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EFFECT OF MAGNESIUM SULPHATE COMBINED WITH NIFEDIPINE FOR THE TREATMENT OF HYPERTENSION INDUCED BECAUSE OF PREGNANCY

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Abstract:

Objective: *This research work was carried out to examine the influence of magnesium sulfate in combination with Nifedipine for the treatment of PIHS (Pregnancy-Induced Hypertension Syndrome).*

Methodology: *A sum of 180 pregnant females present with Pregnancy-Induced Hypertension Syndrome who got admission in our institute from May 2019 to June 2020 were separated randomly into CG (Control Group) and OG (Observation Group) with 59 patients in each. We treated the patients of Observation Group by magnesium sulfate combined with Nifedipine, whereas we treated control group with only magnesium sulfate. We compared level of Apelin, therapeutic effect, viscosity of blood, urinary protein, serum LIF (Leukemia Inhibitory Factor), BP (Blood Pressure) and UARI (Umbilical Artery Resistance Index) between both groups.*

Results: *The rate of effectivity of Observation Group was 94.90%, which was higher than 83.10% effectivity rate of the patients of control group, and this difference was much significant statistically (P <0.050). Level of decrease of diastolic & systolic Blood Pressure in Observation Group was much better as compared to the patients of control group and this difference was also significant statistically (P<0.050). Reduction in the viscosity of blood, urinary protein, Umbilical Artery Resistance Index and S/D in the patients of Observation Group was higher than that of the patients of control group and this difference was also significant statistically (P<0.050). Improvement in the levels of apelin and serum Leukemia Inhibitory Factor in the patients of Observation Group was much better as compared to the patients of control group and we found this difference significant statistically (P<0.050).*

Conclusion: *Treatment of Pregnancy-Induced Hypertension Syndrome with the help of magnesium sulfate in combination with Nifedipine has much better effect and it can efficiently control Blood Pressure, edema, proteinuria. It is also better for the protection of kidneys.*

KEYWORDS: *Pregnancy-Induced Hypertension Syndrome, Viscosity, Blood Pressure, Systolic, Diastolic, Proteinuria, Magnesium Sulfate, Observation Group, Control Group, Apelin.*

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INTRODUCTION:

Normally, there is occurrence of Pregnancy-Induced Hypertension Syndrome after 20 weeks of pregnancy and in the initial puerperium stage. Reasons of Pregnancy-Induced Hypertension Syndrome are heredity of the female with pregnancy, decline of immunity and placental ischemia [1-3]. The manifestation of its symptoms is HTN (Hypertension), proteinuria, edema, abruption of placenta, convulsions, distress of fetal, coma, intra-uterine death, failure of kidney & heart and cerebrovascular accidents [4, 5]. Pregnancy-Induced Hypertension Syndrome morbidity in Pakistan is 9.40% [6] and 1.0% to 12.0% in other countries of the region [7]. This complication can influence the health of infant as well as mother. It is the important reason of high rate of morbidity and maternal mortality. Commonly used magnesium sulfate monotherapy is unable to obtain better results and it is not able to meet the proper requirements of the patients. In current years, it is discovered that magnesium sulfate in combination with Nifedipine can get better outcome [8, 9]. Nifedipine can efficiently stop calcium ions from penetrating myocardium & smooth muscle for transport of transmembrane and highly distinguish it.

Though it restricts the dispersing of the calcium ions in the cells, it will not influence the concentration of the calcium ions present in plasma [10, 11]. There is positive result of combine treatment of magnesium sulfate in combination with Nifedipine for the treatment of Pregnancy-Induced Hypertension Syndrome. The rationale of this research work was to investigate the clinical impact of magnesium sulfate in combination with Nifedipine for Pregnancy-Induced Hypertension Syndrome treatment.

