

Evaluation the Antimicrobial Effect of Glycerin Magnesia on Some Bacteria, In-Vitro Study

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Abstract

This study was aimed to assess the efficacy of glycerin magnesia on some bacteria. A thirty percent of glycerin magnesia were prepared as explained below. Many types of bacteria including *Proteus spp.*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Acinetobacter*, *E. coli*, *Pseudomonas aeruginosa*, *Salmonella spp.* were selected for this study and obtained from university of Tikrit, college of veterinary medicine. A bacterial broth were prepared, a then a sterile swab were emulsify in these broth and streaked on muller hinton agar plate and allowed till dry, then a holes were filled with a given glycerin magnesia and incubated for 24hrs. at 37C . The results showed that a higher antibacterial effects of glycerin magnesia against *Staphylococcus aureus* followed by *Proteus spp.*, *Pseudomonas aeruginosa*, *Salmonella spp.*, *Acinitobacter*, *E. coli*, *Staphylococcus epidermidis* respectively.

In conclusion, the glycerin magnesia have a wide range antibacterial effect and can be used in future in wound healing.

Key words: glycerin magnesia, bacteria, in-vitro.

Introduction

Magnesium (Mg) is an important ion found in the body human and animals, and may be observed as a drug with numerous clinical uses ⁽¹⁾. The total magnesium in human and animal body were 53 % stores in the bones, 27 % in muscle, 19 % in other soft tissues, about 0.5 % in the RBCs and about 0.3 % in the serum ⁽²⁾. About half of Magnesium are existing as free and doesn't bound with albumin or other ion ⁽³⁾.

Magnesium sulfate (MgSO₄) is a solid, odorless material that present as crystal powders or as colorless crystals needle like or as a crystalline powder with white color ⁽⁴⁾.

Magnesium sulfate have a wide uses in building, industrial/processing, agriculture, special care products, medicine, food processing ⁽⁵⁾.

Magnesium sulfate uses in human medicine including as an anticonvulsant for controlling and in preventing seizures especially in children who suffer from nephritis, lowering blood pressure in pregnant females who suffer from preeclampsia, Asthma attacks can also be treated with MgSO₄. MgSO₄ used in human and animals as a laxative and also it can also use in relieving cases of constipation ⁽⁶⁾.

Ismail & Shaker ⁽⁷⁾ reported that MgSO₄ with glycerin have an antibacterial effects when used on wound. The addition of glycerin as a vehicle for MgSO₄, some reported that glycerin increase the antimicrobial activity of material that emulsify in it ⁽⁸⁾.

The most pathogenic bacteria for human and animals were reported including *Salmonella* ⁽⁹⁻¹³⁾, *E. coli* ⁽¹⁴⁻¹⁷⁾, *Staphylococcus spp.* ⁽¹⁸⁾, *Proteus spp.* ⁽¹⁹⁾.

The current study aimed to assess the efficacy of glycerin magnesia against some bacteria.

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Materials and Methods

Glycerin Magnesia (30%): The mixture was prepared by dissolved a 30 g of MgSO₄ in 30 ml heated distilled water and mixing thoroughly. After a complete dissolving of MgSO₄, the glycerin was added slowly to the mixture till a final volume of 100ml and using heat and continual stirring.

Many types of bacteria including *Proteus spp.*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Acinetobacter*, *E. coli*, *Pseudomonas aeruginosa*, *Salmonella spp.* were selected for this study and obtained from university of Tikrit, college of veterinary medicine. Each type of these bacteria were inoculated in 5 ml nutrient broth and incubated for 24hrs., then a sterile swab were emulsify in these broth and streaked on muller hinton agar plate with a central hole (which made in each of the plate with a sterile 2.0 mm diameter cork borers) and allowed till dry, then a holes were filled with a given glycerin magnesia and incubated for 24hrs. at 37C .

Results and Discussion

The current results obtained were showed a higher antibacterial effects of glycerin magnesia against *Staphylococcus aureus* followed by *proteus spp.*, *Pseudomonas aeruginosa*, *Salmonella spp.*, *Acinetobacter*, *E. coli*, *Staphylococcus epidermidis* respectively (Table 1) (figures 1, 2).

Table (1) Antibacterial effects of glycerin magnesia on some bacteria.

Type of Bacteria	Diameter in mm
<i>Staphylococcus aureus</i>	40
<i>Staphylococcus epidermidis</i>	5
<i>E. coli</i>	25
<i>Pseudomonas aeruginosa</i>	30
<i>Acinetobacter</i>	28
<i>Proteus spp.</i>	35
<i>Salmonella spp.</i>	30

Figure 1 results of *S. aureus*

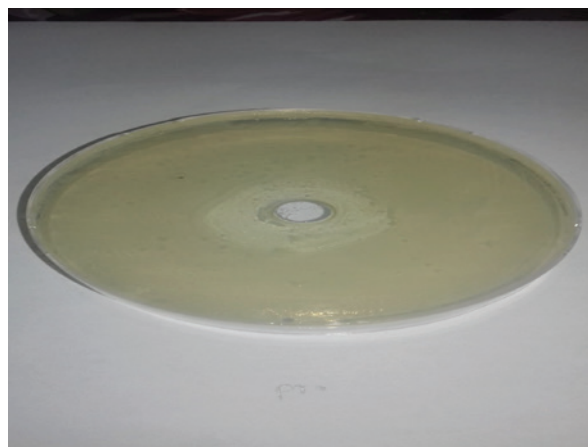


Figure 2 results of *E. coli*

It has been reported that Mg alone has an antibacterial effect invitro by reduction the bacterial growth and prevent the formation of biofilm by increasing of local alkalinity⁽²⁰⁾. Robinson *et al.*⁽²¹⁾ suggested that the alkaline pH was liable for the significance decreasing of CFU/ml¹.

Another researcher reported that the pH and the graded charge were significant in prokaryotic physiology in production the proton motion force that used to do the useful work for bacteria, also reported that a pH is important for extra and intracellular environments favored for growth of organisms⁽²²⁾. Also, other researcher reported that some biomaterial have an ability to yield the alkaline pH which give rise the antibacterial mechanism^(23, 24).

Li *et al.*⁽²⁰⁾ reported that pure magnesium when added to medium has a full effect on MRSA when tested in-vitro.

Also, Crisler *et al.*⁽²⁵⁾ found that the increasing medium salinity to 10% MgSO₄ reduced the number of *Pseudomonas*. However, a report of Marnocha *et al.*⁽²⁶⁾ suggested that MgSO₄ at 10% reduce the growth of most tested bacteria.

Many studies have been suggested that there was an association amongst the cell membrane fluidity and the stress tolerance. The structure of cell membrane fatty acids is liable for preservation of cell membrane fluidity. The most consequences of altering in fatty acid of cell membrane in most microorganisms are inflection the action of cells intrinsic proteins which achieve many purposes for example uptake of nutrient and ion

pumping⁽²⁷⁾. The treatment by using alkaline material resulted in alterations in fatty acid composition of the cell membrane for some bacteria especially *E. coli* and *Salmonella Spp.* which leading to reduction in number of these bacterial types⁽²⁸⁾.

Conclusion

Glycerin magnesia have a wide range antibacterial effect on many bacteria especially *S. aureus*, *Pseudomonas* and other, the future study will use this preparation in wound healing.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: Non

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