EFFECT OF STATIC MAGNETIC FIELD ON E.coli Growth

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ABSTRACT

Many studies indicate that magnetic fields have some biological effect on living things. The effect of magnetic fields are studied in different areas such as drug delivery, cancer therapy, sterilization, water treatment and etc. E.coli collected from hospital environment was subjected to magnetic field of 16 gauss from 2 to 18 hours to study the growth rate of it. The antibiotic susceptibility of E.coli measured according to Kirby-bauer disc diffusion technique. Results obtained in this study illustrates that magnetic field of 16 gauss increased the logarithmic phase within 4 hours of treatment and also decreased from 16 to 18 hours figure. Many researches have been done to study the effect of magnetic field on bacteria. The magnetic field could be used as inhibitory factor against the bacteria such as sterilization of food products and etc.

Key words: magnetic field, Ecoli, Kirby bauer

INTRODUCTION

Many studies indicate that magnetic fields have some biological effect on living things. The effect of magnetic fields are studied in different areas such as drug delivery, cancer therapy, sterilization, water treatment and etc.(6) Magnetic field affect DNA synthesis and transcription (7) as well as ion transcription through all membrane (8) Several studies have been done on different microorganism and the effect of magnetic fields was variables of the type of the microorganism.(9)

Patti et all (10) found that the exposure of Seratiamarcescens to a static magnetic field 80+20 GAUSS resulted in inhibition of S.marsceceens growth. Mohammad et al (11) reported that exposure of the microorganism S.typhi to the magnetic field caused change in growth characteristics and the number of cells at the stationary phase increased. Many of these effects of magnetic fields are the result of interactions with all membrane components and improving the enzymatic activity(12-19).
MATERIALS AND METHODS
The test organism used in this study was E.coli collected from hospital environment, 10 ml of over night culture was added in 90 ml of Nutrient broth and incubated at 37 C for 24 hours.

Antibiotic Susceptibility Test
The Muller-Hinton Agar medium was prepared and after culture antibiotic susceptibility test done by using Kirby-Bauer Disk Diffusion technique and Gentamycin (10µg), Tetracycline (30), Methicillin (20), Vancomycin10( ), Streptomycin (30µg), Oxacillin(), Ampicillin (10 µg), and Amoxicillin (25µg) disks were placed over the media.

Magnetic Field Treatment
Two permanent Magnets with opposite to each other (north pole in front of south pole and vice versa) beside the 15 ml NB tubes containing 1ml newly subculture E.coli producing 16 Gauss magnetic field. The tubes were subjected to magnetic field at 37 C for 2 to 18 hours and one sample did not subjected to magnetic field as control. To evaluate the concentration of bacteria, OD values were taken at 600nm. Antibiotic susceptibility test was done for each of the tubes from 2 hours to 18 hours.

RESULT
Results obtained in this study illustrates that magnetic field of 16 gauss increased the logarithmic phase within 4 hours of treatment and also decreased from 16 to 18 hours figure 1. According to antibiogram test, ampicillin and methicillin nonresistant in whole test and magnetic field does not have any effect on inhibition zone of ampicillin, methicillin and oxacillin. For antibiotic susceptibility, 2, 4, 8, 12 and 16 hours evaluated. For first 2, 4 and 14 hours amoxicillin should a sharp increase in zone of inhibition in contrast to the blank. Streptomycin: The zone of inhibition increased in 4, 8, 12, 14 and 16 hours for streptomycin. Tetracycline: The zone of inhibition increased in 8 and 16 hours.

DISCUSSION:
In this study we aim to study the effect of static magnetic field on E.coli growth and it’s antibiotic resistance pattern. Many studies indicted that magnetic field have biological effect on living things. As relatively simple living organisms, bacteria are important research subject in this field. Kohno et al. [2000] studied the effect of static magnetic field on bacteria, Streptococosmutans, Staphylococosaureus and E.coli. According to their study, ferrite magnet caused strength-dependent decrease in the growth rate and maximum number of bacteria for S.mutans, S.areus when cultured under anaerobic conditions but their growth was hot inhibited under aerobic condition and however no growth effects were detected in E.coli culture. Samir. H. Nasher and Amal. A.hussein. [2001] Concluded that magnetic field effect on bacteria could be considered as bactericidal; While in our study that magnetic field effects the logarithmic and death phase. Stan sell et al [2001] reported that exposure of E.coli to static magnetic field increased it’s antibiotic resistance whereas in our study antibiotic resistance relatively decreased in 18 hours of exposure.

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Figures:
EFFECT OF STATIC MAGNETIC FIELD ON E.coli Growth

2hour

4hour

8hour
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12hour

16hour

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