METHODOLOGY:

A sum of one hundred and eighteen females present with Pregnancy-Induced Hypertension Syndrome who got admission in Allied Hospital Faisalabad from May 2019 to June 2020, were separated into two groups Observation Group and control group with random sampling method. Females with pregnancy who fulfilled the diagnostic standard of obstetrics [12] and present with manifestations as HTN, urinary protein and edema after 20 weeks of pregnancy period were the participants of this research work. We excluded the patients suffering from dysfunction of liver & kidneys, DM (Diabetes Mellitus), nephritis and serious heart complications. There were 59 patients in Observation Group having age from 21 to 42 years with an average age of 29.80 ± 3.10 years. All these females were present with 24 to 36 gestation weeks with an average age of 29.50 ± 4.60 years. There were thirty-five primipara & twenty-four multipara in this group. Twenty-seven patients were present with mild preeclampsia, twenty-one patients were present with moderate preeclampsia and eleven patients were present with severe preeclampsia. There were 59 patients in control group having age from 22 to 39 years with an average age of 29.20 ± 4.10 years. These females were present with 25 to 35 gestation weeks with an average of 29.30 ± 4.50 weeks. There were thirty-three primipara & twenty-six multipara in control group. Twenty-five patients of this group were available with mild preeclampsia, twenty-two patients were present with severe preeclampsia and twelve patients were present with preeclampsia of moderate nature. There was not much difference significantly in clinical data of the patients of both groups (P>0.050). Ethical committee of our hospital gave the approval for the conduction of this research study. We obtained the written consent from all the selected patients of this research work.

We provide the conventional treatment to the patients of control group. 20 ml of 25.0% magnesium sulfate was dissolved into 100.0 ml of 5.0% solution of glucose and dripped intravenously. After half an hour, forty ml of 25.0% magnesium sulfate was added into 500.0 ml of 5.0% solution of glucose and dripped intravenously at 1.50 g/h. We maintained the dosage at speed of 1.0-2.0 g/h. Adjustment of the concentration of the injection of magnesium sulfate was carried out according to the condition of disease and Blood Pressure of the patients in the duration of treatment. Patients in the group of Observation Group obtained 10.0 mg tablets of Nifedipine three to four times a day in addition with magnesium sulfate. We treated the patients of both groups for complete one week. Therapeutic influence, level of Leukemia Inhibitory Factor, apelin and Blood Pressure was under observation. We also monitored the viscosity of blood, urinary protein, systolic & diastolic Blood Pressure and Umbilical Artery Resistance Index on regular basis. We compared the rate of effectivity of treatment in the patients of both groups. Processing of the collected data was carried out with the utilization of SPSS 21.0. We expressed the measurement data in averages and standard deviations. We used T-test for the comparison between both groups. We expressed the enumeration data in percentages and Chi square method was in use for the comparison of this data of both groups. P value of less than 0.050 was considered as significant.

RESULTS:

Overall rate of effectivity of the patients of Observation Group was 94.90%, which was much greater than 83.10% in the patients of control group. This disparity was much significant statistically (P<0.050, Table-1).

Table-I: Treatment Effect Between the Two Groups [n (%)]

Group	Observation Group	Control Group	X^2	P
Significantly effective	33(55.9)	29(49.2)	/	/
Effective	23(39.0)	21(33.9)	/	/
Ineffective	3(5.1)	10(16.9)	/	/
Overall effective	56(94.9)	49(83.1)	7.895	<0.05

Before the start of treatment, we found no difference in diastolic & systolic Blood Pressure between the patients of both groups (P>0.050); Blood Pressure of the patients of both groups reduced after treatment and reduction in the diastolic & systolic Blood Pressure in the patients of Observation Group was much significant as compared to the patients of control group (P<0.050, Table-2).

Table-II: Prior-Treatment and Post-Treatment Blood Pressure Level Between the Two Groups (mmHg)

Group		Observation Group	Control Group
Systolic blood pressure	Prior-treatment	110.54±10.42	111.55±10.24
	Post-treatment	88.23±6.54*#	99.87±6.87*
Diastolic blood pressure	Prior-treatment	171.25±15.55	170.26±15.36
	Post-treatment	125.42±10.57*#	139.58±10.22*

Note: * means P<0.05 compared to prior-treatment; # means P<0.05 compared to the control group.

There was no difference in the viscosity of blood, RI, urine protein and S/D between the patients of both groups before treatment (P>0.050). But after completion of treatment, there was reduction in viscosity of blood, S/D, urine protein and RI in the patients of both groups. The reduction in these variables was much high in the patients of Observation Group as compared to the patients of control group and this particular difference was much statistically significant (P<0.050, Table-3).

