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A COMPARATIVE STUDY OF THE EFFICACY AND SAFETY OF NEBULIZED VERSUS INTRAVENOUS MAGNESIUM SULFATE IN ADULTS WITH ACUTE ASTHMA EXACERBATIONS: A RANDOMIZED CONTROLLED STUDY

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Aim: *To assess the effectiveness and Safety of the recommended dosage of magnesium sulfate (MgSO4), 2000 mg, administered via nebulizer and intravenous routes, when added independently to the recommended asthma treatment regimen.* ***Methods:*** *123 adult patients with acute asthma exacerbations participated in a prospective interventional trial at the Beni-Suef University Hospital. Patients were classified into group (I), which received IV MgSO4; group (II), which received nebulized MgSO4; and group (III), the control group. Blood pressure, respiratory rate, pulse, peak expiratory flow rate (PEFR) measurement using a peak flow meter, Fischl index, together with the necessity for hospitalization in individuals with severe bronchial asthma, were done for all patients before treatment, immediately after the treatment, "30", and "60" min after treatment.* ***Results****: Our study found that MgSO4 can effectively treat respiratory distress, as both the IV and inhaled groups showed improvement in PEFR at 30 minutes (P<0.001), with no significant difference between them (P=0.882). The control group, however, experienced a decrease in PEFR (P=0.001).* ***Conclusion:*** *The current study showed that IV MgSO4 was more effective than nebulized MgSO4 for asthma exacerbation. However, IV and nebulized MgSO4 developed more benefits than the control group. The current study highlights the higher efficacy of IV route of administration of MgSO4 than the inhalation route to help the health care providers and pulmonologists to tailor better clinical interventions for patients with asthma exacerbations.*

Keywords: *Asthma, Magnesium Sulfate, Intravenous, Nebulized, Respiratory Rate, PEFR, FISCHL index*

INTRODUCTION

Asthma is a widespread chronic airway disease that affects a lot of people. It is characterized by inflammation of the bronchial and bronchioles, which causes the airways to become narrower. This narrowing is caused by the contraction of the smooth muscle in the airways and increased mucus production and secretion. It can be a severe condition and needs to be managed carefully. This causes nighttime or early morning wheezes, trouble breathing, and coughing[1]. With or without therapy, constricted airways are frequently reversible[2].

During an asthma attack, seeking treatment promptly to prevent further complications and minimize potential health risks is critical. Research has shown that acute exacerbations of bronchial asthma can lead to increased morbidity and mortality rates, which is why addressing these symptoms as soon as

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they arise is vital[3]. By taking swift and effective action, patients can reduce the likelihood of future exacerbations and prevent additional lung function loss from untreated asthma attacks[4,5].

Salbutamol inhalation and oxygen therapy, supported by anticholinergic medications and intravenous steroids, are significant treatments[6-8]. A severe bronchial asthma attack that does not improve with corticosteroids and traditional bronchodilators is referred to as acute asthma or status asthmaticus[9,10]. A medical emergency is when a blockage of the airways occurs that could result in death, as it may lead to morbidity, mortality, and socioeconomic problems[1]. So, moderate and severe acute asthmatic attacks need adjunct therapy and new effective improvement methods[2]. Conversely, a lack of magnesium can lead to wheezes, airway hyperreactivity, and weakened lung capacity. Magnesium is used to treat and prevent asthma because numerous studies have indicated that it may relax the smooth muscles of the lungs[11-13]. Magnesium is an excellent additional treatment for acute asthma exacerbations in severe degree because magnesium has bronchodilator and anti-inflammatory properties[3]. Patients not responding to conventional asthma therapy may benefit from MgSO4 as an alternative. In the management of asthma, MgSO4 works through a complex method. A study investigated the relationship between hypomagnesemia and pulmonary function tests in patients with chronic asthma revealed that acetylcholine, histamine release, and cellular equilibrium are all affected by MgSO4. It is also a calcium antagonist that prevents the contraction of the smooth muscles in the lungs and encourages bronchodilation. People with moderate to severe asthma have seen significant improvement in their lung function after receiving IV MgSO4. The effectiveness of nebulized MgSO4 for the treatment of acute asthma, however, has not been well studied, and the results must be more consistent[14]. The current study compares the effectiveness and safety of a conventional dose of 2000 mg of MgSO4 administered via intravenous and nebulized methods and the addition of each technique to the recommended course of treatment for asthma exacerbations.

MATERIALS AND METHODS

Setting and design

In Egypt's Beni-Suef, the prospective interventional study was conducted at the university hospital during the period from March to June 2023. The randomization process was done using a sealed envelope approach. According to the Declaration of Helsinki principles, Ethics approval was received from Beni-Suef University's Faculty of Medicine Ethics Committee. The registration number for approval is #FWA00015574. Before participating in the current trial, the patients sign an informed consent form. The study was additionally NCT05908864-registered on Clinical Trials. gov.

