Antimicrobial activity of camel's milk against some bacteria isolated from different sources in Gaza strip.

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Abstract: This study was designed to examine the antimicrobial activity of camel's milk against bacteria and yeasts isolated from different sources in Gaza strip, including medical, food, and water samples. The isolates were Total coliform, Fecal coliform, Escherichia coli., Kliebsiella, Staphylococcus, Pseudomonas, Clostridium, Serratia, Proteus and Enterobacter. Camel milk samples were collected from farm camels in different regions of Gaza strip. Camel's milk was revealed different antimicrobial activity on all positive and gram negative bacteria and yeasts except Kliebsiella, Serratia, and proteus isolated from medical sources. The antimicrobial activity was high when using (100%) pure milk without dilution. The antimicrobial percent were the highest in isolates from food samples (75%), followed by water isolates (50%), and finally medical isolates (25%). In conclusion, the results of this study showed that Camel's milk has antimicrobial activity against different gram positive and negative bacteria isolated from different sources.

Keywords: Antimicrobial activity, camel's milk, bacterial isolates, different sources, Gaza strip.

Introduction

In many countries, especially those of the dry zones, camels (*Camelus dromedarius*) play a key role in the lifestyle of many communities owing to their adaptation to the prevailing climatic conditions. Besides various labor services, transportation and sports, camels contribute to the economy and food security of humans by providing milk and meat.

The milk of mammals is protected to different extents against microbial contaminations by natural inhibitory systems, including the lacto- peroxidase/thiocyanate/hydrogen peroxide system (LPS), lactoferrins, lysozyme, immunoglobulins and free fatty acids (El Agamy et al. 1992; Kappeler et al. 1999).

In a previous study on the microbiological quality of Moroccan camel's milk (Benkerroum et al. 2003), it was observed that coliform organisms were not always present in the samples analysed despite the high total aerobic counts in the same samples. Such results suggest that coliforms are more sensitive to the inhibitory systems of camel' milk than other groups of microorganisms.

Recently, there are significant increases in the prevalence of resistance to antibiotics in common pathogens of humans and animals worldwide. The increasing morbidity, mortality, and cost of health care are the consequences of the appearance and spread of antibiotic resistance. The major cause for the appearance and spread of antimicrobial resistance has been increasing antimicrobial use that enable the pathogenic microorganisms to modify themselves against the antibiotics. Most Bacteria have developed mechanisms of resistance to all classes of antibiotics available for systemic use in humans and animals. These mechanisms can be divided, by function, into three general groups: (1) inactivation of the antimicrobial, (2) alteration of the site of antibiotic activity, and (3) isolation of the target site from the antibiotic (Neu, 1992; Dixit and Gandhi, 2010; WHO, 2014).

Materials and Methods.

Milk Samples

Milk Samples were collected from 4-5 years old camels that raised in the local farm in Gaza strip form four different areas from north to south. The animals were healthy and free from subclinical mastitis according to the results of

California mastitis test (Coles, 1986). The case history of these animals were also collected to be sure that these animals didn't take antibiotics for a period not less than one month from samples collection. The samples were kept in sterile plastic bottles and transport directly to the laboratory using cooling box. The screening test was done to avoid the impurities. The pasteurization treatments at 72C°for 5 second were also conducted.

