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ANTI-LEISHMANIAL ACTIVITY OF ALOE VERA LEAF EXUDATE IN VIVO

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ABSTRACT. The study examined the efficacy of aloe extract in the topical application of zoonotic leishmaniasis. To date, specific drug prevention of leishmaniasis has not been developed.

Due to drug trial and side effects of leishmaniasis treatments, achieving treatment efficacy through unique side effects and greater benefits is of paramount importance. The present study was aimed at a retrospective analysis of aloe vera leaf exudate for Leishmania major in in vivo models on patients with different wound sizes. There are certain difficulties in the treatment of leishmaniasis, such as drug resistance and side effects of standard drugs.

Keywords: aloe vera leaf exudate; in vivo; leishmania major

ИММУНОАКТИВИРУЮШИЙ ЭФФЕКТ ЭКССУДАТА ЛИСТЬЕВ АЛОЭ ВЕРА IN VIVO

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АННОТАЦИЯ. В исследовании изучались особенности эффективности экстракта алоэ при местном применения зоонозного лейшманиоза. На сегодняшний день специфическая медикаментозная профилактика лейшманиоза не разработана.

В связи с лекарственной пробой и побочными эффектами методы лечения лейшманиоза достижение эффективности лечения с помощью уникальных побочных эффектов и большей пользы имеет первостепенное значение. Настоящее исследование было направлено на ретроспективный анализ экссудата листьев алоэ вера на Leishmania major в моделях in vivo на больных с разными размерами ран. Есть определенные трудности в лечении лейшманиоз, например, лекарственная устойчивость и побочные эффекты стандартных препаратов.

Ключевые слова: экссудат листьев алоэ вера; в пробирке; в естественных условиях; лейшмания крупная.

Introduction. Leishmaniasis is a healthcare problem in the Middle East, Central Asia, Africa, and many tropical and subtropical regions of the world

(3,4,20). According to World Health Organization (WHO) reports, it is among the six most important tropical diseases (6).

Regarding adverse side effects, resistance to widely used anti-leishmaniasis drugs, toxicity and cost, achieving a natural bioactive compound with lower toxicity and high efficacy have recently attracted significant attention and increased interest in medicinal plants (19.23). According to the WHO report, about 80% of the world's population uses folk medicine (1,2). Skin leishmaniasis is endemic in some parts of Uzbekistan. Currently, anti-leishmaniasis drugs are either toxic or too expensive for routine use in developing countries where this disease is most common (24).

In this regard, the results of some studies indicate the use of medicinal herbs in the treatment of some skin diseases (3,25). Treatment of this disease can be effective with the help of plant-based preparations. Some studies have successfully reported the discovery of plant products and their use against Leishmania, while others have not shown therapeutic effects on skin leishmaniasis (4.5).

Patients with leishmaniasis should be under observation.

because sometimes treatment does not give satisfactory results, especially in the case of immunodeficiency. Like other conditionally pathogenic parasites such as Leishmania (6,7,8), the disease reactivates and can cause atypical clinical manifestations and easily lead to its wound dilation.

Aloe vera is widely used in health products, and despite several reports on overall growth and fiber gel, little has been done with leaf exudate (20). Our goal was to assess in vivo the effectiveness of aloe vera leaf exudate (AVL) in leishmaniasis. Regardless of disease manifestations, promastigotes from the strains responsible for cutaneous, cutaneous-mucosal, and visceral leishmaniasis were sensitive to aloe vera leaf exudates.

Aloe vera extract causes macro activation of host phages, as evidenced by increased release of active oxygen forms, which was weakened by pre-incubation with absorbers with elevated radical content (3).

Aloe vera (AV) belongs to the herbal disinfectants with a long history of medicinal properties (21). Antimicrobial agents have diverse biological effects, including laxative, antimicrobial and antifungal, immunostimulant, anti-inflammatory, anti-tumor, antidiabetic, and wound healing. Moreover, some studies have reported AV as a potent remedy against leishmaniasis (10,11). AV has a direct parasitic effect on all forms of Leishmania, enhances activated macrophages, and leads to

increase in TNF - α, which is the main mediator of acute inflammation (26). Consequently, it can have a positive effect on the antigenic process and cause resistance to infection. Moreover, some studies have demonstrated that AV does not have a harmful effect on the host cell (6.9) when extracted with acetone, and possesses antimicrobial activity (17.18).