PATIENTS AND METHODS

Following the exclusion of three patients with newly diagnosed heart failure and five patients with newly diagnosed renal failure, 123 adult patients of both sexes between the ages of 18 and 50 who were admitted to the chest department with an acute bronchial asthma attack were included according to GINA guidelines 2017[4,5], as shown in **Fig. 1**. The Raosoft formula was used to determine the sample size[15].

All patients were subjected to complete history taking blood sampling for serum magnesium measurement (on admission before and after the initial treatment). Three equal groups of patients were randomly selected. The three groups of 41 patients each were divided using the closed-envelope approach.

Group (I) was successfully managed using an initial treatment strategy. Our approach involved supplemental oxygen therapy to maintain oxygen saturation levels above 90%. Additionally, one session of nebulization of salbutamol respirator solution diluted with normal saline solution was performed. This respirator solution, Farcolin, produced by Pharco Pharmaceuticals in Alexandria, Egypt, contains 0.121 g of salbutamol sulfate every 20 ml. Finally, we administered 100 mg of hydrocortisone intravenously in a single dose using a Pfizer license. The hydrocortisone was in the form of Solu-Cortef, a vial containing 100 mg of sodium hydrocortisone and sodium

succinate dissolved in 2 ml of sterile bacteriostatic water for IV injection plus a single dose (2000 mg) of MgSO4 prepared by mixing 20 ml of 10 % MgSO4 (2000 mg)[6],manufactured by Memphis Pharmaceuticals and Chemical Industries, with 30 ml of distilled water for injection to produce 50 ml of isotonic MgSO4 solution (324 MSOM/L) administered intravenously over 1 hour. Group II has been managed by the same initial treatment plan plus a single dose (2000 mg) of MgSO4 prepared by mixing 20 ml of 10 % MgSO4 (2000 MG)[6], manufactured by Memphis Pharmaceuticals and Chemical Industries, with 30 ml of distilled water to produce 50 ml of isotonic MgSO4 solution (324 MSOM/L). Each dose was nebulized using a jet nebulizer over 1 hour. The same treatment plan was managed Group III (a control group) Without using MgSO4.

The following outcome measures were recorded for each patient at a fixed interval (before the initial treatment, immediately after the initial treatment, and 30 and 60 min after the initial treatment):

Blood pressure, respiratory rate, and pulse rate, A peak flow meter is an instrument for measuring peak expiratory flow, Asthma relapses and hospitalizations, Fischi index[16].

