



University of Zabol

Graduate school

Faculty of Veterinary Medicine

Department of Basic Sciences

The Thesis Submitted for the Degree of Doctor of Veterinary Medicine

**Investigating the effect of long-term
administration of Caffeine nanocarrier, Sn-
Fe nanostructures, and Co-Ni nanostructures
on histopathological changes of kidney, liver,
and heart of rats**

Supervisor:

Dr. M. Akbari

Advisors:

Dr. M. Hajinezhad

Dr. A. Jamshidian

By:

A. Heidari Khabbaz

December 2023

Abstract:

Today, with the development of the production and consumption of nanoparticles, the concern regarding their negative side effects on the health of humans and other organisms has increased. Although some researchers consider nanoparticles as non-toxic compounds, some other studies have reported their toxic effects. Therefore, the aim of this study was to investigate the effect of long-term administration of caffeine nanocarriers and tin-iron (Sn-Fe) and cobalt-nickel (Co-Ni) nanocarriers on the histopathological changes of the kidney, liver and heart of rats. For this purpose, 40 healthy and adult male rats were purchased. These rats were divided into four groups; control, receiving caffeine nanoemulsion, receiving Sn-Fe nanocarrier and receiving Co-Ni nanocarrier. At the end of the experimental period, the combination of ketamine (75 mg/kg) + xylazine (10 mg/kg) was used to induce anesthesia and tramadol injection solution (2 mg/kg) was used to create analgesia. Then, tissue sampling, histopathologic assessment and blood serum analysis were performed. Finally, the obtained data were statistically analyzed. The results obtained in the present study indicated that all the investigated groups do not show the same effects, so that the least complication was related to caffeine nanoparticle, while tin-iron nanoparticle (Sn-Fe) caused the most complication. Generally, the results of our study showed that metal nanoparticles cause more destructive effects and to use these nanoparticles, the dosage and time of use should be taken into consideration. According to these results, conducting more studies to determine the appropriate dose of nanoparticles and also to determine the side effects of these nanoparticles should be considered and evaluated.

Keywords: caffeine, nanoparticle, liver, kidney, heart