

STUDY OF ANTIBACTERIAL ACTIVITIES OF THE VOLATILE OIL OF NIGELLA SATIVA LINN ON ANIMAL MODEL

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ABSTRACT:

In-vivo antibacterial activity of the volatile oil of Nigella sativa linn was carried out in mice. Mice was infected by inoculation of Staph. Aureus and result shows successful eradication of bacterial colony.

(Bangladesh J Physiol Pharmacol 2006; 22(1/2) : 22-24)

INTRODUCTION:

The research of new antimicrobial chemotherapeutic agents occupies attention throughout the world. Generally the test animal for preliminary evaluation is usually the mouse. Here therapy and infection are given by the same route and this procedure is described as "using the mouse as a test tube".¹ The experiment has been carried out in mice using the method described by Cleeland and Grunberg². Our previous study demonstrated the in-vitro antimicrobial effect. Therefore the present study was designed to investigate the effects of volatile oil of Nigella sativa seeds on iatrogenic staphylococcus infection in mice and this method is referred as testing for local Chemotherapy.³

MATERIALS AND METHODS:

The Nigella sativa linn. seeds were purchased from local market and identified by the Department of Taxonomy, National Herbarium of Bangladesh, Dhaka. The volatile oil was prepared by Clevenger's apparatus on steam distillation and the yield was 0.12 % w/v. It was dehydrated by passing through anhydrous sodium sulphite and stored in a refrigerator at 4°C.

Test organism: Pure identified culture of *Staph. aureus* were collected from the stock cultures from Department of Microbiology, BSMMU. Antimicrobial activity was semiquantitatively determined by using the disc-agar diffusion techniques.⁴

Collection of Mice: For this study 15 albino mice of 2-3 months age weighting 30-40 gms were kept at room temperature under condition of natural light and dark

schedule and fed with good quality basal diet. They were divided into 3 groups.

1st day: Each mice were given 0.2 ml of an over night culture of *Staph. aureus* with 0.1 ml of sterile saline intradermally in the loose skin between the shoulders.

2nd day: Group 1 (experimental) was treated with 1200 µg of volatile oil sample with few drops of glycerin, Group 2 (+ve control) was treated with 1mg of gentamicin with few drops of glycerin. Group 3 (-ve control) was treated with only a few drops of glycerin.

3rd day: All mice were sacrificed as per schedule and swab from the site of infection of each mouse was taken and cultured on a nutrient agar plate and incubated at 37°C for 24 hrs. Then examined for bacterial growth.

RESULTS:

Picture of culture plates showing (Fig.-1, Fig.-2 & Fig. -3) no bacterial growth or the presence of no more than 10 colonies indicated successful treatment of the *Staph. aureus* infection.⁵ Experimental (Group 1) group is treated by volatile oil shown apparently no growth or no more than one colony. Group 2 (positive control) which was treated by Gentamicin shows no growth or no more than three colonies. And Group 3 (negative control) which was only treated by glycerin shows heavy bacterial growth, forming a continuous layer (Shown in the table I, II & III).

Following tables show the experimental design of the in vivo antibacterial study of the volatile oil in mice model indicating the grouping of animal, average body weight, age and treatment schedule for each group.

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Table-I

Gr. 1	No. of mice	Ave. mice wt(gm)	Mean body wt(gm)	Ave. age in month	Treatment.	Insference
1a		34		2-3	Organism <i>S.aureus</i> +1ml sterile saline +10ml of V. oil +few drops of glycerine to each mice.	NG.
1 b		3 8		2-3		
1 c	5	38	37	2-3		
1 d		3 5		2-3		
1 e		4 0		2-3		

Group-1 is Experimental i.e. treated by *N. sativa* volatile oil.
NG=No Growth.

Table-II

Gr. 2	No. of mice	Ave. wt. of mice (gm)	Mean wt. in (gm)	Ave. age in mount hs.	Treatment.	Insference
2a		32		2-3	Organism <i>S.aureus</i> +1ml sterile saline +1mg gentamicin+few drops of glycerine	NG.
2b		38		2-3		
2c	5	38	35	2-3		
2d		35		2-3		
2e		40		2-3		

Group-2 is Positive control i.e. treated by gentamicin.
NG=No Growth.

Table-III

Gr. 3	No. of mice	Ave. wt. of mice (gm)	Mean wt. in (gm)	Ave. age in mount hs.	Treatment.	Insference
3a		32		2-3	Organism <i>S. aureus</i> +1ml sterile saline+ few drops of glycerine.	Heavy growth in all plates
3b		34		2-3		
3c	5	36	34	2-3		
3d		36		2-3		
3e		32		2-3		

Group-3 is Negative control i.e. treated by glycerin.
Heavy bacterial growth

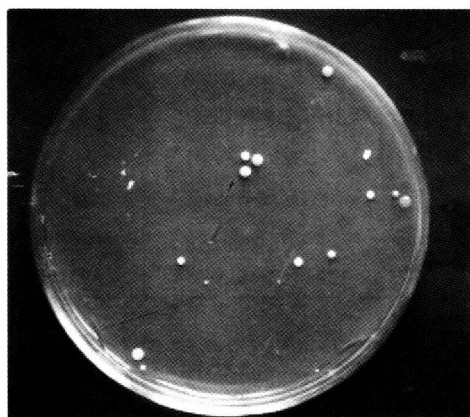


Fig.-1: (Experimental) treated by *N. Sativa* volatile oil showing no growth.

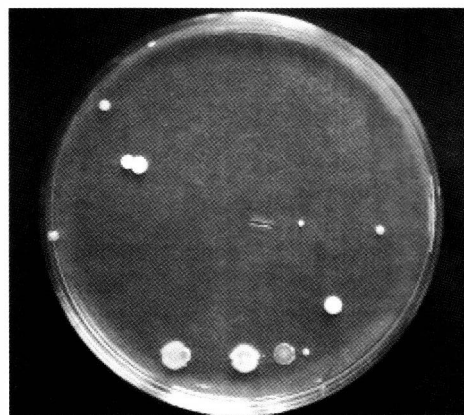


Fig.-2: Positive control i.e. treated by gentamicin showing no growth.

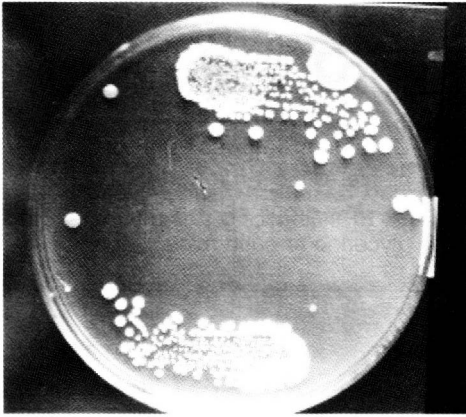


Fig.-3: *Negative control i.e. treated by glycerin showing heavy bacterial growth*

DISCUSSION:

Results of *in vivo* studies shows that the volatile oil of *Nigella sativa* linn seed successfully eradicate local infection of *Staphylococcus aureus* in mice and this eradication of growth of organisms is equivalent to that of a standard antibiotic Gentamicin. A previous study of *Nigella sativa* extract showed antibacterial synergism with streptomycin and gentamicin.⁶ Thus *Nigella sativa* seeds can possibly provide the basis for

a successful antibacterial preparation for the chemotherapy of localized infection. From this study it seems that the Volatile oil can be incorporated in topical formulations.

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