Table-III: Changes of Blood Viscosity, Urine Protein, S/D and RI

Group		Observation Group	Control Group
Blood viscosity (m Pas)	Prior-treatment	4.73±1.13	4.84±1.22
	Post-treatment	2.22±0.53*#	3.27±0.96*
24 h urine protein quantity (g/24 h)	Prior-treatment	2.53±0.39	2.50±0.36
	Post-treatment	1.08±0.24*#	1.98±0.22*
S/D	Prior-treatment	2.73±0.31	2.74±0.32
	Post-treatment	1.79±0.33*#	2.45±0.38*
RI	Prior-treatment	0.59±0.05	0.57±0.06
	Post-treatment	0. 27±0.04*#	0.46±0.04*

Note: * means P<0.05 compared to prior-treatment; # means P<0.05 compared to the control group.

Before the start of treatment, we found no statistically significant difference in levels of apelin and serum Leukemia Inhibitory Factor between the patients of both groups (P>0.050). After the completion of treatment, there was better improvement in the levels of apelin and serum Leukemia Inhibitory Factor in the patients of Observation Group as compared to the patients of control group and this difference was significant statistically (P<0.050, Table-4).

Table-IV: Prior-Treatment and Post-Treatment Serum LIF And Apelin Levels Between the Two Groups (ng/L)

Group		Observation group	Control group
LIF	Prior-treatment	688.69±31.23	684.54±30.54
	Post-treatment	759.58±30.55*#	711.98±31.25*
Apelin	Prior-treatment	384.54±25.62	389.54±26.66
	Post-treatment	220.57±21.86*#	279.56±22.88*

Note: * means P<0.05 compared to prior-treatment; # means P<0.05 compared to the control group.

DISCUSSION:

This current research work investigates the clinical impacts of magnesium sulfate in combination with Nifedipine and magnesium sulfate for the Pregnancy-Induced Hypertension Syndrome treatment. The results of the research showed that overall rate of effectivity of the Observation Group was much better as compared to control group which was similar to the findings of the study conducted by Pasaribu [13]. One of the common obstetric complication is Pregnancy-Induced Hypertension Syndrome [14, 15]. Currently, therapy for Pregnancy-Induced Hypertension Syndrome emphasizes on reduction in Blood Pressure, spasmolysis and decrease in cardiac load and for this purpose, main & preferred drug is magnesium sulfate [16]. There is presence of magnesium ions in magnesium sulfate which has the ability to restrict the acetylcholine's release from the junction of motor nerve muscle to block the transduction of signal at nerve muscle junction and improve the contraction of muscle and it has much better effect in treating eclampsia [17]. It shows a positive anti-hypertensive effect and decrease Blood Pressure in very short duration in the females with pregnancy [18].

Practice in the clinical field showed that there is rebound of Blood Pressure after leaving of drug although better control of Blood Pressure can be achieved by magnesium sulfate [19]. The function of Nifedipine is coronary artery dilation, rise the flow of blood in the coronary artery of the patients and relaxation of smooth muscles present in the coronary artery [20]. This function of smoothing the muscle in the vessels of blood decreases the Blood Pressure. There is much better anti-hypertensive effect of Nifedipine as compared to other inhibitors. One research work concluded that magnesium sulfate in combination with Nifedipine can efficiently promote the relaxation of smooth muscle, decreases Blood Pressure and improve the nutrition of fetal [2]. The findings of this research work showed that reduction in the systolic & diastolic Blood Pressure of the Observation Group was much visible as compared to the control group, showing the better effect of Nifedipine in combination with magnesium sulfate. Current research work examined that viscosity of plasma, level of proteinuria, RI and S/D of the Observation Group were much low as compared to the patients of control group and this finding is similar with the results of study conducted in past.

Leukemia Inhibitory Factor stands for leukemia inhibitory factor which is responsible for the trophoblast's proliferation in the period of pregnancy. Findings of this research stated that improvement in the levels of apelin & serum Leukemia Inhibitory Factor in the patients of Observation Group was much better as compared to the patients of control group showing that the combined treatment with the help of two drugs improves the levels and similar result was the finding of another research study conducted in past.

CONCLUSION:

Findings of this research work concluded that Nifedipine in combination with magnesium sulfate for Pregnancy-Induced Hypertension Syndrome treatment has much better rate of effectivity as compared to the treatment with magnesium sulfate. It can effectively control Blood Pressure, decrease viscosity of plasma, and quantity of urine protein and it also has the ability to regulate the levels of apelin and serum Leukemia Inhibitory Factor. The follow-up duration of this research work is very small to examine the outcome of pregnancy of these patients which requires a follow up research work of long duration with large size of sample in near future to consolidate the findings of this research study.

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