Effect of Silver Nanoparticles to the Growth of Leishmania Cutaneous in Samara City

Maysaa Tarik Hanoon[1], Ayser Saleh Mohammed[2], Ghassan Fares Ateyaa[3]
[1,2] College of Applied Science/University of samarra/Iraq
[3] Department of Biology, College of Education, University of Samarra-Iraq
E-mail: dr.aysaralsamarrai@uosamarra.edu.iq

Abstract
The current study was conducted in the city of Samarra for the period from 1/11/2021 until 1/3/2022. Samples were collected from the injured in Samarra General Hospital, and 250 samples were diagnosed for patients with cutaneous leishmaniasis, and the information about the injured was recorded according to a special information form Silver nanoparticles were used, three concentrations were taken, 2, 4, 6, and at a time of 48, 72, 96 and 120 hours, and they were used for inhibition, where it was found that the concentration (6) was the highest inhibition at 96 and 120 hours compared to With other concentrations

1. Introduction

a prominent place in the development of innovative approaches to agricultural practices and food Cutaneous leishmaniasis is endemic in tropical and subtropical regions. Symptoms of cutaneous leishmaniasis appear as skin lesions within weeks or months of being bitten by a sand fly. The lesions are naturally painless and heal on their own, sometimes taking months or even years to heal without treatment. Infection often recurs, with secondary infections, and some infections leave scars or marks on the wound (Claudio et al., 2009). Female sand flies of the genus Phlebotomy transmit the disease. (Collier et al., 2016). The cause of infection is the primary intracellular parasite of the genus Leishmania (Rahi,2013) and the class Kinetoplastida of the family Trypanosoma (Millan et al., 2014). There are three forms of diseases caused by the parasite, namely: Leishmaniasis Visceral leishmaniasis, Cutaneus leishmaniasis, and Mucosal leishmaniasis, depending on the location of the parasite in mammalian tissues and pathological symptoms, which cause the greatest mortality in developing countries, caused by malaria, leishmaniasis and trypanosomiasis American and African Cutaneous leishmaniasis is the most common, infecting the epidermis and causing unpleasant lesions (Karimkhani et al., 2015). In different parts of the world, mainly by the bite of sandflies from one host to another (Bates et al., 2013,). As well as contact transmission from infected to healthy people, infections associated with immunodeficiency also occur. Acquired through the use of medical syringes contaminated with parasites.

.Silver nanoparticles are small particles ranging in size from 1-100 nanometers. Nanotechnology has occupied production as well as in the fields of materials science, energy, medicine and life sciences, promoting a variety of methods for the preparation of nanoparticles Nanoparticles have been clearly used in the field and applications of genetically modified crops and genetically modified technology and the production of fine agrochemicals currently (Narayanan and Sakthivel,2011) and the pace of progress in nanotechnology is occurring rapidly and significantly Several methods for preparing silver nanoparticles have been documented, including physical and chemical methods, as well as electrochemical reduction methods and preparation for photolithography and thermal evaporation (Das et al., 2013)) Nanoscience is concerned with the study of the basics of molecules and compounds with dimensions up to to 100 nanometers, and is also interested in using these nanomaterials by determining their chemical and physical properties, while studying the phenomena associated with them arising from their small size. It also includes complete and accurate control of the production of materials by controlling the number of atoms that make up the particles of the material, as the atomic number of the particles of the material changes, and the properties of the resulting material change to a large extent (Naiga 2009 and Al-Iskandarani 2010).

2. Materials and Methods

Biphasic medium

Also called Novy Mac-Neal-Nicolle NNN medium, it consists of two phases: liquid and solid for the growth and continuity of the Leishmania parasite. The promastigote phase is used to conduct the experiments under study.

Solid phase

The medium was prepared according to the method (Kagan & Norman., 1970), as it 37 g Brain heart Infusion
10 g Dextrose
20 g Agar
100 ml Defibrillated Rabbit Blood
1.25 ml. 80 mg/ml Gentamicin

Preparation of the solid phase

The medium was prepared by dissolving the above-mentioned substances except for antibiotics and

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blood. The solution was then sterilized at 121 °C and 1 atm pressure for 30 minutes, then cooled to 50 °C in a water bath. Then antibiotics were added, and 15% (B, O) human blood obtained from the blood bank of Samarra General Hospital was used, and then the medium was distributed into 5 mm sterile glass vials and placed on a slope until the middle hardens. The bottles were left warm at 37 degrees throughout the day to ensure that they were not contaminated, and then transferred to the refrigerator and kept at four degrees Celsius until use.

How nano silver works

Silver nanoparticles were prepared at a concentration of 10 mg/ml and the following concentrations were prepared from the stock solution
A solution at a concentration of 2 µg/ml1
A solution at a concentration of 4 µg/ml2
A solution with a concentration of 6 µg/ml3
(Gatta, et al., 2015)

3. Results

Table (1) shows the numbers of Leishmania parasites after activation and diagnosis, and it was adopted as a control group

Table (1) shows the control group.	
Time	Mean ± SD * 10^4
24 hr	23.700±0.264 e
48 hr	34.333±0.251 b
72 hr	45.367±0.152 a
96 hr	32.200±.200 c
120 hr	26.200±.200 d

The effect of silver nanoparticles

In this study, silver nanoparticles were used at concentrations (2, 4, 6) in the laboratory to combat leishmaniasis in glass. The results showed that the concentration of 6 gave higher inhibitory results compared to other concentrations with a time of 72 hours and 96 hours compared to the control group. to the permeability of the cell membrane, as many studies have been recorded as in the table (2) below

Table (2) Effect of Silver Nanoparticles on parasite growth by Concentration and Time					
Mean ± SD					Time Concentrations
120 hr	96 hr	72 hr	48 hr	24 hr	
-	1.867 ± 0.047	6.567 ± 0.047	13.567 ± 0.094	24.433 ± 0.094	2
-	0.733 ± 0.205	2.600 ± 0.163	8.267 ± 0.125	25.133 ± 0.094	4
-	-	-	2.967 ± 0.125	24.800 ± 0.163	6

Several studies recorded agreement with the results of our study if the results of the researcher (Al-Saeedi et al. 2017) showed the effectiveness of silver nanoparticles in reducing Leishmania Tropica promastigote. The death of the parasite by silver nanoparticles may be related to the mechanism of disruption of the cell membrane and the proteins that led to the leakage of the internal contents cells outward leading to its eventual death (Xie et al. 2011).

Table (3) shows the percentage of parasite infection by sex		
Sex	Number of infectors	Percentage%
Male	140	56
Female	110	44
Total	250	100

4. Conclusions

The current study reached some important points, which are:
1. The incidence of infection is higher in males than in females
2. The rate of infection with Leishmania parasite was higher in January than in the rest of the months
3. The incidence of wet cutaneous leishmaniasis is higher than the dry type
4. Silver nanoparticles were highly efficient in inhibiting parasite growt

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