

Green synthesis of silver nanoparticles using *salix aegyptiaca* and its application in traditional medicine

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ABSTRACT

The nanotechnology and biomedical sciences opens the possibility for a wide variety of biological research topics and medical uses. Green synthesis and characterizations of nanoparticles has become an important branch of nanotechnology. In this paper, we report green synthesis of silver nanoparticles (AgNPs) using the extract of *salix aegyptiaca* as a reducing and stabilizing agent. This approach is a simple, cost-effective and stable for a long time, reproducible in room temperature and an eco-friendly manner to obtain a self-assembly of AgNPs. The resulting nanoparticles are characterized using UV-vis, TEM, XRD and FT-IR spectroscopic techniques. In traditional medicine of Iran, with adding *Salix aegyptiaca* extract to pure silver, they obtained a brown powder is called "Kushta Nuqra". After processing the *Salix aegyptiaca* extract using silver, a drug with palpitation, weakness of the heart, cerebral atony, liver dysfunction, anxiety, sexual debility, spermatorrhoea, nocturnal emission and hydrospermia properties can be formulated.

Keywords: *Salix aegyptiaca*; Silver nanoparticles, Green synthesis, Traditional medicine

1. INTRODUCTION

The AgNPs have been synthesized using a variety of methods, including chemical and physical methods. Some of methods are quite expensive and potentially dangerous to the environment. Use of biological organisms such as microorganisms and plant extracts could be an alternative to chemical and physical methods in an eco-friendly manner and green synthesis. Plant extracts may provide a better alternative to nanoparticle production [1-6]

Salix aegyptiaca is a deciduous 2.5 to 10 meters high shrub or tree with a rounded spreading canopy in the willow family Salicaceae. The genus name *Salix* comes from Latin for willow and the specific epithet *aegyptiaca* refers to the land of Egypt, even though the willow is not native there. The natural range is the temperate regions in the north of Iran and Iraq, in the southeast of Turkey and Azerbaijan. The distillate obtained from male inflorescences of plant, with common local name of "Araq Bidmeshk", in most parts of Iran have long been used in traditional medicine. In traditional medicine, it's nature is cooler and some believe that it is warm at first and desirable to dry [7, 8].

2. RESULTS AND DISCUSSION

2.1. Synthesis of AgNPs

Different volume of *Salix aegyptiaca* flower extract was added to a vigorously stirred 30 mL aqueous solution of AgNO_3 (1×10^{-2} M) and were sonicated with a 45 W 20 kHz ultrasonic pulse for 2 min under ambient conditions and the final volume was adjusted to 50 mL with deionised water at room temperature. The resulting solution became brown in colour after 2 min. Colour intensity increases with the increase of AgNO_3 concentrations at a fixed volume fraction of extract.