In addition to the direct parasitic effect of AVL on Leishmania, it possessed immunomodulatory activity and contained two low- and high-molecular-weight components (25). The low molecular weight component exhibits anti-

inflammatory and immunosuppressive properties, but the high molecular weight component has immunostimulant properties, increases activated macrophages, and enhances the reactive forms of oxygen (RFS) and reactive nitrogen species (RNS) in macrophages, leading to increased secretion of IL12, IL1, IL6, and TNF-α (12,13,14,15). This result corresponds to the results of the in vivo model currently being studied.

Local residents in the Somali region of Ethiopia use Aloe vera leaves to treat malaria, jaundice, and skin diseases (22). In the constant search for new, effective, and safe anti-leishmaniasis drugs, we investigated the exudate of Aloe vera leaves and its acid-hydrolyzed product against promastigotes and amastigotes found in patients' wounds. The study of activity was conducted based on the fluorescence characteristics of resazurin added to the treated cultures.

In some studies (3,16), the plant's internal gel was used and it was shown that its emidine compounds can effectively reduce the size of the ulcer in cutaneous leishmaniasis, however, in this study, we used the plant's leaf instead of its gel.

Purpose of the research. In this study, the anti-leishmanial activity of Aloe vera is evaluated in vivo in patients.

Assess the clinical and laboratory changes during local treatment of zoonotic leishmaniasis with aloe extract in combination with a mixture of ointments.

Research materials and methods: A study was conducted on 30 sick children, men, and women with zoonotic leishmaniasis for 20 days, with an average age ranging from 3 to 50 years. Patients complained of necrotic foci, leishmaniosis accompanied by an increase in regional lymph nodes and lymphangitis (usually painless), and wounds complicated by purulent infection with the development of phlegmon and sarcoma. Microscopic examination of wound material was carried out to diagnose Borovsky's carcass.

Due to the drug test and side effects of treatment methods for leishmaniasis, achieving treatment effectiveness through unique side effects and greater benefits is of paramount importance. Moreover, in the treatment of complicated cases of cutaneous leishmaniasis, the use of ART will be proposed as an additional treatment.

This study was aimed at a retrospective analysis of aloe vera leaf exudate from Leishmania major in vivo models in patients: various aloe vera (AV) exudates and standard preparations, a mixture of Levamisole, Vishnevsky, and Ichthyol ointments, were prepared. Measuring the area of the wound after 24, 48, and 72 hours.

A total of 30 patients with skin leishmaniasis were divided into three groups for in vivo models:

1: Main group, Patients of the 1st group (main group) Study the effect of aloe extract when applied 4 times locally for 20 days.

2: Patients of group 2 (main group). Study the effect of aloe extract when applied 8 times locally for 20 days.

3: Patients of the 3rd group (control group) who received traditional therapy.

1 and 2: experimental groups (treatment: aloe vera extract 4 times and aloe vera extract 8 times, respectively). The size of the ulcer was recorded at the beginning of the experiment weekly for 3 weeks.

Results and discussions. In the 1st group (14 people), wound size was 0.5-2 cm. In the 2nd group (21 people), wound size was more than 2 cm, and there were complications in the regional lymph nodes.

The remaining patients of the 3rd group, regardless of the wound, received traditional therapy.

Reduction in the size of wounds with almost perfect smooth scars in the 1st group occurred in 7 people (50%), already after 1 week. In the 2nd group, the disease did not progress to a complicated form in 3 people (14%) for 3 weeks. In patients of the 3rd group of 1 person, epithelialization was observed in the 4th week, while the remaining patients of the 3rd group did not recover until the 4th week.

Conclusion: The results of the in vivo model showed that both the aloe vera extract and the ointment mixture reduced the number of promastigotes and AV at 8 times and the ointment mixture significantly reduced the size of the ulcers compared to AV at 4 times. For in vivo study, the ointment was in a ratio of a mixture of AV as a plant-based medicinal product and a mixture of ointments as a standard treatment had similar results.

This data has been confirmed by some studies (13.15), which reported that AV can heal skin ulcers and restore some skin damage. AVL has a direct leishmanial effect.

Treatment of promastigotes with antiviral drugs demonstrated dose-dependent and time-dependent inhibition of parasite growth, so a decrease in the number of promastigotes increases the concentration of antiviral drugs and the duration of their exposure.

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