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Magnesium Sulfate (Epsom salt): A forgotten salt is useful for the treatment of preeclampsia and eclampsia

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Abstract
Preeclampsia is a condition that affects pregnant women. Characterized by high blood pressure and signs of damage to different organ systems like liver and kidneys. Pre-eclampsia/eclampsia is a life threatening multisystem disorder affecting 2-8% of all pregnancies worldwide. The exact cause of preeclampsia involves several factors. Magnesium sulphate has been the first choice drug in the USA since 1930 for controlling the first eclamptic fit and for preventing further fits. Magnesium sulfate is recommended for the prevention of eclampsia in women with severe pre-eclampsia in preference to other anticonvulsant.

Keywords: magnesium sulfate, pre-eclampsia, eclampsia

Introduction

Preeclampsia is a condition that affects the pregnant women. It is marked by high blood pressure in women during pregnancy who may not have experienced high blood pressure before. Preeclamptic women will have a high level of protein in the urine and often also have swelling in the feet, leg and hands. This condition usually appears late in pregnancy, usually in the third trimester of pregnancy and worsen over time. If undiagnosed, preeclampsia can lead to eclampsia, a serious condition that can put the baby and mother at risk, and in some cases may cause death. Seizures are considered to have eclampsia.

Pre-eclampsia/eclampsia is a life threatening multisystem disorder affecting 2-8% of all pregnancies worldwide [1]. Preeclampsia and eclampsia account for about 9% of maternal deaths in Africa and Asia and about one quarter of the maternal deaths in Latin America and Caribbean and in some part of the northern Nigeria eclampsia contributes almost one third of maternal mortality [2].

Magnesium sulphate is the treatment of choice for the eclampsia and prophylaxis of eclampsia in patients with severe preeclampsia [3].

Symptoms of preeclampsia: In some women, preeclampsia develops without any symptoms. High blood pressure, the major sign of preeclampsia, usually occurs suddenly. Due to that, it is important for expectant mothers to monitor their blood pressure closely, especially during the early part of their pregnancy. A blood pressure reading of 140/90mm/hg, taken at two separate times at least four hours apart, is considered abnormal.

- Beside high blood pressure, other signs or symptoms of preeclampsia including.
- Excess protein in urine(proteinuria)
- Decreased amount of urine
- Low platelet count in blood(thrombocytopenia)
- Intense headache
- Vision problems such as loss of vision, blurry visio and sensitivity to light
- Pain in the upper abdomen
- Vomiting or nausea
- Weakened liver function
- Trouble breathing (due to fluid in lungs)
- Rapid weight gain, swelling of limbs and face.

Possible complications: = A woman is more likely to have complication if she develops preeclampsia in her pregnancy, and has noticeable symptoms. If left untreated, complications may develop. Some complications of preeclampsia include –

- A lack of oxygen to the placenta
- Placental abruption: the separation of the placenta from the uterus wall, which can cause severe bleeding and damage to the placenta.
- HELLP syndrome: causes hemolysis (loss of red blood cell), elevated liver enzymes and low blood platelet count, resulting organ damage.
- Eclampsia: preeclampsia with seizures.

Role of magnesium sulfate: Magnesium sulphate has been the first choice drug in the USA since 1930 for controlling the first eclamptic fit and for preventing further fits. The study that provides the most compelling evidences for the role of magnesium in eclampsia trial collaborative group (ETCG), co-ordinated by the perinatal trial service in oxford [4].

Magnesium sulphate has been shown to be an effective treatment option for the prevention of eclampsia. Its mechanism of action is likely multifactorial, encompassing both vascular and neurological mechanism. Being a calcium antagonist, its effects on vascular smooth muscle to promote relaxation and vasodilation may have an effect on the cerebral endothelium to limit vasogenic edema by decreasing stress fibre contraction and paracellular permeability via calcium-dependent second messenger systems such as MLC kinase. Lastly, MgSo4 may also act centrally to inhibit NMDA receptors, providing anticonvulsant activity by increasing the seizure threshold [5].

Although the effectiveness of $mgso_4$ in treating and preventing eclampsia has been established, but still question is there for its safety. There are concerns regarding the possibility of hypomagnesaemia toxicity in eclampsia treatment. Normal serum concentration of mg^{+2} are 1.8-3.0mg/dl with one third to one half bound to plasma protein [7]. Total magnesium serum concentration advocated for the treatment of eclamptic convulsions are 4.2-8.4mg/dl [8, 9], which can be obtained by administering it intramuscularly (6g loading dose followed by 2g/h), intravenously (2-4g does upto 1g/minute) or combination of both [6, 7, 10]. Progressively higher serum magnesium levels can ultimately leads to cardiac arrest.

WHO recommendations

- Magnesium sulfate is recommended for the prevention of eclampsia in women with severe pre-eclampsia in preference to other anticonvulsant.
- Magnesium sulfate is recommended for the treatment of women with eclampsia in preference to other anticonvulsants.
- The full intravenous or intramuscular magnesium sulfate regimens are recommended for the prevention and treatment of eclampsia.
- For those settings where it is not possible to administer the full magnesium sulfate regimen, the use of magnesium sulfate loading dose followed by immediate transfer to a higher level healthcare facility is recommended for women with severe pre-eclampsia and eclampsia.

The guideline development group of WHO has noted that the following issues should be considered before applying the recommendation as follows.

1. Women receiving magnesium sulfate should never be left alone and resources to monitor the wellbeing of both the woman and her fetus should be made available.
2. When IV magnesium sulfate is used for the treatment or prevention of eclampsia the infusion rate of magnesium sulfate should be closely monitored.
3. Health care facilities using magnesium sulfate should have calcium gluconate available in case of magnesium sulfate toxicity.

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