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Research Paper

The Antiamoebic Effect of Oliveria Decumbens and Peganum Harmala Extract on Acanthamoeba

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ABSTRACT

Background and Aim Acanthamoeba is one of free-living amoebas, which are very abundant in nature. As a free-living amoeba, this parasite has a very high lethality, especially in people with underlying diseases, so researchers are always looking for a way to combat it. Drug plants are a good way to fight Acanthamoeba species. In this study, we aimed to investigate the lethal effect of the extract of Oliveria decumbens vent and Peganum harmala alcoholic extract on Acanthamoeba.

Methods & Materials In this study using the extract from an extract of Oliveria decumbens vent and Peganum harmala with concentrations of 1.25, 2.5, 5, 10, and 20 mg/ml to investigate the lethal effect of this extract. The plant was treated with Acanthamoeba amoebae after three times (24, 48, and 72) hours.

Ethical Considerations This study was approved by the Ethics Committee of the Jahrom University of Medical Sciences (Code: IR.JUMS.REC.1398.029).

Results The present research showed that using different concentrations at three times (24, 48, and 72) hours the effect of the extract on trophozoites and cysts of Acanthamoeba was shown. The highest lethality is related to the concentration of 20 mg/ml using a combination of both extracts at the time 72 hours and the lowest lethality is related to the concentration of 1.25 mg/ml of Oliveria decumbens vent at the time 24 hours.

Conclusion Observations indicate that the alcoholic extract of Oliveria decumbens vent and Peganum harmala had a perfect effect both separately and in a combination of both extracts. These two extracts had a synergistic effect on the lethal effect of Acanthamoeba amoeba.

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Extended Abstract

Introduction

Free-living amoebas are protozoans that are abundant in nature. [1]. Some species of these amoebas cause serious and sometimes fatal diseases in humans and animals. [2, 3]. The high lethality of this disease has caused researchers to always look for a way to fight free-living amoebas [4]. Various plants have been researched to fight free-living amoebae, each of which has a different range of lethal effects on these protozoa according to the type of plant [5-7]. Peganum harmala is an herbaceous plant and a bush whose height reaches up to 50 cm. Peganum harmala is found in most places [8]. Recently, there has been an increase in research on plants, such as Oliveria decumbens and Peganum harmala, whose germicidal effect has been proven; thus, we decided to study the anti-Acanthamoeba effects of the alcoholic extract of Oliveria decumbens and Peganum harmala.

Materials and Methods

Oliveria decumbens and Peganum harmala were collected from the southern regions of the country and dried in suitable conditions away from the sun. Then, the extracts were obtained using a percolation device and dried. In the next step, the desired amounts of each of the dried extracts were dissolved in distilled water to obtain different concentrations [9]. Acanthamoeba was cultured on non-nutrient agar plates. After almost three weeks, the amoebae were washed, then trophozoites and cysts were counted using trypan blue dye and Nicobar slide. To evaluate the anti-amoebic activity of the extracts in their different concentrations, which were prepared as 1.25, 2.5, 5, 10, and 20 mg/ml, were added separately to the microtubes containing Acanthamoeba [10]. The effect of the extracts in different dilutions was investigated at 24, 48 and 72 hours [9]. The collected data were measured using SPSS 21 software.

Results

The highest lethality was related to the concentration of 20 mg/ml using a combination of both extracts at 72 hours and the lowest lethality was related to the concentration of 1.25 mg/ml of Oliveria decumbens at 24 hours. As seen, the results showed the lethal effect of Oliveria decumbens and Peganum harmala extracts on trophozoites and cysts of Acanthamoeba, and the lethal effect of the extracts had a direct relationship with the concentration and duration of the effect, so that as the amount and time increased, the amount of amoebae decreased and showed a significant difference ($P<0.05$). Also, the results indicated the greater effect of Oliveria decumbens extract and the synergistic effect of these two extracts on each other.

Discussion

Many studies have been done worldwide to find a suitable method to prevent Acanthamoeba infection, and medicinal plants are always considered a suitable method to prevent and treat diseases [5, 11]. Nayeri et al. investigated the effect of artemisinin and alcoholic and aqueous extracts of Gondwash (Artemisia annua) on Acanthamoeba T4 genotype in vitro. They showed that different concentrations of Artemisia annua extract have anti-Acanthamoeba activity and in the presence of 10 mg per ml of alcoholic extract in the culture medium after 72 hours, 30.51% of trophozoites were alive. Also, in the presence of 10 mg/ml aqueous extract of Artemisia annua in the culture medium, after 72 hours, 58.25% of trophozoites were alive, which was consistent with the results of this study and the lethal effect of Peganum harmala alcoholic extract. Also, considering the percentage of lethality related to Peganum harmala, it can be said that the lethal effect of the Peganum harmala alcoholic extract was greater than that of Artemisia annua extract [9]. Nayeri et al investigated the aqueous extract of Peganum harmala and reported that the aqueous extract of Peganum harmala has a dose- and time-dependent anti-amoebic activity on trophozoites and cysts, and in the presence of 10 mg/ml of aqueous extract of Peganum harmala in the culture medium after 72 hours, 47.32% of trophozoites and 15.50% of cysts were alive [9, 12]. Despite the obtained results, it can be said that the alcoholic extract of Oliveria decumbens has a greater amoebic effect than the extract of the Peganum harmala and also these two plants had a synergistic effect on each other.

Therefore, it can be said that Oliveria decumbens and Peganum harmala have a good killing effect on Acanthamoeba amoeba. If they are used together, they increase each other's killing impact.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the Jahrom University of Medical Sciences (Code: IR.JUMS.REC.1398.029).

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Authors' contributions

All authors equally contributed to preparing this article.

Conflicts of interest

The authors declared no conflict of interest.