Latin American Journal of Pharmacy
(formerly *Acta Farmacéutica Bonaerense*)
Lat. Am. J. Pharm. **42** (7): 1415-20 (2023)

Received: March 16, 2023
Accepted: April 18, 2023

Synthesis, Characterization, and Determination of Antifungal Activity of *Acacia arabica* Mediated Metal Doped Copper Oxide Nanocomposites

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SUMMARY. **Metallic nanoparticles (NPs) can be synthesized using a range of methodologies, include chemical, physical, and biological processes. Current study undergoes the antimicrobial activity of the copper oxide nanocomposites synthesized by the sol-gel method with the help of *Acacia arabica* plant extract. About 1 g of copper sulphate was dissolved in 100 mL of distilled water and stirred with aid of heating till the copper sulphate may get fully dissolved. The particle size and lattice of the nanocomposites was determined by XRD. The different functional groups were identified by means of the FTIR. The presence of Cu and O in CuO NCs was confirmed using EDAX analysis. Antifungal activity was investigated by using the disc diffusion method. The characteristic peaks of diffraction obtained at 2θ values of 37o, 39o, 48o, 53o, 58o, 61o, 68 o and 73o, respectively, for the planes of (002), (111), (-202), (020), (202), (-113), (-311), (220), and (-222) which clearly represent the monoclinic phase of CuO nano-composite while the peaks at 44 o and 63o correspond to the plane orientation (131) and (220), TGA curve of CuO nanocomposites showed three-step decomposition. The major mass loss was observed in the range of 400 to 800 ºC. EDX confirms the presence of the Au, and Cuo in the nanocomposites. *Aspergillus niger* showed 18 mm zone of inhibition with 10 g/mL and 21mm was shown by *Candida albicans*. Copper oxide nanocomposites showed the outstanding antifungal activity and can be considered the best antifungal therapy.**

RESUMEN. Las nanopartículas metálicas (NP) se pueden sintetizar utilizando una variedad de metodologías, que incluyen procesos químicos, físicos y biológicos. El estudio actual se somete a la actividad antimicrobiana de los nanocompuestos de óxido de cobre sintetizados por el método Sol-gel con la ayuda del extracto de la planta *Acacia arabica*. Se disolvió aproximadamente 1 g de sulfato de cobre en 100 mL de agua destilada y se agitó con ayuda de calentamiento hasta que el sulfato de cobre se disolvió por completo. El tamaño de partícula y la red de los Nanocomposites se determinó mediante XRD. Los diferentes grupos funcionales se identificaron mediante el FTIR. La presencia de Cu y O en CuO NC se confirmó mediante análisis EDAX. La actividad antifúngica se investigó utilizando el método de difusión en disco. Los picos característicos de difracción obtenidos a 2θ valores de 37o, 39o, 48o, 53o, 58o, 61o, 68 o y 73o respectivamente para los planos de (002), (111), (-202), (020), (202), (-113), (-311), (220) y (-222) que representan claramente la fase monoclínica del nanocompuesto de CuO mientras que los picos a 44 o y 63 o corresponden a la orientación del plano (131) y (220), la curva TGA de los nanocompuestos de CuO mostró una descomposición en tres pasos. La mayor pérdida de masa se observó en el rango de 400 a 800 ºC. EDX confirma la presencia de Au y Cuo en los nanocomposites. *Aspergillus niger* mostró una zona de inhibición de 18 mm con 10 g/mL y *Candida albicans* mostró una de 21 mm. Los nanocompuestos de óxido de cobre mostraron una excelente actividad antifúngica y pueden considerarse la mejor terapia antifúngica.

KEY WORDS: Acacia arabica, antifungal, disc diffusion, metallic nanocomposites, therapy.

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ISSN 0326 2383 (printed ed.)
ISSN 2362-3853 (on line ed.)