Milk sample preparation

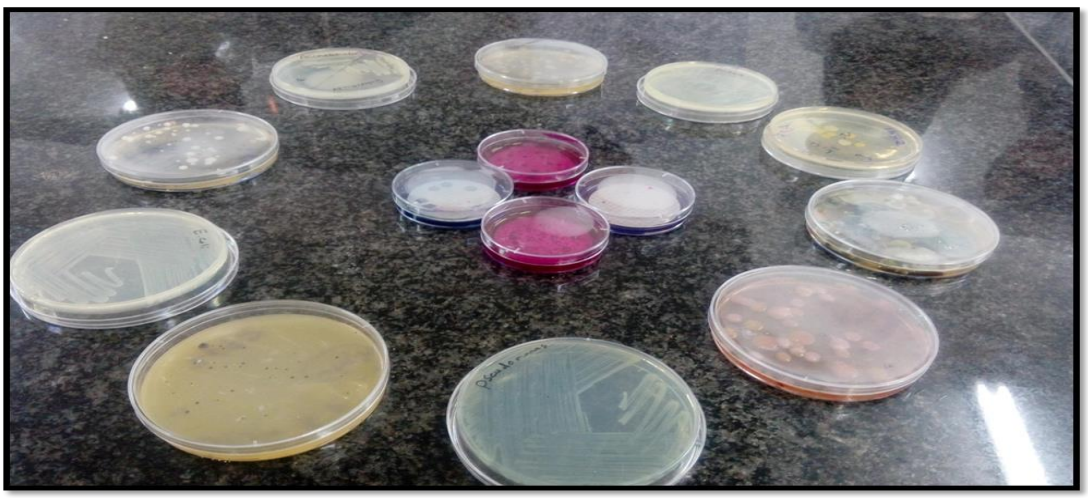
After pasteurization of samples, four concentrations (5%. 20%, 50%, 100%) was prepared for every samples using serial dilution by adding distilled water to show the effect of different concentration.

Pathogenic microorganisms

Five different species of pathogenic bacteria, were used in this study and kindly provided from the laboratories of Gaza strip including public health central lab., Alnaser hospital lab., and the lab. Of ministry of national economy. These isolates were Escherichia coli., Kliebsiella, Staphylococcus, Clostridium, and Enterobacter All these microorganisms are pathogenic for human and animals and also considered as important food pathogens that cause damage for some food (Abu Elnaga et al., 2014).

Culture of pathogenic microorganism's isolates

All selected microorganisms were cultured according to method described previously by Atlas et al., (1995). The bacteria were cultured on Muller Hinton medium (Oxide), All cultured bacteria were kept at 37 C° for three hours. Growth turbidity was compared with turbidity of the standard McFarland solution by reading optical density using a spectrophotometer on wavelength 450 nm. The dilutions of bacterial cultures density were adjusted to the McFarland with cells number 1.5 x 108 cfu/ml.

