e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(6); 2469-2471

Original Research Article

Evaluation of Pulse Rate and Blood Pressure Changes After Nebulized Salbutamol

Amarendra Annavarapu[1], Ekta Satyakumar Singh[2]

[1]Assistant Professor, Dept of Pharmacology, ICARE Institute of Medical Sciences, West Bengal, India
[2]Associate Professor, Dept of Pharmacology, ICARE Institute of Medical Sciences, West Bengal, India

Received: 25-04-2023 / Revised: 23-05-2023 / Accepted: 25-06-2023
Corresponding Author: Amarendra Annavarapu
Conflict of interest: Nil

Abstract:

Background: Nebulized salbutamol is commonly used in the management of acute bronchospasm in patients with asthma and chronic obstructive pulmonary disease (COPD). Although effective as a bronchodilator, salbutamol may produce cardiovascular side effects such as tachycardia and changes in blood pressure.

Objective: To evaluate the changes in pulse rate and blood pressure after administration of nebulized salbutamol in patients presenting with acute bronchospasm.

Methods: A prospective observational study was conducted in 120 patients receiving nebulized salbutamol in the emergency and respiratory departments of a tertiary care hospital. Pulse rate, systolic blood pressure (SBP), and diastolic blood pressure (DBP) were recorded before nebulization and at 15 minutes and 30 minutes after administration. Data were analyzed using paired t-test, and p-values <0.05 were considered statistically significant.

Results: The mean pulse rate increased significantly after nebulized salbutamol administration from 84.6 ± 10.2 beats/min at baseline to 96.8 ± 11.4 beats/min at 15 minutes and 94.1 ± 10.9 beats/min at 30 minutes ($p<0.001$). Mean SBP showed a mild increase from 118.5 ± 12.6 mmHg to 121.3 ± 13.1 mmHg at 15 minutes ($p=0.032$), while DBP decreased slightly from 76.4 ± 8.3 mmHg to 74.2 ± 7.9 mmHg ($p=0.041$).

Conclusion: Nebulized salbutamol causes significant transient increases in pulse rate with mild alterations in blood pressure. Monitoring of vital signs is recommended, especially in elderly patients and those with cardiovascular comorbidities.

Keywords: Salbutamol, Nebulization, Pulse Rate, Blood Pressure, Bronchodilator, Cardiovascular Effects.

Introduction

Salbutamol is a selective β2-adrenergic receptor agonist widely used for the treatment of bronchial asthma and chronic obstructive pulmonary disease (COPD) [1]. Nebulized salbutamol provides rapid bronchodilation and symptomatic relief in acute exacerbations [2]. Despite its pulmonary benefits, systemic absorption may result in cardiovascular adverse effects such as tachycardia, palpitations, and fluctuations in blood pressure [3].

Several studies have documented the cardiovascular effects of β2 agonists, but limited data are available regarding short-term hemodynamic changes following nebulized salbutamol in routine clinical settings [4,5]. Understanding these effects is important for safe administration, especially in patients with underlying cardiovascular diseases.

The present study aimed to evaluate pulse rate and blood pressure changes after nebulized salbutamol administration in patients with acute bronchospasm.

Materials and Methods

Study Design and Setting: A prospective observational study was conducted over six months in the Department of Pulmonary Medicine and Emergency Medicine at a tertiary care teaching hospital following standard bronchodilator administration guidelines.

Study Population: A total of 120 patients aged 18–65 years who required nebulized salbutamol for acute bronchospasm were included.

Inclusion Criteria

- Patients diagnosed with bronchial asthma or COPD exacerbation, Patients requiring nebulized salbutamol, Age between 18 and 65 years, Patients willing to provide informed consent

Exclusion Criteria

- Known cardiac arrhythmias, Severe hypertension, Ischemic heart disease, Use of β-blockers, Pregnancy

Procedure: Baseline pulse rate, systolic blood pressure (SBP), and diastolic blood pressure (DBP) were recorded before nebulization. Patients received 2.5 mg salbutamol diluted in 3 mL normal saline via nebulizer according to standard therapeutic recommendations. Vital signs were recorded again at 15 minutes and 30 minutes after nebulization.

