21.0	21.0	100.0
Total	100.0	100.0	

The asthma problem for the 120 samples at the starting point of the problem is detailed in the table 3 below:

Table 3: Asthma Problem Starting by Age Group

Asthma problem starting period in age perspective			Types of inhaler used		Total
			inhaler (MDI)	inhaler (DPI)	
5 to 15 years	Age	20-44	2	7	9
		45-69	7	0	7
	Total		8	6	14
16 to 35 years	Age	20-44	2	12	14
		45-69	1	4	15
	Total		6	13	29
36 to 50 years	Age	20-44	0	23	23
		45-69	1	0	10
	Total		1	22	32
51 to 70 years	Age	20-44	0	1	1
		45-69	9	0	9
	Total		9	1	10

Figure 1 shows the asthma patients perception towards the cooperation and helpfulness of the healthcare staff with both medication administrations. Proper inhalation techniques were demonstrated to the patients by health care staffs. DPI is peak inspiratory flow rate (PIFR) dependent, usually 60L/min or higher, on the other hand MDI require a slow & deep inhalation with PIFR less than 60 L/min. MDI require patient-device co-ordination. The Perception of the patients regarding the afore-mentioned are described in figure 2 and 3.

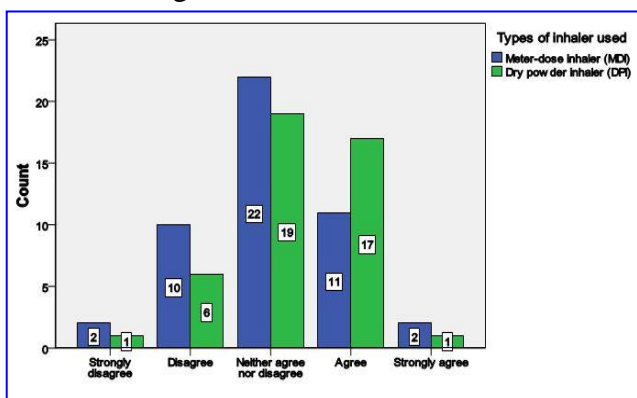


Figure 1: Cooperation of the healthcare staff in samples' perspectives

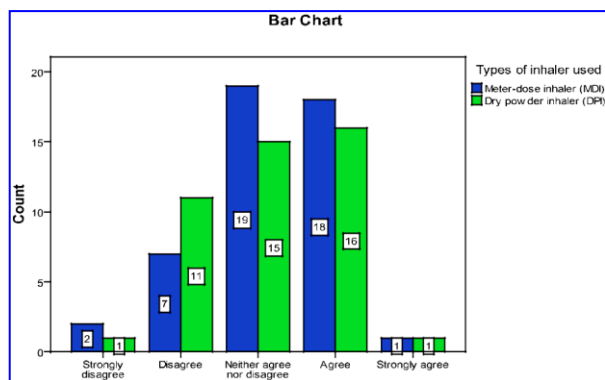


Figure 2: Ease of Patient-Device Coordination

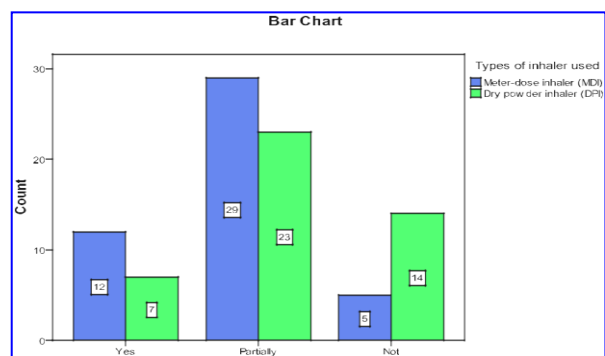


Figure 3: Types or Combination of Inhaler Used

Table 4: ANOVA with Factor DPI and MDI

Description	Sum of Squares	Df	Mean Square	F	Sig.
Good know-how about medication:	Between Groups	1	.086	.087	.769
	Within Groups	89	.983		
	Total	90			
The medication is convenient to use:	Between Groups	1	.155	.354	.552
	Within Groups	89	.439		
	Total	90			
That the staff listen and take the patients view about asthma into Account:	Between Groups	1	.542	.953	.332
	Within Groups	88	.561		
	Total	89			
That diseases is actively followed up:	Between Groups	1	.751	1.377	.244
	Within Groups	89	.545		
	Total	90			
That a health worker is responsible for the patient and his/her asthma:	Between Groups	1	1.189	1.621	.205
	Within Groups	89	.733		
	Total	90			
That the patient received information and education about the diseases:	Between Groups	1	.138	.175	.676
	Within Groups	89	.783		
	Total	90			

Discussion

Asthma is a chronic inflammatory disorder causing hyper-responsiveness of the airways to specific improvements bringing about intermittent variable airflow confinement, at any rate somewhat reversible exhibiting as wheezing, breathlessness, chest, tightness and coughing etc. The etiology is perplexing, and various ecological and hereditary determinants are ensnared. pressurized metered dose inhaler is the pharmacological specialist in a suspension plan that outcomes in a 10% respirable division; an agent in a weaken arrangement definition with an unstable propellant mix may result in up to 40% respirable fraction. The surfactant balances out the suspension by counteracting caking.^[7,8,9,10]

A dry powder inhaler (DPI) is a breath-incited gadget that conveys the medication as particles contained in a capsule or blister that is punctured before use. This kind of inhaler requires a sufficient inspiratory stream for the organization of medications, since it does exclude a propellant. In view of this inspiratory stream prerequisite, DPIs are not suitable for the treatment of intense asthma attacks. For instance, the diskus is a low-resistance device and accordingly is reasonable for treatment

of children and those with decreased lung function, though the turbuhaler is a high-opposition gadget that requires a higher inspiratory stream rate to aerosolize a comparable medication dose.^[11,12,13,14]

Advantages of pMDIs are as its portability, lower risk of bacterial contamination, and multi-dose delivery capability. On the other hand the disadvantages of MDIs are: it needs correct actuation and inhalation coordination, the flammability possibility of new HFA propellants, and Oropharyngeal drug deposition. Additionally, DPI advantages are that it is breath-actuated, there is no need to hold breath after inhalation, spacer is not necessary, No need for propellant, and its portable. The disadvantages for DPI are that it needs adequate inspiratory flow required for medication delivery, the

Humidity potentially causes powder clumping and reduced dispersal of fine particle mass, and it may result in high pharyngeal deposition^[15,16,17,18]

From the ANOVA test result in SPSS, it can be seen that the p value is greater than the general alpha value .05, which indicates that both pMDI and DPI (Aerolozzer) have no significant differences in patient's perspective in rural Bangladesh. Dataset also shows that the pMDI is comparatively more convenient than DPI. Also, DPIs are flow dependent and thusly, require minimal patient-device co-ordination.

Conclusion

In conclusion of the study, it is seen that, pMDI and DPI essentially have no significant different in the perspective of the rural Bangladesh. However, a larger sample size is needed for better validity of the results. The research needs to be continued for a longer period of time to glean the effectiveness of the current asthma medication to create a better treatment plan for the disease.

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