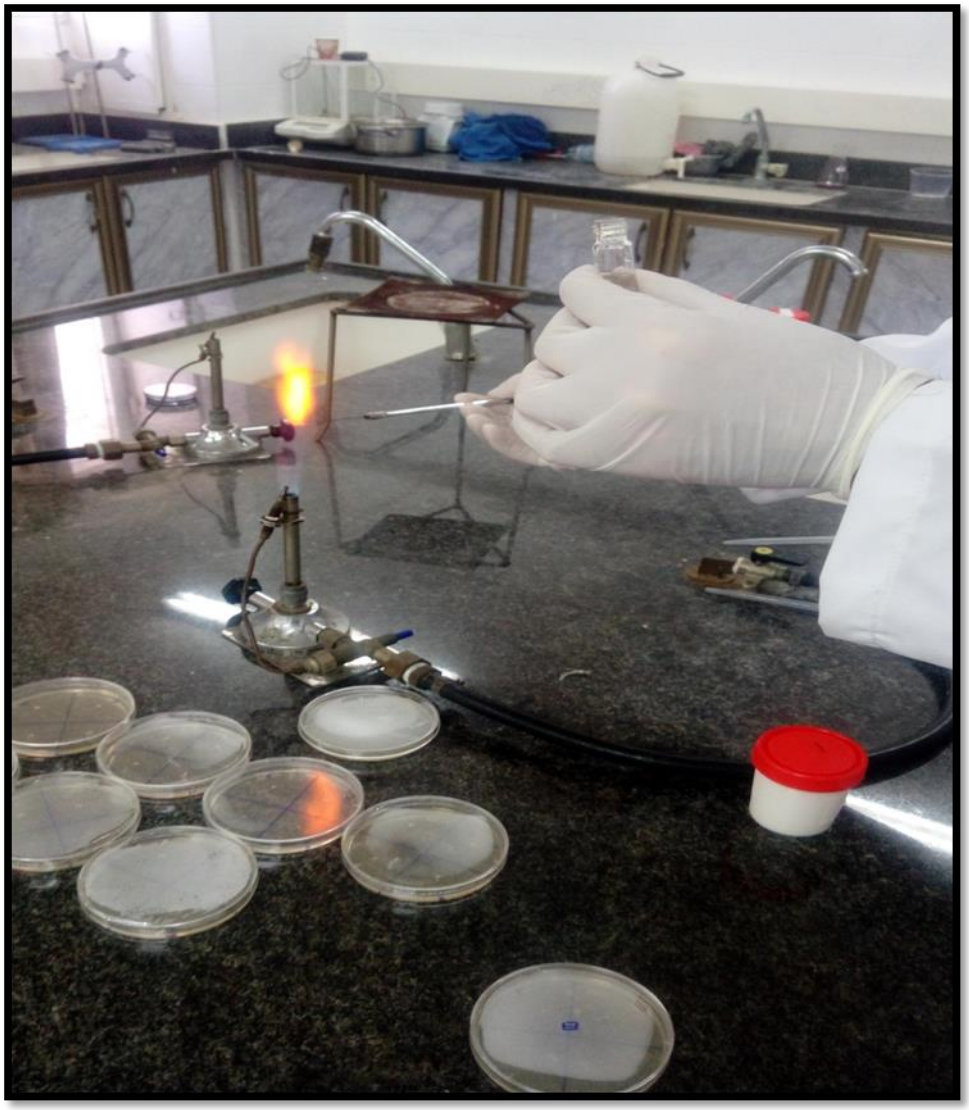


Screening for the camel milk antibacterial activity

Well diffusion method was used to study antimicrobial activity of camel's milk filtrate and according to method described by Cleidson et al., (2007).

Antibacterial activity was tested using the agar well diffusion method on nutrient agar media using milk dilutions (5–100%). The wells were made using a sterile borer and were filled with 0.45 µl of each concentration. The antibacterial assay plates were incubated at 37°C for 24 h.

The diameter of the zones of inhibition around each well was taken as a measure of the antibacterial activity.



Results

The camel milk samples were used to investigate its antibacterial effect against the tested bacterial strains.

The agar well diffusion method was carried out to investigate the effect of the different milk samples against the tested bacterial strains as it is shown in table (1) camel milk has no antibacterial activity against Kliebsiella, Serratia, and proteus isolated from medical sources, but in other side the camel milk has antibacterial activity in other strains like Acinobacter and pseudomonas.

Table (1): Antimicrobial activity percent of camel milk against isolates from medical sources.

Isolates	Antimicrobial percent (%)
Klebsiella	0%
Acinetobacter	50%
Serratia	0%
Proteus	0%
Pseudomonas	75%
E.coli	75%

Regarding the antibacterial activity of camel milk against bacterial strains isolated from food samples as shown in Table (2) camel milk has antibacterial activity against all isolates from food samples.

Table (2): Antimicrobial activity percent of camel milk against isolates from food sources.