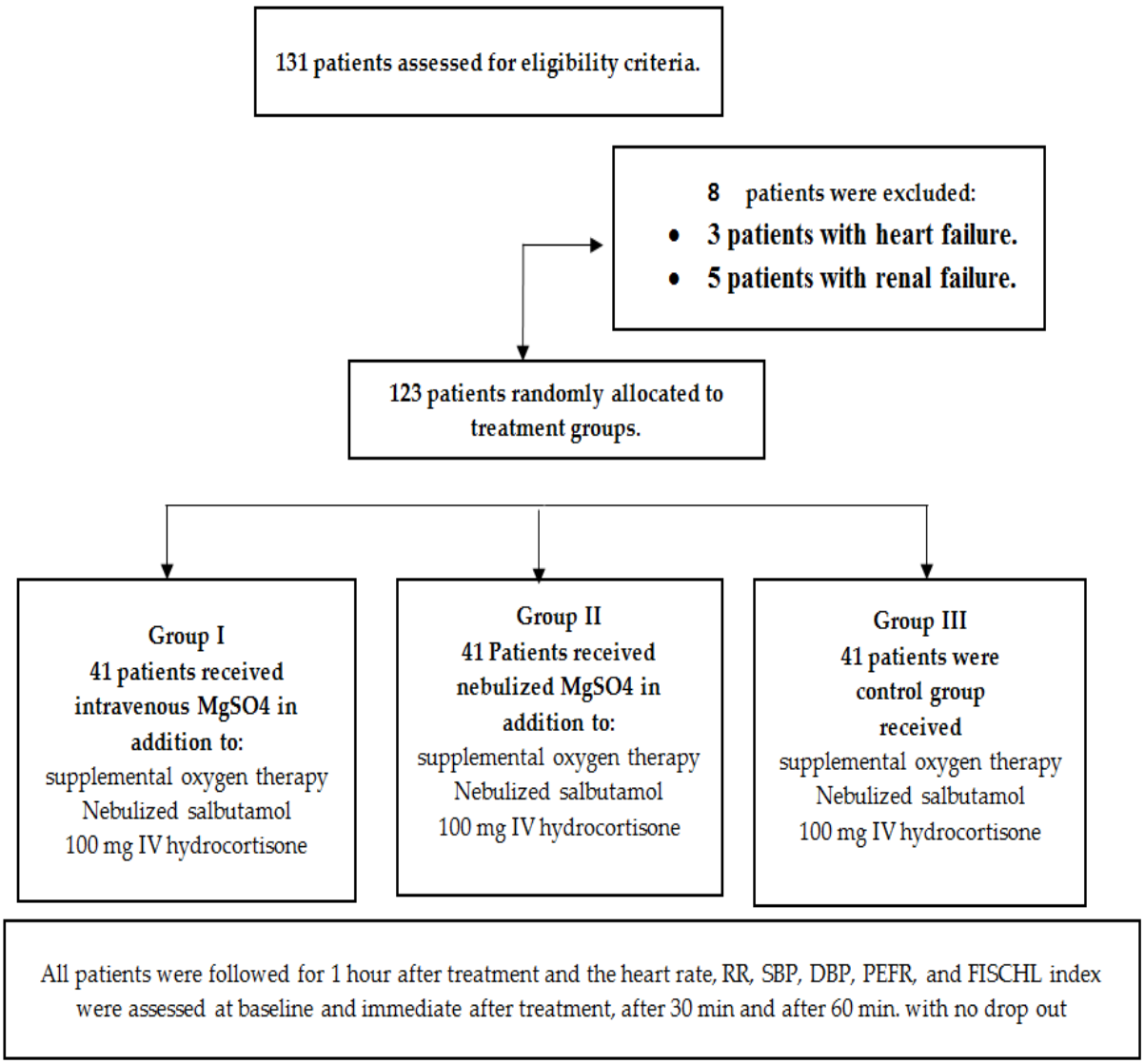

Fig. 1: Flow chart of the study patients.

Exclusion criteria

The current study excluded patients older than 50 or under 18 years old. Patients with chronic obstructive lung disease, kidney illness, or heart failure. Also, patients with contraindication to MgSO4 or allergy. In addition, patients who refused participation in the study or who did not sign the informed consent form were excluded from the trial.

Statistical Analysis

SPSS version 23 was used to conduct the statistical analysis. Means and standard deviations (SDs) were used to describe patients' initial characteristics. Based on Wilcoxon-signed rank, each group was monitored over time. The Kruskal-Wallis non-parametric test analyzed the FISCHL index, heart rate, PEFR, and systolic blood pressure. P-values less than 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

Results

Efficacy and safety of nebulized MgSO4 and intravenous MgSO4 were compared in a study of asthma exacerbations treated with high-dose nebulized MgSO4 and standard-dose intravenous MgSO4. As previously mentioned, the patients were enrolled into three matched groups:

- **Group (I):** IV MgSO4.
- **Group (II):** High-dose nebulized MgSO4.
- **Group (III):** Control group.

Statistically, none of the three groups differed significantly from each other regarding cough productivity, age, gender, body weight, or systolic blood pressure, but as regards diastolic blood pressure and heart rate were significantly lower in group I, respiratory rate was significantly higher in group II, as shown in **Table 1.**

Table 1: Baseline characteristics among the studied groups:

Items	Group I (no=41) N(%)	Group II (no=41) N(%)	Group III (no=41) N(%)	Test of significance	P-value
Gender					
Females	28(68.3%)	20(48.8%)	28(68.3%)	$\chi 2$ =	0.110
Males	13(31.7%)	21(51.2%)	13(31.7%)	4.408	
Age (mean±SD)	38.9±9.1	39.2±7.7	38.1±8.2	H= 0.483	0.786
Weight (mean±SD)	84.7±14.6	83.2±11.6	79.8±12.5	H= 2.380	0.304
Systolic BP (mean±SD)	122.2±23.8	129±23.7	133.0±23.5	H= 4.850	0.088
Diastolic BP (mean±SD)	78.7±7.9a	83.5±11.6b	81.6±7.3b	H= 6.533	0.038*
Respiratory rate (mean±SD)	26.2±6.7a	31.2±7.6b	26.9±6.6a	H= 10.322	0.006*
Heart rate (mean±SD)	83.4±20.8a	90.7±18.8b	90.4±21.9b	H= 6.77	0.034*
Cough					
Non-productive	18(43.9%)	24(58.5%)	22(53.7%)	$\chi 2$ =	0.402
Productive	23(56.1%)	17(41.5%)	19(46.3%)	1.824	
Smoking					
Non-smoker	18(43.9%)	24(58.5%)	22(53.7%)		0.035*****
Ex-Smoker	23(56.1%)	17(41.5%)	19(46.3%)	$\chi 2$ =	
Smoker	18(43.9%)	18(43.9%)	18(43.9%)	10.216	

a & b: There is a significant difference (P>0.05) between any two groups, within the same row not having the same letter .

($\chi 2$): Chi-square Test. **H**: Kruskal-Wallis test.

p: p value for comparing between the studied groups.

*P-value <0.05 is significant **P- value ≤0.001 highly significant.

