Combine Antimicrobial Effect of Ginger and Honey on Some Human Pathogens


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Abstract: The aim of this study is to determine the antibacterial effects of different honey samples on clinically isolated bacteria species. Ginger (Zingiber officinale) and honey are one of the nature gifts to mankind and have been used to prevent and control disease conditions. The crude extracts of the plant materials were used with pure honey collected from various parts of Kogi State. The Agar diffusion method was used to determine the antimicrobial activity of the plant extracts, honey and combination of both against Salmonella typhi, Shigella dysenteriae, Escherichia coli and Candida albican. The growth of all test organisms were inhibited though to varying degrees by the plant extract and honey and with greater effect when combined thus justifying their use in traditional medicines in treating enteric infection and other diseases across Africa.

Keywords: Antimicrobial, enteric infections, ginger, honey, medicinal use, plant extract

INTRODUCTION

Ginger (Zingiber officinale) is a native plant in the Southeast Asia but is grown in many tropical regions of the world. The plants are commonly used as spice for flavoring and herbal medicine and the treatment of gastrointestinal infections (Radwan, 1984). The plant is reported to have antibacterial, anti-oxidant, anti-protozoa, anti-fungal, anti-emetic, anti-rhinoviral, anti-inflammatory, anti-insecticidal activity (Ficker et al., 2003). Reported pharmacological activities of ginger include antipyretic, analgesic, ant tissues in addition to hypersensitive effects (Thompson et al., 2002). It is also used commonly as digestive and circulatory medicine and also helps to lower blood pressure and fever (Carr et al., 1987). It is also reported to sooth indigestion relieve motion sickness (Lien et al., 2003). Ko (1999) state that it may be beneficial for nausea and vomiting from pregnancy. Its efficacy is believed to come from its aromatic, carminative and absorbent properties (Portoi et al., 2003). Honey is a rich food product that is widely consumed throughout the world and an ancient remedy for the treatment of various infections. Antimicrobial activities of honey against a number of Gram positive and Gram negative bacteria have been reported by Hazir and Kestin (2002). The antimicrobial activity of honey has been attributed to its high osmotic effect (pH 3.2-4.5), hydrogen peroxide and its photochemical nature. High osmolarity has been considered a valuable tool in the treatment of infections, because it prevents the growth of bacteria and encourage healing (Archer et al., 1990). The use of sugar to enhance wound healing has been reported for several hundred patients (Knutson et al., 1981). Efem et al. (1992) reported that undiluted honey stop the growth of Candida sp, Salmonella, Escherichia coli, Aspergillus niger and Penicillium chrysogenum. Honey prevents the growth of isolates and inhibits their growth when honey is added to growing culture. The therapeutic period and recovery growth of isolates necessitate adjustment of honey doses according to type of isolate and grade of growth. A sugar solution resembling honey in its high sugar content was made and the antimicrobial properties when compared with that of honey on 21 types of bacteria and 2 types of fungi, indicates the presence of antimicrobial substance(s) in honey and that the age of honey sample nor whether they have been processed was associated with lower antimicrobial activities of honey but flora sources in the antimicrobial activity was highly significant (Stewart et al., 1991). It has been reported that the antimicrobial substances in honey can withstand refrigeration temperatures for six months and are heat stable at 100ºC. Joerg and Sontag (1993) attributed the anti bacterial effect of honey to its phenolic content. Several studies have been done testing the antimicrobial effect of honey and propolis. Methicillin-Resistant Staphylococcus Aureus (MRSA), a deadly and antibiotic resistant infection, was cured using honey in seven consecutive patients (Blaser et al., 2007).

Since honey is used extensively in Nigeria, it is desirable to determine the antimicrobial activities of the honey in common use. The increasing failure of chemothearapeutics antibiotics resistance exhibited by many pathogenic infectious agents has led to the
screening of several medicinal plants for their potential 
antimicrobial activity. Plants with possible 
antimicrobial activity should be tested against 
appropriate microorganisms to confirm their activity 
and ascertain other parameter associated with it. 
The study was design to access the antimicrobial 
potentials of a few commercially sold honeys and 
ginger plant in Kogi East, Nigeria. The investigation is 
expected to determine the antibacterial effects of 
different honey samples on clinically isolated bacteria 
species.