Statistical Analysis: Data were analyzed using SPSS version 25. Continuous variables were expressed as mean ± standard deviation. Paired t-test was used to compare pre- and post-nebulization values. A p-value <0.05 was considered statistically significant.

Results

Demographic Characteristics

Table 1: Demographic Profile of Study Participants (n=120)

Variable	Number (%)
Male	72 (60%)
Female	48 (40%)
Mean Age (years)	42.5 ± 11.8
Bronchial Asthma	78 (65%)
COPD	42 (35%)
Smokers	38 (31.7%)
Hypertension	22 (18.3%)

Table 2: Pulse Rate Changes After Nebulized Salbutamol

Time Interval	Mean Pulse Rate (beats/min)	Mean Difference	p-value
Baseline	84.6 ± 10.2	—	—
15 Minutes	96.8 ± 11.4	+12.2	<0.001
30 Minutes	94.1 ± 10.9	+9.5	<0.001

The pulse rate increased significantly at both 15 minutes and 30 minutes following nebulized salbutamol administration, consistent with the known β-adrenergic effects of salbutamol.

Table 3: Systolic Blood Pressure Changes After Nebulized Salbutamol

Time Interval	Mean SBP (mmHg)	Mean Difference	p-value
Baseline	118.5 ± 12.6	—	—
15 Minutes	121.3 ± 13.1	+2.8	0.032
30 Minutes	119.8 ± 12.9	+1.3	0.118

A mild transient increase in systolic blood pressure was observed at 15 minutes, similar to findings reported in previous bronchodilator studies.

Table 4: Diastolic Blood Pressure Changes After Nebulized Salbutamol

Time Interval	Mean DBP (mmHg)	Mean Difference	p-value
Baseline	76.4 ± 8.3	—	—
15 Minutes	74.2 ± 7.9	-2.2	0.041
30 Minutes	75.1 ± 8.1	-1.3	0.084

A slight reduction in diastolic blood pressure was noted after nebulization, likely secondary to peripheral vasodilation induced by β2 receptor stimulation.

Table 5: Adverse Effects Following Nebulized Salbutamol

Adverse Effect	Frequency (%)
Palpitations	18 (15%)
Tremors	14 (11.7%)
Headache	6 (5%)
Dizziness	4 (3.3%)
No Adverse Effects	78 (65%)

Discussion

The present study demonstrated a significant increase in pulse rate following nebulized salbutamol administration. This finding is consistent with the pharmacological action of salbutamol as a β2-adrenergic agonist, which may produce tachycardia through peripheral vasodilation and reflex sympathetic stimulation [1,4]. Similar findings have been reported in previous studies evaluating inhaled β2 agonists [5].

A mild transient increase in systolic blood pressure and slight reduction in diastolic blood pressure

were also observed after nebulization. These changes are likely related to β2 receptor-mediated cardiovascular effects and were generally clinically insignificant [3,5].

Palpitations and tremors were the most common adverse effects noted in the study, which is comparable with earlier reports on nebulized salbutamol therapy [3]. No serious cardiovascular complications were observed.

Overall, nebulized salbutamol was well tolerated, although monitoring of vital signs is advisable, especially in elderly patients and those with pre-existing cardiovascular disease.

Conclusion

Nebulized salbutamol significantly increases pulse rate and produces mild transient changes in blood pressure. Although these effects are usually clinically insignificant, monitoring of cardiovascular parameters is advisable, especially in patients with pre-existing cardiac disease.

References

1. Barnes PJ. Beta-adrenergic receptors and their regulation. Am J Respir Crit Care Med. 1995;152(3):838-860.
2. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention. 2022.
3. Cazzola M, Matera MG. Safety of beta2-agonists in the treatment of airway diseases. Drug Saf. 2012;35(6):501-515.
4. Johnson M. Mechanisms of action of beta2-agonists. Pulm Pharmacol Ther. 2001;14(1):1-10.
5. Rodrigo GJ, Rodrigo C. Cardiovascular effects of inhaled bronchodilators. Chest. 1998;114(2):411-415.