The current study also found no statistically meaningful distinction between the baseline systolic blood pressures of the three groups. Intriguingly, the systolic blood pressure dramatically decreased with time in the IV and inhaled magnesium groups at the same pace but remained stable in the control group. Additionally, as shown in **Fig. 2**, the systolic blood pressure in the control group was significantly higher immediately following treatment (120.0±15.3, 124±13.2, 135.0±17.9,p<0.001*), after 30 minutes (123.5±19.0, 123±13.8, 135.5±18.0, p=0.001*), and after 60 minutes (122.2±17.7, 125.9±12.2, 134.5±17.5, p=0.003*) than the IV and inhaled magnesium groups.

Additionally, there was a statistically meaningful distinction in the baseline diastolic blood pressure of the three groups. Additionally, as shown in **Fig. 3**, there was a considerable difference between the IV and inhaled magnesium groups and the control groups in the diastolic blood pressure with time at the same rate. The diastolic blood pressure in the control group was significantly higher immediately following treatment (77.87.9, 82.4±6.9, 85.9±7.6, p<0.001*) , after 30 minutes (80.5±8.1, 80.9±7.3, 85.9±8.0, p=0.008*), and after 60 minutes (79.6±8.5, 80.5±6.6, 85.0±7.1, p=0.005*) than the IV and inhaled magnesium groups.

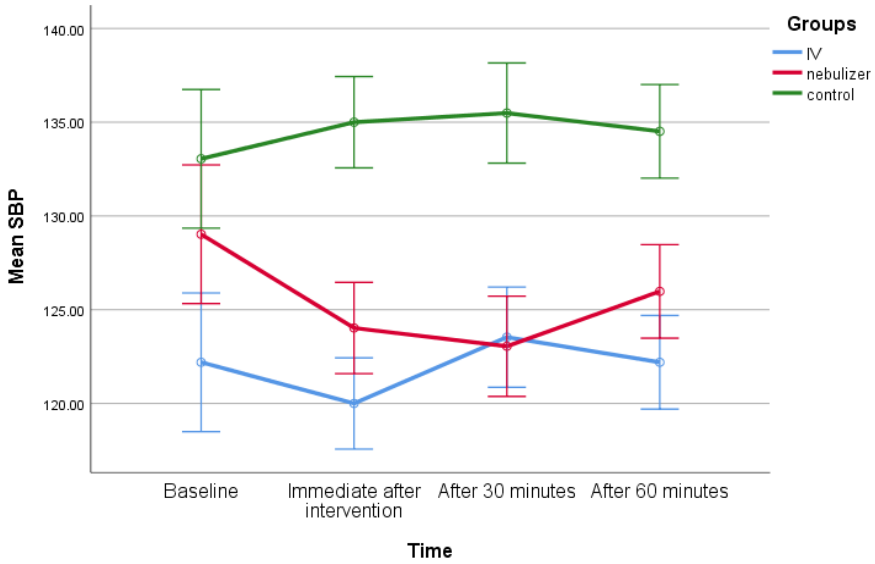

Fig. 2: Follow-up of systolic blood pressure in the three groups.

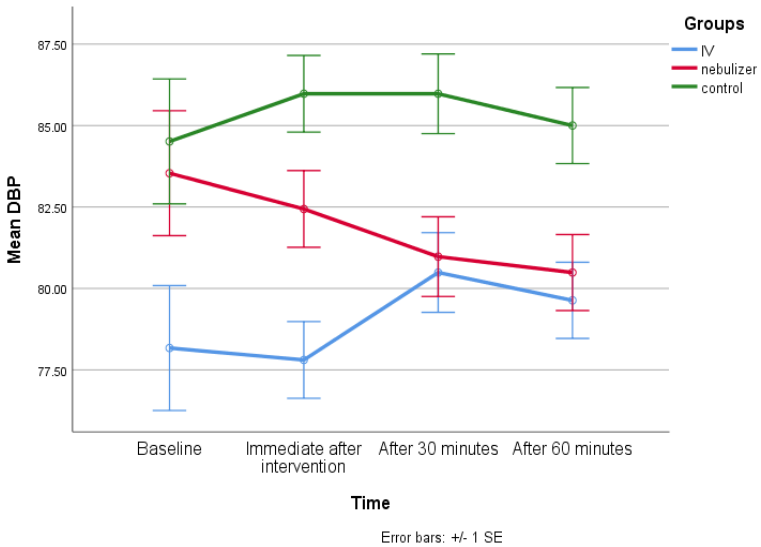

Fig. 3: Follow-up of diastolic blood pressure in the three groups.

There was a statistically meaningful distinction in the baseline respiratory rates of the three groups. According to **Table 2**, there was a substantial increase in respiratory rate in the IV and inhaled magnesium groups than control group at 30 and 60 minutes after treatment.

Interestingly, the baseline heart rates of the three groups varied significantly statistically. There was no discernible change in the heart rates of the three groups immediately following treatment, after 30 minutes, or after 60 minutes. But as seen in **Table 3**, both the magnesium-inhaled and the control groups had significant heart rate changes over time.