Isolates	Antimicrobial percent (%)
Staphylococcus	50%
Total coliform (Pca)	75%
yeast	25%
Clostridium	50%

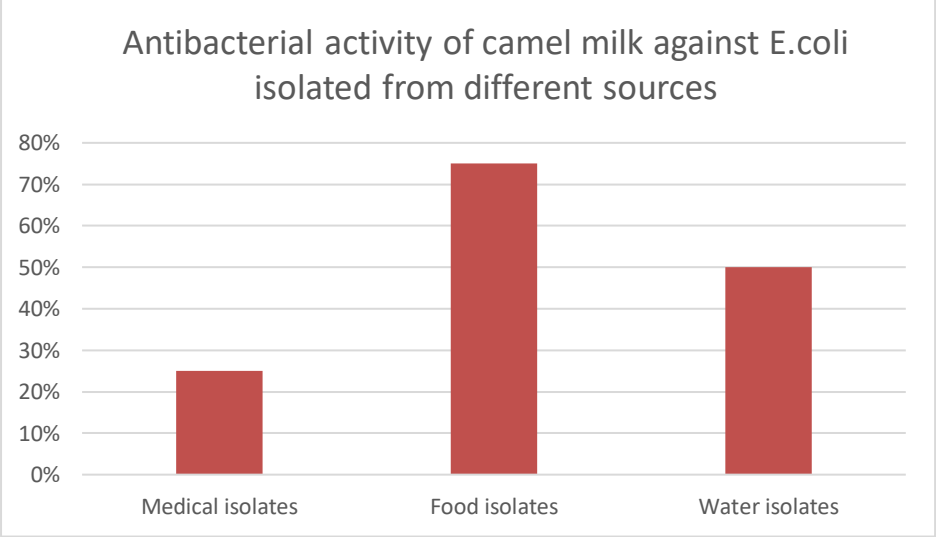
As shown in table (3) camel milk has antibacterial activity against bacteria strains isolated from water samples.

Table (3): Antimicrobial activity percent of camel milk against isolates from water sources.

Isolates	Antimicrobial percent (%)
Total coliform	50%
Fecal coliform	50%

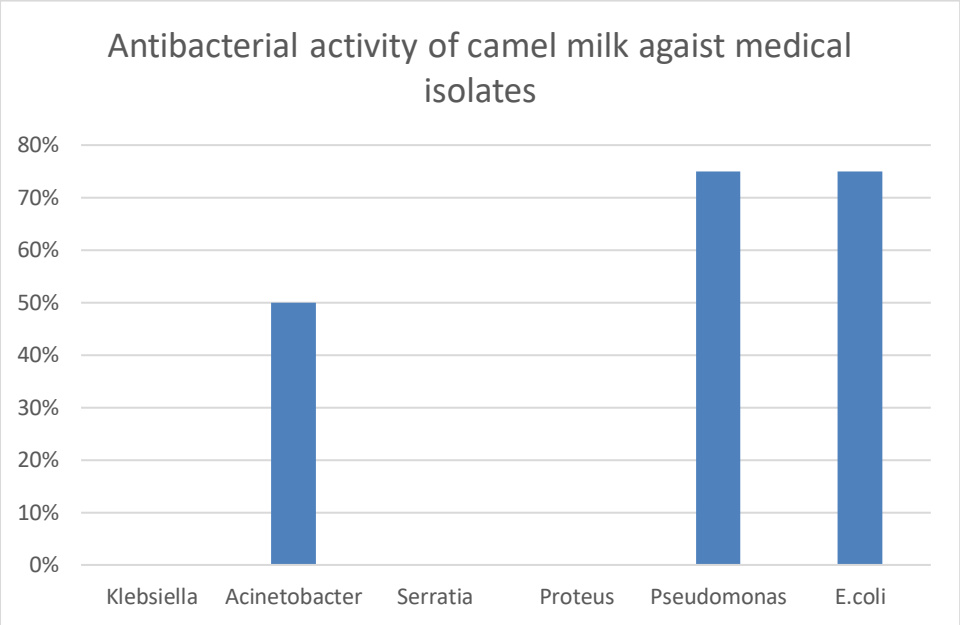
The antibacterial activity percent was varying according to different bacterial strains in addition the source of isolates. Figure (1) shows that bacterial strains isolated from food samples was the highest in antibacterial activity of camel milk, followed by strains from water samples and then the strains from medical samples.

Figure (1): Antimicrobial activity of camel milks against isolates from different sources.



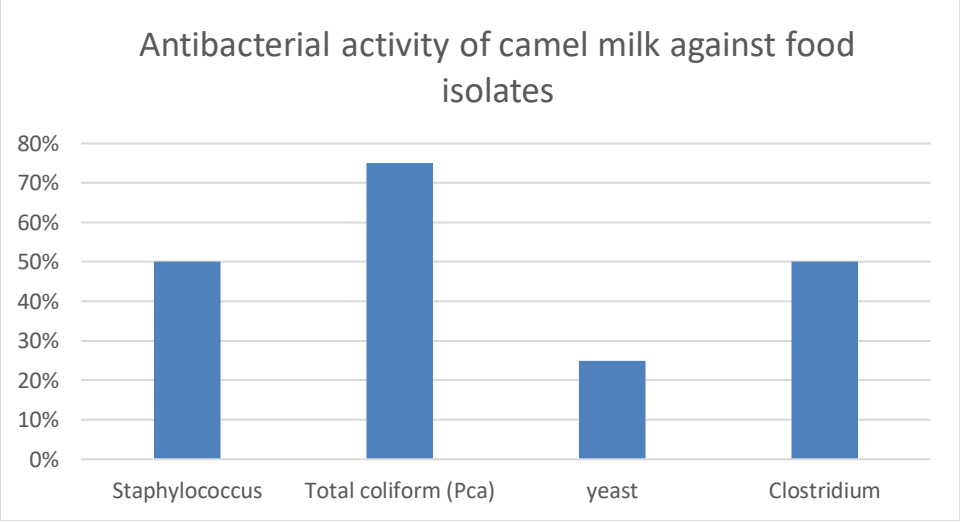
As shown in figure (2) regarding the antibacterial activity percent of camel milk against bacterial strains isolated from medical sources pseudomonas shows the highest antibacterial activity percent 75%, and Acinobacter 50%, while Kliebsiella, proteus, and Serratia were resist.

Figure(2): Antimicrobial activity of camel milks against isolates from medical samples.



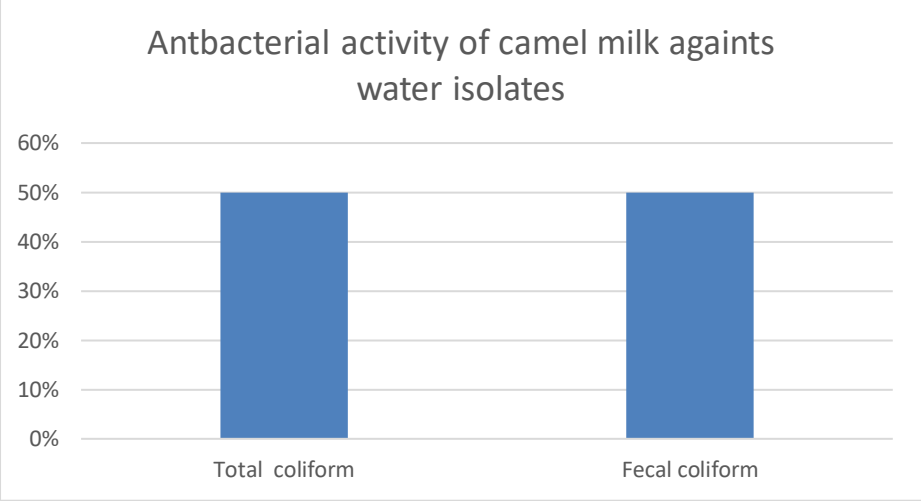
As shown in figure (3) regarding the antibacterial activity percent of camel milk against bacterial strains isolated from food sources, Total coliform showed shows the highest antibacterial activity percent 75%, while for Staphylococcus, Clostridium was 50%, and Yeast was 25%.

Figure(3): Antimicrobial activity of camel milks against isolates from food samples.



As shown in Figure (4) regarding the antibacterial activity percent of camel milk against bacterial strains isolated from water sources. It shows equal percent for total coliforms and fecal coliforms 50%: 50%.

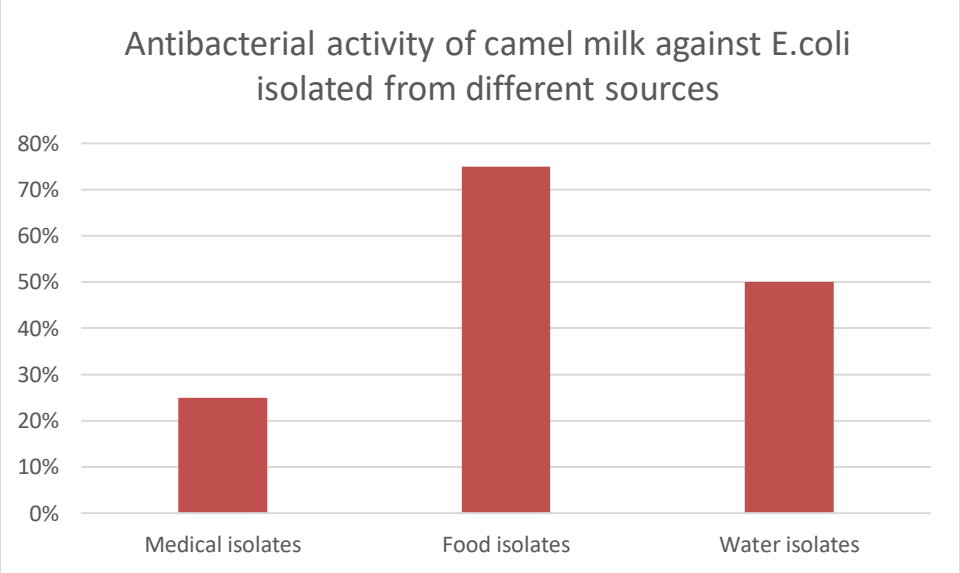
Figure (4): Antimicrobial activity of camel milks against isolates from water samples.



Antibacterial activity percent of camel milk against E. coli isolated from

Different source shows different patterns. The highest antibacterial percent for E. coli isolated was from food samples, then from water samples, and finally from medical samples.

Figure (5): Antimicrobial activity of camel milks against E. coli isolates from different sources.



Discussion

There is an urgent need to find new antimicrobials to treat bacterial pathogens. It is generally well established that the food constituents can be used to reduce the risk of developing or aggravating human disease conditions. In this regard, functional foods had emerged as adjuvant or alternative to chemotherapy, especially in the prevention and management of human diseases and for maintaining optimum health state (Kris-Etherton PM etal., 2002).

Interest in camel milk usage for human nutrition is increasing due to its distinct composition and unique bio functional properties (Sboui A, etal., 2012).

The results of this study revealed the efficiency of camel's milk in which revealed clear inhibition zones of the growth of both gram positive and negative tested pathogenic bacteria and yeasts in high concentration (100 %).

This results are compatible with previous studies (Agrawal et al., 2003), who proved that camel's milk has inhibition effects against gram negative and positive bacteria because it possesses of high concentration of inhibitory substances. This substance appeared to have a considerable role in the inhibition of microorganisms such as Escherichia coli, Listeria monocytogenes, Staphylococcus aureus and Salmonella typhimurium.

The results of this study indicated that camel's milk had the highest antibacterial activity against E. coli isolated from different sources. These results are compatible with previous study (Amal Othman, 2015) who showed that camel's milk had antibacterial activity against E. coli and K. pneumoniae. Different concentrations were used, and it was found that 40 and 70% were the highly effective concentrations on both organisms, respectively.

Conclusion:

The results of this study showed that pure Camel's milk (100%) has antimicrobial activity against different microorganisms isolated from different sources.

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