Fe_3O_4 NANOPARTICLES SYNTHESIS AND THEIR ANTIBACTERIAL ACTIVITY.

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Antibiotic resistance is one of the well-known phenomenon in public health which is increased due to human misuse and neglect. At the same time antibiotic resistance has become a serious problem with economic and social implications throughout the world [1]. To overcome this, a newer area of research, i.e. nanoparticles in controlling bacterial growth is carried out by many authors. Due to their antibacterial activities, various metallic nanoparticles represent an effective solution for overcoming bacterial resistance [2].

Iron oxide (Fe_3O_4) based nanomagnets have attracted a great deal of attention in nanomedicine over the past decade because the magnetic nanoparticles with size less than 100 nm have the ability to attach to microbial cells [3].

This thesis presents a chemical synthesis of iron oxide nanomagnets and investigation of their antibacterial activity.

The iron oxide nanoparticles were synthesized by using co-precipitation method in alkaline media solutions with Fe^{2+} and Fe^{3+} in ratio 1:2 as showed by Sh.Kekutia et al., but with the use of ultrasonic homogenizer [4]. The synthesis of iron oxide nanoparticles were validated by UV-Visible spectroscopy which showed higher peak at 370 nm as a valid standard reference. Antibacterial activities were studied by disc-diffusion method on agar against gram negative E.coli K-12 [5]. The square of inhibition zone was calculated by the special program “Image Repair”.

Characterization of the morphology of iron oxide nanoparticles confirmed that the particle size is 10-15nm. Inhibition zone square under iron oxide nanoparticles (17 μg/ml) influence was 2982±219 $pixel^2$, which is comparable to antibacterial activity of kanamycin at a concentration of 100 μg/ml. So, it was found that the Fe_3O_4 magnetic nanoparticles have antibacterial activity.

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