There was a statistically meaningful distinction in the baseline PEF rates of the three groups (124.5±55.4, 118.1±67.1, 180.0±86.5, p=0.076). In both the IV MgSO4 group and the inhaled MgSO4 group, the PEFR significantly increased from baseline to maximum at 30 minutes and 60 minutes, PEF rates were (124.5±55.4, 225.2±86.8, 237.6±95.8, 235.1±97.8, p=0.001) in the IV MgSO4 group, and (118.1±67.1, 226.7±89.9, 233±93.4, 236.5±94.1, p=0.001) in the inhaled MgSO4 group, with no discernible difference between the two groups. According to **Fig. 4**, the control group's PEFR significantly decreased (180.0±86.5, 237.1±95.1, 227.193.1, 227.6±93.1, p=0.001*)

However, there was no statistically meaningful distinction in the first Fischl indices of the three groups (3.4±1.2, 3.8±1.1, 2.9±0.9, p=0.076). The index immediately following treatment dramatically dropped to be comparable in the IV and inhaled groups but notably different from the control group. **Fig. 5** shows a statistically meaningful decrease in the IV and inhaled MgSO4 groups than the control group immediately (0.6±0.6, 0.6±0.7, 1.5±1.3 p=0.001), 30 minutes (0.6±0.6, 0.5±0.7, 1.5±1.2 p=0.001), and 60 minutes (0.7±0.7, 0.5±0.6, 1.5±1.2 p=0.001), after treatment.

Table 2: Follow up of the respiratory rate from baseline to immediate after treatment, 30 and 60 minutes after treatment among the studied groups.

Respiratory rate (mean±SD)	Group I no=41 (%)	Group II no=41 (%)	Group III no=41 (%)	Test of significance	P-value
Baseline	26.2±6.7a	31.2±7.6b	26.9±6.6a	H=10.322	0.006*
Immediate after treatment	23.6±3.7a	25.6±5.8a	24.3±5.7a	H=3.541	0.170
After 30 min.	24.3±5.7a	26.1±5.4b	23.7±5.2a	H=10.259	0.006*
After 60 min.	24.5±3.7a	25.9±5.4a	23.8±5.3b	H=7.054	0.029*
P1	0.006*	<0.001*	0.001*		
P2	0.012*	<0.001*	0.001*		
P3	0.051	<0.001*	0.001*		
P4	0.130	0.097	0.077		
P5	0.007*	0.350	0.048		
P6	0.031*	0.146	0.832		

H: Kruskal-Wallis test for comparison between groups.
a & b: There is a significant difference (P>0.05) between any two groups, within the same row not having the same letter.
Wilcoxon signed rank test: for comparison of the progress over time for each group.
P1 (baseline vs. immediate after treatment), **P2** (baseline vs 30 minutes), **P3** (baseline vs 60 minutes), **P4** (immediate after vs. 30 minutes), **P5** (immediate after vs. 60 minutes), **P6** (30 minutes vs 60 minutes).
p: p value for comparing between the studied groups.
*P-value <0.05 is significant.

Table 3: Follow up of the heart rate from baseline to immediate after treatment, 30 and 60 minutes after treatment among the studied groups.

Heart rate (mean± SD)	Group I no=41 (%)	Group II no=41 (%)	Group III no=41 (%)	Test of significance	P-value
Baseline	83.4±20.8a	90.7±18.8b	90.4±21.9b	H=6.77	0.034*
Immediate after treatment	84.7±12.8a	84.9±8.8a	87.5±15a	H=0.136	0.934
After 30 min.	84.4±12.3a	84.6±7.6a	89.0±16.3a	H=0.927	0.629
After 60 min.	83.0±11.1a	84.9±8.6a	89.1±15.9a	H=2.507	0.268
P1	0.676	0.031*	0.565		
P2	0.773	0.024*	0.879		
P3	0.989	0.033*	0.819		
P4	0.812	0.574	0.037*		
P5	0.058	0.934	0.022*		
P6	0.074	0.623	0.670		

H: Kruskal-Wallis test for comparison between groups.
a & b: There is a significant difference (P>0.05) between any two groups, within the same row not having the same letter.
Wilcoxon signed rank test: for comparison of the progress over time for each group.
P1 (baseline vs. immediate after treatment), **P2** (baseline vs 30 minutes), **P3** (baseline vs 60 minutes), **P4** (immediate after vs. 30 minutes), **P5** (immediate after vs. 60 minutes), **P6** (30 minutes vs 60 minutes).
p: p value for comparing between the studied groups.
*P-value <0.05 is significant.

