

## Summary:

Today, herbal compounds are used as an alternative to chemical compounds to control the biofilm of pathogenic bacteria. The aim of this research was to investigate the effects of *Withania coagulans* fruit extract (WCE) along with benzoalkonium chloride (BAC) on *Salmonella* Enteritidis and *Staphylococcus aureus* biofilms. First, the proteolytic activity of WCE was measured and then the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of WCE and BAC were determined by macrodilution method. Next, the power to inhibit biofilm formation (WCE) (in one-fourth, one-half dilutions, whole crude extract) and also in combination with benzalkonium chloride (concentration 100ppm) was evaluated. Also, the ability to remove biofilm (WCE) (in dilutions of one-fourth, one-half, three-fourths, whole crude extract) and combination (WCE) (in three-quarters dilutions, whole crude extract) with benzalkonium chloride (concentration 100 ppm against *Staphylococcus aureus* and 200 ppm against *Salmonella* Enteritidis) was investigated. In the coagulation activity evaluation (WCE), the mean end point when the first clot particles were observed was  $240 \pm 5$  seconds and it also showed good proteolytic activity. The minimum inhibitory concentration (WCE) was determined against both *Staphylococcus aureus* and *Salmonella* Enteritidis at a one-half dilution, and the minimum lethal concentration (WCE) was not observed. (MIC) and (MBC) of Benzalkonium Chloride against *Salmonella* Enteritidis 100 ppm and against *Staphylococcus aureus* 50 ppm were determined. In evaluating the inhibition of *Staphylococcus aureus* biofilm formation, the combination of total crude extract with benzalkonium chloride showed the highest percentage of inhibition of biofilm formation (71.41%), which was comparable to the inhibition of *Staphylococcus aureus* biofilm by benzalkonium chloride (73.12%). Also, the highest percentages of inhibition of *Salmonella* Enteritidis biofilm formation by the crude extract of Tom, the combination of the crude extract of Tom with benzalkonium chloride, the crude extract diluted one-half, respectively (41.77%), (41.64%), (41.51%) were observed. which was higher than the inhibitory effect of benzalkonium chloride (30.86%) against the formation of *Salmonella* Enteritidis biofilm. In examining the ability to remove *Staphylococcus aureus* biofilm, the combination of crude extract in three-quarter dilution with benzalkonium chloride, crude extract with one-half dilution, crude extract with three-quarter dilution respectively with (53.96%), (51%), (47.37 %) showed the highest percentages of biofilm removal, which compared to benzalkonium chloride (40.70%), showed more biofilm removal ability. In evaluating the removal of *Salmonella* Enteritidis biofilm, the crude extract with one-fourth dilution and the crude extract with one-half dilution showed the highest percentage of removal (76%), (72.44%) respectively, which were comparable to the removal of benzalkonium chloride biofilm. (71.96%). Overall, the results of this study showed that (WCE) has good anti-biofilm effects on *Salmonella* Enteritidis and *Staphylococcus aureus*, and the combination of (WCE) with benzalkonium chloride also showed anti-biofilm effects.

**.Key words:** *Withania coagulans*, extract, benzoalkanium chloride, biofilm, *Salmonella* Enteritidis, *Staphylococcus aureus*