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Used of nano silica particles to elimination larvae and virgins of mosquitoes *Anopheles spp.*

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ABSTRACT

The present study aimed to clarify the effect of nano silica particles on the larval and the virgin activity of Anopheles spp. The results of this study showed that the highest mortality rate for the larvae was the larvae of the first stage where it reached 100% at 30 mg/ml concentration, while the second, third and fourth stages were 79.30, 71.98 and 68.21 respectively at the same concentration while the less mortality rate was (52.07) for the fourth stage larvae at 5 mg /ml concentration. For the virgins, the lowest loss was 5 mg/ml (57.34). The highest mortality rate was 100% at 30 mg/ml.

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INTRODUCTION

Mosquitoes are a major and complex health problem and have been described as the worst among medical and veterinary insects for being pathogens that threaten the lives of millions of people. Malaria, Filariasis and yellow fever (WHO; Amer & Mehlhorn, 2006) with an extraordinary and growing interest from researchers at the World Health Organization and beyond, and the research and articles on the various aspects of the insect to more than thousands annually and issued a special edition and tagged Mosquitoes News. Most of the research and studies have focused on the control of mosquitoes and for several decades on the use of chemical pesticides such as organochlorine insecticides such as chlorinated hydrocarbons such as DDT and organic organophosphorus compounds such as malathion and have a large impact on mosquito eradication and reduction of damage (Shaalan *et al.,* 2005; Sha'ban and Al-Malah 1993; Adel and Abd, 1979). However, this success did not last long as the indiscriminate and sometimes excessive and non-programmed use of pesticides in the control of agricultural and medical pests led to pollution of the environment in addition to the side effects of toxins that fall within the manufacture of pesticides on humans and other life and that threaten to life and existence, As well as the emergence of the resistance class of both types of common and multiple, which is considered the most important weakness in the use of chemical resistance, not to mention the money spent on the manufacture of pesticides and the development of its composition between time and time (Zayed, 2006; Zubaidi, 1992). Which encouraged researchers to reduce the reliance on chemical control and the search for alternatives, including the use of pesticides and recently used nanotechnology in insect control as a safer and more environmentally friendly (Chiasson *et al.,* 2004).

METHODS AND MATERIALS

Breeding of mosquitoes and preparing concentrations: Immature roles collected (eggs and larvae) from one of the water drainage sites in Diwaniyah governorate by a long scoop. They were placed in a plastic container with a lid, transferred to the lab and then placed in plastic containers filled with chlorine-free water and add the rat

grounded fodder composed of (yellow corn, wheat, rice and protein) By (0.25: 1: 1: 1) (2 g) for each larval feed basin, covered with tulle and fixed with a rubber band.

For the purpose of obtaining a pure permanent farm, the modern virgins were transferred by means of a wide-open droplet to plastic containers deposited in a 50-cm-long cube-shaped wooden cage wrapped in tulle. And put inside the dishes Petri containing cotton saturated with a sugar solution (10%) to feed the modern mussels, and to get the boats of eggs Mehdi and Mohsen (1989), method used, where the female mosquitoes were nourished three days after they emerged on the blood of a dove that had plucked her feathers from the chest and abdomen. She then tied her wings and tied her feet and was kept on top of the cage all night long. Also placed a small water pot inside the cage for egg laying. The white boats were transported by a small brush to a new water tank containing the larvae food. They were followed up until the appearance of plenary to prevent rotting; the water was changed every three days. This method was repeated until the emergence of the third generation of plenary. samples of the fourth and adult larvae of this generation taken for the purpose of diagnosis and according to the taxonomic characteristics contained in the taxonomic keys Abualhab, 1968; Abdelkader, 2000) The breeding of the insect and the numbers of its farm were carried out in the laboratory conditions at temperatures of 28±2 and humidity 55±5% and light 12 hours (Sharrook *et al.,* 1991). The following concentrations prepared (5, 10, 20, 30) of nano-silica called hydrophobic nano silica which was obtained from an office in Baghdad