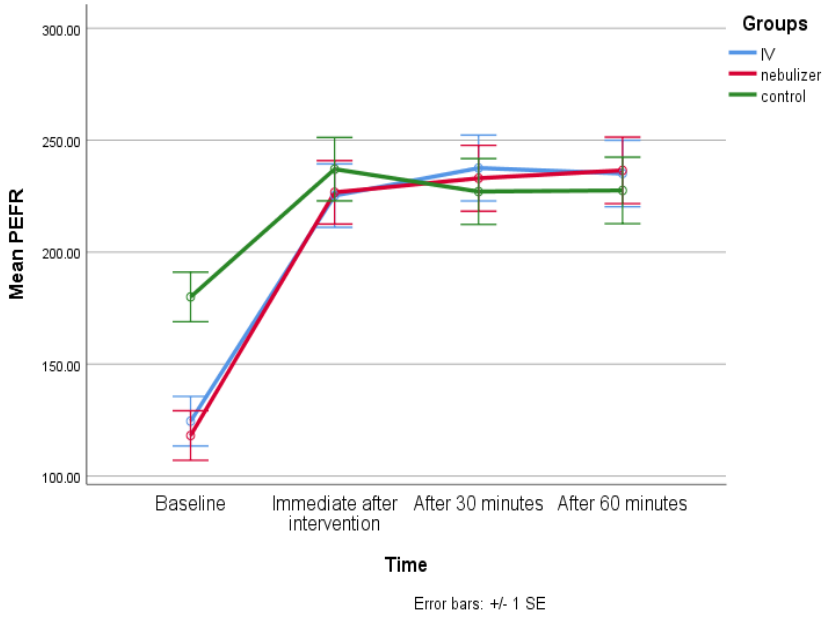

Fig. 4: Follow-up of PEFR in the three groups.

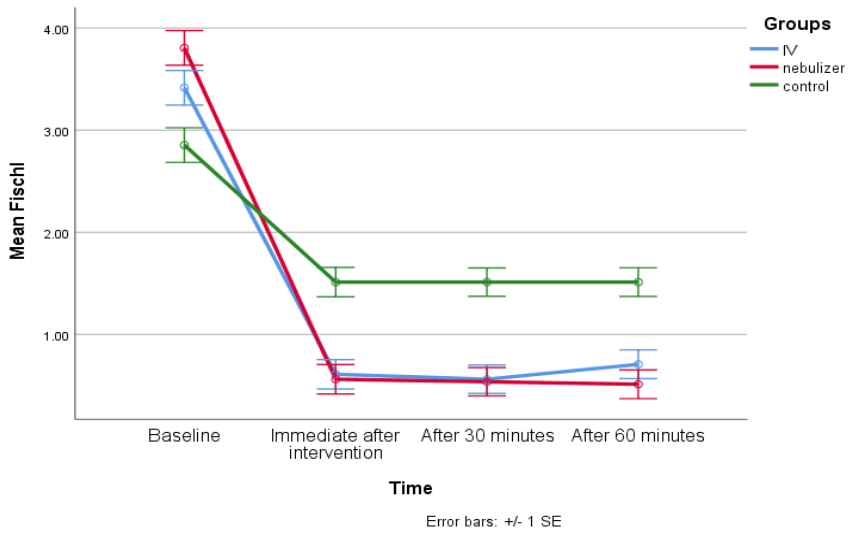

Fig. 5: Follow up of FISCHL index in the three groups.

Furthermore, the three groups differed statistically significantly regarding their serum magnesium level before and after treatment. When the groups were followed up, the serum magnesium level increased dramatically in the IV MgSO4 group (2.0±0.2, 2.4±0.2, p=0.001) and the inhaled MgSO4 group (1.9±0.2, 2.2±0.3, p=0.001). Still, it decreased significantly in the control group (2.2±0.3, 2±0.3, p=0.001) as shown in **Fig. 6**.

Finally, statistically significant differences were found between the three groups in the FISCHI index, PEFR, and serum magnesium level (from the start of the trial to the end). In the IV and nebulized MgSO4 groups, PEFR and serum magnesium increased dramatically and nearly similarly, but significantly differently from the control group. Additionally, as shown in **Table 4**, the FISCHI index dramatically dropped and decreased approximately equally in the IV and nebulized MgSO4 groups but significantly differed from the control group.

