**Synthesis and Characterizaiton of Metal-Metal Hybrid Nanoparticles Using *Tilia Tomentosa* Plant Extract With “Green Chemistry” and Investigation of Their Antibacterial Activities**

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As a consequence, the discovery of novel synthesis methods for the synthesis of nanoparticles has emerged. The silver nanoparticles (Ag NP), which are known to be abused and known to have antibacterial properties, are synthesized using chemical compounds of hybrid nanoparticles (hNP) from different metals. However, the use of chemicals has harmful effects on the environment. The green chemistry synthesis technique is of great importance in terms of eliminating the use of chemicals and eliminating harmful effects due to the reasons. In the study, metal-metal hNPs are used as biocompatible, simple and low- was synthesized using chemical synthesis technique. Metal-metal hNPs provide higher physical and chemical activity than metal NPs. Ag-Cu, Ag-Zn, Ag-Fe metal-metal hNPs were synthesized using *Tilia tomentosa* aqueous plant extract. For antibacterial activity tests, Gram+ *Staphylococcus aureus* (*S. aureus*), Gram-*Escherichia coli* (*E. coli*) bacteria and *Candida albicans* microorganisms were used. The effects of the reaction time to the formation of metal-metal hNPs have been investigated. The 100 mg/L *Tilia tomentosa* plant extract showed a slight inhibitory effect on inhibiting the development of all target pathogens. 100 mg / L Ag-Cu, Ag-Zn and Ag-Fe hNP inhibited ~ 100% growth of all pathogens. It has been observed with antibacterial tests that the metal-metal hybrid nanomaterials have a synergistic effect on the inhibition of microorganisms. It is promising that the use of synthesized plant extract will expand the use of metal-metal HNPs in biomedical and bioanalytical applications.

**Keywords:** Hybrid, Green chemistry synthesis, Tilia tomentosa plant, Nanoparticles