MATERIALS AND METHODS

Sample collection: Local honey samples were 
collected from the comb during dry seasons 
(December-April) from different parts of Kogi East 
Senatorial District of Nigeria and stored in air tight 
bottles at temperature in dark. Samples were used 
within 1 to 2 days of collections in the Department 
of Science Laboratory, Federal Polytechnic, Idaho, Kogi 
State, Nigeria. The plant used in this study was bought 
from Edgar market in Idaho, kogi State, Nigeria, where 
they are sold in commercial quantities.

Assay of antibacterial activity: Clinically isolated 
bacteria species of Escherichia coli, Salmonella typhi, 
Shigella dysenteriae and Candida albican 
were obtained from the Microbiology Laboratory, Federal Polytechnic, Idaho, Kogi State. The antibacterial 
activities of the honey samples were carried out using 
the Agar well diffusion method (Hazir and Keskin, 
2002). Bacteria were cultured in liquid Tryptic soyar 
broth (Difco 30g/l) and the measurements of the 
bacterial growth were calculated using Mc Farland 0.5 
method (Jeddar et al., 1985). About 1ml of bacteria 
isolates samples were diluted 100x with sterile nutrient 
agar medium (Difco 28g/l), mixed thoroughly and 
poured into the Petri dishes. Six wells on the growth 
medium with diameters of 6 mm were made and filled 
up with honey, extract from Ginger and mixture of 
honey and extract of Ginger samples in equal 
proportions before dilutions (30-100%). One of the 6 
wells was filled with undiluted honey samples. The 
plates were incubated at 37°C for 24-30 h (Hazir and 
Keskin, 2002). Antibacterial activity was assumed if 
there is zone of clearance. Control plates were also 
prepared for the antibacterial activity tests.

RESULTS

The results showed that the ginger extract had 
activity on all the test organisms at varying degree. 
The highest ginger activity was recorded on Candida 
albican at concentrations of 50% and above, followed 
by E.coli and Salmonella typhi at 60% and above. S. 
typhi was more sensitive to honey at 50% and above 
while E.coli showed least sensitivity (Table 1 and 2). 
All the test organisms were sensitive to the combine 
effect of ginger and honey at all concentrations tested 
(30% and above). The zones of inhibitions increased 
tremendously to the synergistic effect (Table 3).

DISCUSSION

The study revealed the microbial effect of ginger 
and honey on the target organisms tested. The highest 
zone of inhibitions by ginger extracts were obtained 
with E. coli while that of honey was on S. typhi. S. 
dysenteriae showed the least sensitivity to ginger and 
E.coli showed least sensitivity to honey. 
The difference in the zones of inhibitions may be 
directly related to the susceptibility of E. coli, S. typhi, 
C. albican to the ginger extract and honey. The factors 
responsible for the high susceptibility of the test 
organism to ginger are not exactly known but may be 
attributed the secondary metabolite (inhibins) and 
phytochemicals (gingerol and shagelol, flavonods) 
(Stewart et al., 1991). The results obtained in this study 
agrees with that of Ficker et al. (2003), Grange and 
Davey (1990) and Zahra et al. (2009).

All the commercial samples of honey showed 
antibacterial activity on clinical bacterial isolates. The 
property exhibited may be possibly due to redox
potential of ascorbic acids present in the honey (Rahmanian et al., 1970). The results which also showed that honey can stop the growth of bacteria at 50% dilution confirmed the observations of Jeddar et al. (1985). However, the results did not agree completely with those of other authors because some honey samples tested were found not to have anti-bacteria activity at 40% dilutions. The ability of honey to kill microorganisms has been attributed to its higher content of tetracycline derivatives, peroxidases, fatty acids, phenols, ascorbic acids and amylases (Jeddar et al., 1985; Nzeako and Hamdi, 2000).

The anti-microbial substances in the ginger and honey samples were not estimated in this study, however, the fact remains that the samples tested all showed a high degree of activity on the tested microbes. It can be concluded that this plants and the honey when combined show much promise in the development of phytomedicines with great antimicrobial properties.

REFERENCES