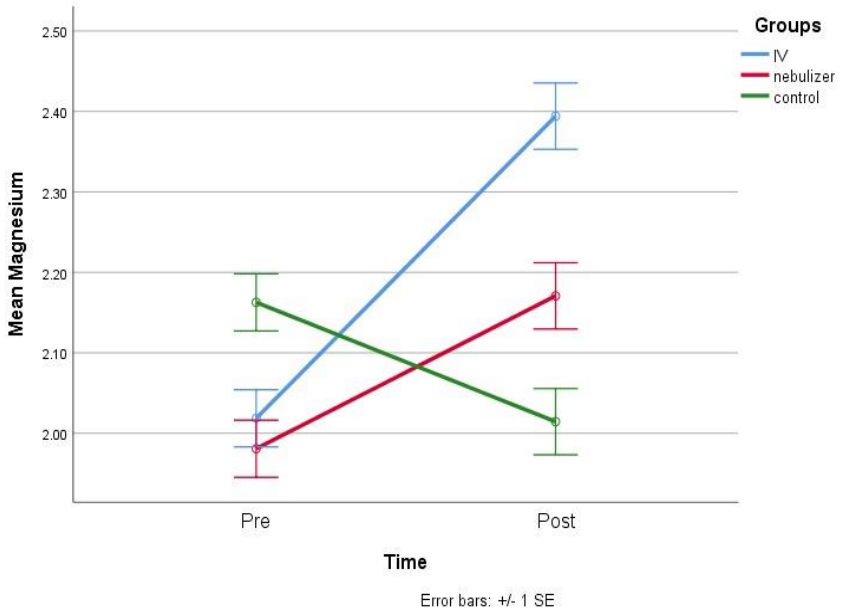

Fig. 6: Follow-up of serum magnesium in the three groups.

Table 4: Comparison of the percentage changes in different parameters between the three groups.

% of difference (Median (IQR))	Group I no=41 (%)	Group II no=41 (%)	Group III no=41 (%)	Test of significance	P-value
SBP	0(-3.6 to 0)	0(-8 to 6.9)	0(0 to 0)	H=0.517	0.772
DBP	0(-12.5 to 0)	0(0 to 11.1)	0(-13.4 to 0)	H=3.438	0.179
HR	0(-63.1 to 23.8)	0(0 to 17.8)	0(-30.4 to 16.7)	H=3.693	0.158
RR	0(0 to 16.7) a	13.3(7.4 to 28.3) b	10(0 to 20) a	H=10.597	0.005*
Fischl index	75(66.7 to100) a	100(75 to100) a	50(29.2 to 70.8) b	H=34.364	<0.001**
PEFR	-81.8(-155 to-34.1) a	-100(-205.6 to -50)a	-18.2(-41.4 to 0)b	H=28.642	<0.001**
Serum Mg	-15.8(-24.4 to -12.8) a	-9.1(-14.3 to -5) b	6.1(4.6 to 9.5) c	H=83.420	<0.001**

a, b & c: There is a significant difference (P>0.05) between any two groups, within the same row not having the same letter.
H: Kruskal-Wallis test.
p: p value for comparing between the studied groups.
**P- value ≤0.001 highly significant.

Discussion

A comparison of age, gender, body weight, and cough productivity between the three groups in this study did not show any statistically significant differences. This outcome is regarded as a robust solution point that facilitates a fair comparison of the three groups. The baseline systolic blood pressure of the three groups did not differ statistically significantly from one another.

In addition, the current study showed that PEFR was improved with the IV and inhaled magnesium. Similarly, Mohamed et al. (2018) noted an improvement in PEFR with acute asthma patients after nebulized MgSO4[17]. The treatment of severe acute asthma with intravenous MgSO4 is described as a promising option in Farshadfar et al. (2021), where the Peak expiratory flow rates change between 0 and 60 min was15.2% in the IV magnesium sulfate group[18]. Magnesium may inhibit smooth muscle contractions in acute asthma, Calcium ions cannot enter respiratory smooth muscles because magnesium SO4 prevents them from entering[19]. Additionally, the current study discovered that treating acute asthma with IV and inhaled MgSO4 is effective and beneficial. Whenever oxygen, nebulized short-acting beta2-agonists, or intravenous corticosteroids have failed to relieve acute asthma, IV corticosteroids may be used. It has been demonstrated that MgSO4 lowers hospital admissions and enhances lung health[2]. Similar outcomes were noticed by Kimia Farshadfar (2021) concerning the PEFR-improving effects of IV MgSO4 in acute asthma[18]. This was by Vafadar et al. (2020), who stated that IV MgSO4 may be helpful as an adjunct therapy with acute asthmatic patients[19]. Daengsuwan (2017) revealed that IV MgSO4 may be more effective than nebulized magnesium[20]. Furthermore, the current study suggested a clinical benefit from intravenous or nebulized MgSO4 compared to the control group. However, there was no notable variation in the impact of MgSO4 on PEFR when comparing intravenous and nebulized administration methods. Similarly, Brian H Rowe (2013) suggested a slight difference between IV and nebulized MgSO4 was developed concerning breathlessness scores[21]. Steve Goodacre (2013) presented that intravenous or nebulized MgSO4 did not add any clinical benefit compared to placebo; the early termination of trials may explain this contrasting result and not completing their study. However, they reported that IV MgSO4 might help decrease the hospital admission rate[22].

Moreover, the present study suggested that IV and nebulized MgSO4 affected blood pressure, respiratory rate, and heart rate. There was a significant decrease in the systolic and, to some extent, the diastolic blood pressure over time in the IV and inhaled magnesium

groups, but this didn't happen in the control group. The control group had a significantly higher systolic blood pressure in all measured times, as in **Fig.s 2 and 3**.

