Anti-Bacterial and Synergistic Effects of Some Local Plants extracts

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EXTENDED ABSTRACT

1. Introduction:
Infectious diseases still represent an important cause of morbidity and mortality among humans, especially in developing countries. Even though pharmaceutical industries have produced a number of new antimicrobial drugs in the last years, resistance to these drugs by microorganisms has increased. The use of plant extracts with known antimicrobial properties can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are due to compounds synthesized in the secondary metabolism of the plant. These products are known by their active substances, for example, the phenolic compounds which are part of the essential oils, as well as in tannin (1). The antimicrobial properties of plants have been investigated by a number of researchers worldwide but research on synergism is very limited and few studies have been reported (1, 2).

2. Materials and Methods
The plant materials that used in this study consisted of _Cakile maritimea_ (roots & shoots), _Cakile maritimea_ (seeds), _Mesembryanthemum crystallinum_ (whole plant), _Atriplex halimus_ (leaves), _Withania somnifera_ (leaves), _Marrubium vulgare_ (stems) and _Marrubium vulgare_ (leaves) were collected from different places from the Mediterranean Sea beach (Gaza Strip). The air-dried plant materials were ground into fine powder and extracted by four different methods: water reflux (3), ethanol 8 hours (3), methanol 5 days (4) and ethanol reflux (5).
All extracts were tested for possible antibacterial activity and synergistic effect against _Escherichia coli, Staphylococcus aureus_ which were isolated by medical technology department; Islamic University of Gaza.

3. Result:
There was no antibacterial activity of all the plant extracts against _E. coli_ was observed except with _Cakile maritima_ (seeds) when extracted with ethanol 8 hrs. (Inhibition zone = 13 mm).
But against _S. aureus_, antibacterial potentials were observed for the extracts of _Withania somnifera_ (leaves) with inhibition zone = 25 mm, _Marrubium vulgare_ (stems) with inhibition zone = 15 mm and _Marrubium vulgare_ (leaves) with inhibition zone = 13 mm which extracted by ethanol 8 hrs.
Synergistic effect of antibiotics and plant extracts showed synergistic antibacterial activity against antibiotic-resistant bacteria. The results obtained with _E. coli_ was particularly interesting, since it was inhibited by _Cakile maritime_ (roots & shoots extracted by) _Mesembryanthemum crystallinum_ (whole plant), _Marrubium vulgare_ (stem) and _Marrubium vulgare_ (leaves) extracts at least in one extraction method. In case of _S. aureus_, it showed synergistic activity of all
antibiotics and plant extracts used except *Atriplex halimus* (*leaves*) extracted by water reflux and *Cakile maritime* (*seeds*), *Withania somnifera* (*leaves*), *Marrubium vulgare* (*stem*) extracted by methanol 5 days extraction method. This inhibition was observed when they were used with low effective or ineffective antibiotics. The highest synergistic effect was observed by most plant extracts with tetracycline and minocycline.

4. Discussion and conclusion
In the present study, the antimicrobial activity of plant extracts on microorganisms strains were confirmed and synergism was possible with most of the tested antimicrobials. Tetracycline and minocycline presented synergism with the most extracts.
The results showed that:
1. Plant extracts have potential as antimicrobial compounds against microorganisms. Thus, they can be used in the treatment of infectious diseases caused by resistant microbes.
2. The synergistic effect from the association of antibiotic with plant extracts against resistant bacteria leads to new choices for the treatment of infectious diseases. This effect enables the use of the respective antibiotic when it is no longer effective by itself during therapeutic treatment.

5. References: