



The Effect of Using Asthma Inhaler with and without Asthma Spacer on Blood O₂ Saturation in Patients with Asthma

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ABSTRACT

Asthma is the most common respiratory tract disease. One of the drugs prescribing in the patients with asthma is inhalation spray or inhaler that is used with or without spacer. The effect of spacer on improving patients with asthma has always been under discussion. Hence, the aim of the current study was to determine the effectiveness of using inhaler on arterial O₂ saturation (Sao₂) with and without a spacer in patients with Asthma. This study was an interventional -experimental research that was concluded at hospitals affiliated to Kermanshah University of Medical science in 2016. Sampling was done by random sampling method and 60 patients were selected and included in two groups, i.e. with spacer and without spacer. The data was collected within three consecutive days using questionnaire and data recording forms. The analyses were performed using SPSS 20 by two-way analysis of variance and independent t-test. The average oxygen saturation in the asthmatic group increased from 87.7667±6.03257 on the first day to 88.9±5.86251 on the third day, and in the asthmatic group, it increased from 89.9667±5.01366 on the first day to 94.8±3.38760 on the third day. Between the levels of time, there was a significant difference between the two groups in asthmatic and non-asthmatic groups (P<0.001). Given the results obtained from this study, it seems that using spacer with inhaler has a significantly positive effect on pulmonary function improvement and increasing blood oxygen saturation.

Keywords: Gender selection, PGD, Implantation, Laboratory Embryo

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INTRODUCTION

Asthma is a chronic inflammatory disease of airway which gives rise to excessive airway sensitivity, mucous edema and mucous secretion [1] generation and as a result gives rise to drastic narrowness and reducing the diameter of airway and symptoms like chest wheeze and dyspnea [2].

The prevalence of asthma around the world is averagely four to seven percent and in Iran it is reported 8 to 12 %. Currently, it is estimated that there are 300 million asthmatic persons around the world and it seems that by 2025, it increases 33% and it reaches to 400 million people [3]. Asthma overshadows all family members [4] and faces healthcare system with exuberant economic costs [5]. This disease like AIDS, diabetes and tuberculosis is raised as a global hygiene problem and due to its increase from 1.5 to 1.7% it brought about healthcare system concern [6]. Annually

roughly 250000 people around the world lose their life due to this disease [7]. In U.S. also annually more than 497000 people are hospitalized due to Asthma. According to Agency for healthcare research and quality (AHRQ), annually 27.6 million dollars is expensed for asthmatic hospitalized patients [7]. The research show that between 5 – 25 % of adult asthma is related to carrier. Carriers with higher risk of affliction to asthma includes dyers, bakers, chiefs, nurses, chemical workers, those who deal with animal, welders, hairdressers and woodcutters [8]. Iran asthma and allergy association has reported the extent of asthma incidence in Iran as roughly 5.9% namely 6.5 million people. The studies indicated in a city like Tehran among each three people, one has the asthma symptoms [9]. disease control in many patients can be done by preventive measures and proper medicinal interventions. Inhaled corticosteroids (ICSs) are standard treatment of most of patients. In most of adults which fail to respond to ICS treatment, one uses long acting beta 2-agonists, LABA) with ICS [10]. In many patients also in spite of complying with all of instruction of use of inhaler, the improper use continues to persist. Among these patients, the amount of input drug to airway is small and some drug is deposited on tongue and pharynx and some is wasted in air. Perhaps in such cases the problems can be solved by use of spacer device to some extent and to have a positive effect on key respiratory factors such as arterial blood oxygen saturation [11]. The results of Newman et al study in 2002 use of spacer accompanied by inhaler increased gas exchange in asthmatic patient [12]. Thus, given the great number of users of inhaler and high prevalence of use of spacer and as the selection of best method for delivery of inhaler drug in asthma control is very more important than selected drug, the current study aims to determine the effect of inhaler use with and without spacer on blood saturation oxygen amount among asthmatic patients so that maybe one can take a positive step for patients physical recovery and curtailing the treatment costs of patients of respiratory disorders using designed sprays.

MATERIALS AND METHODS

This study is intervention empirical type and the statistical population is made up of all patients with asthma hospitalized in Kermanshah University of medical science dependent hospitals.

The criteria of entering includes having at least one year asthma disease history, being at age range 15-65, tendency in participating in the study, having physical and mental ability for use of spray, history of using inhaler and proper use of spacer during spray use and having hemoglobin 10 and higher based on tests inserted in patient medical record.

Sampling is done by random method and among asthmatic patients 60 people with entry criterion are selected. At each day at least four patients are singled out and nearly 10 to 15 minutes is spent for information record, and averagely nearly 20 to 30 days are spent for sampling and information registration. These people are divided into two 30-person group and the first used inhaler with spacer and the other used inhaler without spacer. The demographic and basic data of study is collected and recorded by questionnaire and the information registration notelet. Information registration leaflet has two parts. First section is related to demographic data (age, gender, education etc.) and these data are recorded in quantitative and qualitative data. Another part includes data are obtained by pulse oximetry (Abadis firm model 707) and blood saturation percentage. The data is considered as continuous quantitative with advice of statistics expert. By pulse oximetry device, the base data has been registered during three successive days at 9:00 a.m. and analyzed by SPSS software version 21 and t test and variance analysis with repetitive measures.

RESULTS

The results of this study suggest that examined people in terms of gender in the group with spacer are 23 men (76.7%) and seven women (23.3%) and in group without spacer 22 men (73.7%) and eight women (26.7%), most of participants in both groups were men (Table 1).