Effect of nano-silica particles at the larvae roles for *Anopheles spp*

A 100 larvae from the first phase were distributed on 5 containers containing 100 ml of each concentration of the concentrations mentioned in paragraph (1), and each of them was added 1 gm of rat fodder, When testing the effect of concentrations in each of the second, third and fourth larvae roles, each one of them was prepared for testing by isolating sufficient numbers of the larvae that preceded them and placing them in the individual breeding tubes and monitoring them until they reached the desired stage of the experiment. The losses were recorded in each concentration and control treatment and the mortality rate corrected according to the equation of (Abbott, 1925).

Effect of nano silica molecules in virgins *Anopheles spp*

Virgins were isolated from the permanent farm of the insect and in number equal to the number which used in the experiment of the larvae roles. The same method of testing was used in paragraph (2) except for the addition of the feed**.**

RESULTS AND DISCUSSIONS

Table 1: Effect of nanosilica on a percentage of mosquito larvae

Cone	Mortality Percentage			
Mg/MI	R1	R2	R3	R4
5	58.68	56.60	53.22	52.07
10	60.46	58. 50	56.76	55.60
20	68.13	64.73	63.03	59.85
30	100.00	79. 30	71.98	68.21

The results in a table (1) show the effect of nano-silica particles on the four larvae of the Anopheles spp. The results show that the silica particles have an effect on the larvae where the highest mortality rate of the larvae of the first phase is 100 % at 30 mg/ml concentration. And the highest percentage of the second, third and fourth phases was (79.30), (71.98) and (68.21), respectively, at the same concentration (30 mg/ml).

The reason is that the Nano silica particles cause impregnated on insect cuticle and effect of the cuticular barrier, and this caused loss of water from insects' bodies, and then it was dead (Kumar *et al.,* 2009). Similar results were recorded when used silica nanoparticle in reduction of first larval stage of *Anopheles stephensi* ranged 89.25% (Murugan et al, 2015) and (Ahmed et al, 2010) found that Nanoparticles effect on enzymes in the gastrointestinal tract and decrease the sugar and protein level in hemolymph of insects, and then this leads to death of larvae or the larvae can be prevented before the three larvae stages complete which produce deformed Pupal. Also, the study of (Patil *et al.,* 2012) showed that 10 ppm of silica nanoparticles leading to larvae mortality at 41% in *Drosophila melanogaste*r.

Table 2: The effect of nanosilica on the mortality percentage of virgins of mosquitoes

Mortality Percentage of virgins of mosquitoes	
Concentration Mg/ml	Mortality Percentage
5	57.34
10	62.46
20	80.61
30	100.00

The results of a table (2) show the effect of nanoparticles on Anopheles spp. Virgins. It shows that the particles of nano-silica have an effect on the role of the virgin with the lowest mortality rate at 5 mg/ml (57.34), while the highest mortality rate was 100% at 30 mg/ml. Concentration. Many studies agree with our results which indicated the effect of nanoparticles on types of virgins for some insects like (Bariketal, 2012) study shows that the

Nano molecules had a severe effect on *Aedes Aegypti* pupal mortality in 112.5 ppm concentration. Madhiyazhagan (215) found that Nano silica molecules caused 70% mortality of A. Stephensi pupal in 10 ppm concentration. From these studies clear that Nano silica molecules were more sufficient in decreasing the Drosophila pupal member. Due to the mechanical barrier provided by deposition of elements of the cell wall, this caused the insect to lose water from their body and dead (Benelli *et al.,* 2016). The results also show the decreasing of pupal weight and produced deformed pupal as well as the delay of the pupal stage.

CONCLUSION

The use of nanoparticles, especially nano-silica, has an important role in reducing the spread of larvae and virgins of mosquitoes and thus reduces the spread or transmission of mosquito-borne diseases.

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