

The Combined Effect of Nerium Oleander Cold Leaf Extract and Some Selected Omani Frankincense *Boswellia Sacra* Oleo-Gum Resin on the Parasite Causing Cystic Echinococcosis *In vitro* Effect

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ABSTRACT

Cystic echinococcosis (CE) is a severe zoonotic disease that poses a significant threat to humans and animals, slow animal husbandry, caused by larval stages of *Echinococcus granulosus*. Canines are the definitive host, while humans are the accidental host. *E. granulosus* infections often remain asymptomatic for years before the cysts grow large enough to cause symptoms. Hepatic and pulmonary signs and symptoms are the most common clinical manifestations. Approximately 4 million people are infected with hepatic hydatid disease globally, and an additional 60 million are at risk of infection. The liver is the most involved organ, although it may affect other organs. The diagnosis of cystic echinococcosis relies on immunodiagnostic methods alongside radiological methods in combination with clinical findings. Albendazole and Mebendazoles are the drugs for choice in treating small cysts and preventing recurrence after surgery. In general, herbal extracts from different plants have gained attention in recent years for the prevention and treatment of a variety of chronic conditions due to their multi-targeted characteristics. *Nerium oleander* has a wide range of potential activities including anticancer, antibacterial and anti-inflammatory properties. *B. sacra* gum resin possesses a wide range of potential activities such as anti-cancer, anti-inflammatory, anti-asthmatic, analgesic, immunomodulatory. Given the side effects of the medications used and the risks of surgical procedures, the present study aimed to investigate the effect of combining extracts of *N. oleander* leaves and selected *B. sacra* gum resin extracts. The samples were exposed for different time periods (5-20-35-50) minutes using different concentrations (30µg/ml-3µg/ml-0.3µg/ml) for each exposure period. The combination of the extracts had a clear effect on the percentage of killing protoscoleces *in vitro*. The percentage of killing protoscoleces increased with increasing concentration and exposure period of the extracts *in vitro*, the highest percentage of killing was recorded in the *N. oleander* extract, reaching 70% at a concentration of 30mg/ml for a 50-minute exposure period. After combining the extracts, the highest percentage of killing was recorded, reaching 64% at a concentration of 30mg/ml for a 50-minute exposure period. The highest percentage of killing was recorded for the *B. sacra* extracts reaching 58% at a concentration of 30mg/ml for a 50-minute exposure period. The current results *in vitro* are interesting and encouraging, indicating some synergistic effect between these extracts, however, additional animal studies are required to further validate the synergistic effect of *B. sacra* and *Nerium oleander* leaves.