Table 1: absolute and relative frequency distribution of studied units in terms of gender of those who are admitted to hospitals dependent to Kermanshah Medical Science University in 2016

Indicator	With spacer		Without spacer	
	Frequency	Percentage	Frequency	Percentage
Male	23	76.7	22	73.3
Female	7	23.3	8	26.7
Total	30	100	30	100

In both group the most use of spray in spacer group with 29 persons (96.7%) and in without spacer 23 persons (76.7%) was Salbutamol. Beclomethasone spray was the least spray used in both group with frequency three people (10%). The greatest percentage of people participating in the group with spacer (66.7%) were villagers and in group without spacer (73.3%) were urban.

Among 30 participants in group with spacer 16 people (53.3%) and from among 30 participants in group without spacer 19 people (63.5%) had the smoking history (Table 2).

Table 2: absolute and relative frequency distribution of study units in terms of the participants smoking background who admitted to hospitals dependent on Kermanshah Medical Science University in 2016

Indicator	With spacer		Without spacer	
	Frequency	Percentage	Frequency	Percentage
History of smoking				
Yes	16	53.3	19	63.5
No	14	46.7	11	36.5
Total	30	100	30	100

Most of participants in both groups with asthma spacer 10 people (33.3%) and without asthma spacer 11 persons (36.7%) have freelancer jobs.

Table 3: SPO2 amount of studied units in terms of group with spacer and without it who admitted to hospitals dependents on Kermanshah medical science university year 2016

Variable Name	Time Group	Average± SD (beginning time)	Average± SD (first time)	Average± SD (second time)	P value (time * group)
SpO2	With asthma spacer	89.9667± 5.01366	91.5667± 4.60647	94.8± 3.38760	<0.001
	Without asthma spacer	87.7667± 6.03257	87.7667± 6.18870	88.9± 5.86251	
	P value (time)		<0.001		

For achieving to general goals of study, SPO2 variable is examined at two levels with space and without it. Given the table 3, one can conclude that the effect of group with spacer and without spacer on SPO2 is significant ($P < 0.001$) and it seems that use of spacer has positive effect on blood oxygen saturation and increases SPO2 than group without spacer. In fact, there is a significant difference between two groups in amount of SPO2 at time and group level ($P < 0.001$).

Using independent t test and average of blood oxygen saturation at two groups with and without

spacer are compared at second day and the results of test showed that there is significant difference ($P < 0.001$) between two groups average in third day (Table 4).

Table 4: comparing SPO2 average of study units in group with and without spacer in terms of third day admitting to hospitals dependent to Kermanshah Medical Science Universities in 2016

Variable name	Time	Group	Average SD (third day)	P value (time *group)
SPO2		With spacer	94.8± 3.3876	0.001
		Without spacer	88.9667± 5.81605	

CONCLUSION

Today with availability of various devices in the market, the problems of use of inhaler drugs are curtailed. One of these devices is asthma spacer that given the need, one can adjust the drug delivery and tune the drug amount up or down. Inhaler drugs may be prescribed for patient by nebulizer with or without spacer. Spacer use smooth the use of spray and improve the drug lung propagation [13]. Some studies compared the inhaled drug prescription through spacer and nebulizer and the results showed that there is not difference between two devices in terms of clinical response. Rahmati et al in a clinical trial showed that training the proper use of inhaler with and without spacer have positive effect on the recovery of respiratory state and key respiratory factors such as arterial blood oxygen saturation and peak expiratory flow rate (PEFR) and gives rise to improvement of quality of life and gas exchange among patients with Asthma ($P < 0.001$) [15]. Given the repeated use of inhalers by asthmatic patients as well as use of spacer upon spry use, it seems that knowing gains and effect of spacer use is essential for patients, physicians and nurses.

The results of this study show that in a group of asthmatic patients which uses spacer upon inhaler use, the average of blood oxygen saturation is more than group that didn't use spacer. This difference is stated by variance analysis test and independent t test in statistical terms. At independent t test, $P < 0.001$ and in analysis of variance $P < 0.001$ and in both tests the difference was significant. The results of study by Niumeno et al showed that in a group that used spacer, gas

exchange and blood oxygen saturation increased and the disease relapse decreased between day 14 and 21. Similarly, the significant difference is found at the stay duration in the emergency ward. Similarly, in asthma spacer group there is a significant difference between two groups about albuterol consumed amount and average albuterol that is distributed by nebulizer was six times greater than albuterol distributed by spacer [12] that is consistent with the results of this study.

In this study, it was revealed that blood oxygen distribution in a group that didn't use spacer there is no difference in various days and even in some stages the outcome was reverse ($P=0.758$). therefore, it seems that use of spacer upon inhaler spray use is necessary. Asthma spacer use technic calls for training. Thus, it is recommended that health caregivers would be fully familiar with the use of spacer and teach the proper technic of use to necessitous patients.

Mortality from asthma is a painful even and by identifying and treating the patients with asthma the asthma related mortality is drastically diminished. The results of this study show that asthma spacer use upon inhaler use affects the recovery of respiratory status and increase of arterial blood oxygen saturation. Even at the cases of failure to use of spacer this slowed down the treatment process. Therefore, use of spacer among asthma patients who use inhaler is quite necessary as there was a difference between arterial blood oxygen saturation among asthmatic patients and use of inhaler with and without spacer. Therefore, the results of this study can be a shot in the arm for healthcare team and incumbent of health ministry so that by comprehensive program of action and by available facilities to heighten the quality of life of asthmatic patients. Similarly, it is suggested that medical science university professors draw on the results of this study for teaching students and other practitioners.

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