In all three groups, there were statistically significant differences regarding their baseline respiratory rate, PEF rate, and heart rate, as represented in **Tables 2 and 4**. So, direct comparison was avoided, and percent change was used for comparison that showed PEFR and serum magnesium increased significantly and almost equally in the IV and nebulized MgSO4 but substantially different from the control group. In addition, the FISCHI index significantly decreased and almost equally in the IV and nebulized MgSO4 but substantially different from the control group.

MgSO4 nebulized in a bronchodilator effect was found to improve the clinical condition in acute asthmatic patients by Elrifai et al. (2020)[23]. Leigh et al. (2021) suggested that antibiotics benefited patients with bacterial infection by decreasing the critical exacerbation duration and recovering the respiratory tract spasm[24]. Baseline Fischl index of the three groups didn't differ significantly, but immediately after treatment the index decreased significantly to be similar in the inhaled and IV groups but substantially different from the control group. There was a statistically significant decrease in the IV and inhaled MgSO4 than the control group immediately after treatment, 30, and 60 minutes. As illustrated in **Fig. 5**.

Finally, the current study indicated the improvement in fischl index was reported when asthmatic patients received IV and nebulized MgSO4 compared to the control group. IV and nebulized MgSO4 had the same effect on the fischl index. Similar to our results, Hatem A Sarhan (2016) reported that the fischl index was improved with nebulized MgSO4[25].

In the safety part, there was no serious adverse reaction in both nebulized and IV MgSO4, where only two patients reported nasal sting sensation during the first dose of nebulized MgSO4 treatment, and one patient had mild vomiting in the IV MgSO4 group. Their symptoms were spontaneously improved without MgSO4 discontinuation nor extra treatment. In addition, serum magnesium levels did not increase in both treatment groups. The safety of inhaled MgSO4 in our study was not differed from the previous study of Daengsuwan of the efficacy and safety of nebulized magnesium sulfate and intravenous magnesium sulfate in children with severe acute asthma.

Conclusion

IV and nebulized MgSO4 have a bronchodilator effect on acute asthmatic patients who are not responding to other treatments. The current study showed IV MgSO4 was more effective than nebulized MgSO4 .This will help the health care providers and pulmonologists to tailor better clinical interventions for patients with asthma exacerbations. However, IV and nebulized MgSO4 developed more benefits than the control group.

Limitations

The small sample size, in children MgSO4 has a more evident clinical effect, but the child population has not been considered in this study, the effects of IV and nebulized MgSO4 on acute asthmatic patients should also be evaluated in further randomized controlled trials with large sample sizes and on different populations.

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فعالية كبريتات المغنيسيوم الرذاذ مقابل الوريد في علاج نوبة الربو

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الهدف

تقييم فعالية وسلامة الجرعة الموصى بها من كبريتات المغنيسيوم، ٢٠٠٠ ملليجرام، عند إعطائها عن طريق البخاخ والوريد، بشكل مستقل عن نظام علاج الربو الموصى به.

الطريقة

شارك ١٢٣ مريضًا بالغًا مصابًا بنوبات الربو الحادة في دراسة تدخلية مستقبلية بمستشفى جامعة بني سويف .تم تقسيم المرضى إلى ثلاثة مجاميع :المجموعة (١) التي تلقت كبريتات المغنيسيوم الوريدية، والمجموعة (٢) التي تلقت كبريتات المغنيسيوم المستنشقة، والمجموعة (٣) وهي مجموعة التحكم .تم قياس ضغط الدم ومعدل التنفس والنبض ومعدل تدفق الهواء الزفيري الذروي باستخدام مقياس الذروة ومؤشر فيشل، بالإضافة إلى تقييم الحاجة إلى الاستشفاء للمرضى الذين يعانون من الربو القصبي الشديد، وذلك قبل العلاج فورًا وبعده، وبعد ٣٠ و٦٠ دقيقة من العلاج.

النتائج

أظهرت دراستنا أن كبريتات المغنيسيوم فعالة في علاج ضيق التنفس، حيث أظهرت كلتا المجموعتين الوريدية والمستنشقة تحسنًا في معدّل تدفق الهواء الزفيري الذروي بعد ٣٠ دقيقة، دون اختلاف كبير بينهما .وعلى النقيض، شهدت مجموعة التحكم انخفاضًا في معدّل تدفق الهواء الزفيري الذروي.

الاستنتاج

أظهرت الدراسة الحالية أن كبريتات المغنيسيوم الوريدية كانت أكثر فعالية من المستنشقة في علاج نوبات الربو الحادة .ومع ذلك، أظهرت كل من كبريتات المغنيسيوم الوريدية والمستنشقة فوائد أكثر من مجموعة التحكم .تسلط الدراسة الضوء على فعالية أعلى لطريق الوريد لإعطاء كبريتات المغنيسيوم، الأمر الذي يساعد أطباء الرعاية الصحية وأطباء الرئة على تصميم تدخلات علاجية أفضل للمرضى الذين يعانون من نوبات الربو الحادة.