

The antimicrobial activity of pomegranate (*Punica granatum*) juice

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Abstract—In The present study microbial property of pomegranate juice was evaluated against both Gram positive and Gram negative bacteria (*Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*) using disk inhibition zone (Heart brain diffusion) method. The bacteria were obtained from reaserch center of Sulaimani Polytechnic University . The result of this study showed good antibacterial effect of pomegranate juice against both Gram negative and Gram positive bacteria, diameter of inhibition zones were significantly higher in pomegranate juice as compared to standard antibiotic disc. The present study concluded that the juice of *Punica granatum* have a strong antibacterial activity.

Index Terms— *Pomegranate*; *Staphylococcus aureus*; *Escherichia coli* ; *Pseudomonas aeruginosa*; *antibacteria*

1 INTRODUCTION

Punica granatum, commonly known as pomegranate, is a fruit-bearing deciduous shrub or small tree belongs to the family Lythraceae [1], native to Asia Mediterranean and is an important crop plant in Kurdistan-Iraq. From thousand year the ancient peoples in many countries were used different parts of this plant such as leaves, juice and fruit rind as traditional medicine for dysentery, abdominal pain and deworme (antiparasite) [2]. The chemical analytic of different parts of pomegranate has been studied by many researchers they found fruit and peel of pomegranate were rich source of polyphenolic compounds [3]. Pomegranate have been reported in many studies that have antimicrobial activity against a wide range of microorganisms including bacteria (Gram positive, Gram negative) [4]. Additionally this plant was reported in numerous studies to have excellent antifungal, antiprotozoal, antioxidant anticarcinogenic, anti-inflammatory and antibacterial properties " [5], [6], [7]" The goal of this study was to investigate the antibacterial activity of some popular pomegranate cultivars juice grown in Halabja district/ Kurdistan-Iraq using freezer dring and heat dring methods to obtain pomegranate powder and aqueous extract were followed .

2.1 MATERIALS AND METHODS

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Pomegranate fruits of Kurdistan cultivars were selected from Halabja garden. The fruits of uniform size, colour and maturity were selected by visual observation and used as experimental material.

2.2 Extraction of Juice

The extraction method were according to joshi A.A. [1]

1. Hand Press Method: Pomegranate juice arils were separated manually. The juice was extracted by crushing the arils followed by pressing through two layers of muslin cloth.

2. Domestic Mixer Method: Pomegranate juice arils were separated manually. The arils were crushed in domestic mixer, then juice was strained using muslin cloth. the juice were dried to obtain powder using dry freezing and oven 75c for 96 hours and the powder were used as five concentration 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50ml/mg.

2.3 Microorganisms and Culture

A total of tree medical related bacteria were provided by reaserch center of Sulaimani Polytechnic University. The Gram- positive bacteria (*S. aureus*) and two Gram-negative bacteria (*E. coli* and *P. aeruginosa*). The bacterial growth were maintained at 4 °C on the nutrient agar slants, before experimental use, sub culture were prepared and incubated for 24 hour at 37 °C and used as in ocular. Antibacterial activities of the pomegranate juice were tested by agar well diffusion method [8], a loop full of the selected bacteria were transferred from nutrient agar slant to Mueller Hinton agar and Heart Brain agar and incubated at 37°C. The wells were punched with a sterile cork borer and 50 µl of each concentration was added to each well, controls were maintained with sterile distal water. Amikacin, ampicillin and ciprofloxacin (50 mg/ml) were used as standard antibiotics for gram positive and gram negative bacteria, following

incubation at 37°C for 24 hrs, diameters of the inhibitory zones were measured. The minimal inhibitory concentration (MIC) was determined as the lowest concentration of antibacterial which inhibite visible growth of bacteria using different concentration of pomegranate juice using Brain Heart Infusion (BHI) [8].

3 RESULT

In present study the antibacterial activity of Pomegranate juice, aqueous extracts was evaluated against *S. aureus*, *E. coli* and *P. aeruginosa*. The result of the present study showed that Pomegranate juice have strong antibacterial effect against Gram positive and Gram negative bacteria. Table (1) show the effect of different concentration of pomegranate juice using aqueous extract.

TABLE 1
 Antibiotics susceptibility and pomegranate juice antibacterial effect (zone of inhibition in mm)

Test organism	Amp 10mcg	Cipro 5mcg	Amik 10mgcg	Pom. 10mg/dl	Pom. 15mg/dl	Pom. 20mg/dl	Pom. 25mg/dl	Pom 30mg/dl
<i>P. aeruginosa</i>	8	-	-	10.5	11	13	12.5	14
<i>E. coli</i>	2	17	-	8.5	11	12	13	14
<i>S. aureus</i>	-	-	16	11	12.5	13	14	14.2

Amp = Ampicillin, Cipro= Ciprofoxacin, Amik = Amikacin;
 pom= pomegranat

4 DISCUSSION

Most of the world populations depends on the natural

products for primary health care, "[6],[9]". pomegranate was extensively studied and their results showed that this plant is strongly have therapeutic property [10]. the therapeutic property of pomegranate due to The tannin rich, gallic acid, quercetin and phenolic acids which have antibacterial, antiviral, antifungal and antihelmenthic activity "[11],[12]". In the current study the hot aqueous extracts of pomegranate juice showed zone of inhibition of at least 14 mm against *P.aeruginosa* which was significantly greater than that of Ciprofloxacin 4mm , amikacin 2mm and ampicillin. The inhibition zone was 13mm against *E.coli* which was a little lesser than that of Ciprofloxacin 17mm while it was greater than other antibiotic disc, regarding the *S. aureus* the mine of the zone zone was and 14.5mm which was greater than that of akamycin 2mm and ampicillin 8mm but it was lesser than that of ciprofloxacin (16mm). this result indicate that most of bacteria were get resistant against most of antibiotic due to broad use of these antibiotic, the *P.aeruginosa* was well define as resistant bacteria against most antibiotic, the results of present study indicated that pomegranate juice have strong effect toward *P. aeruginosa* this result have medical important which have direct concern with resistant pathogenic nosocomial bacteria. The result of present study were in agreement with[9] the mean of inhibition zone of all concentration 10ml/mg, 15ml/mg, 20ml/mg, 25ml/mg and 30ml/mg showed antibacterial effect and Minimal inhibition concentration was 10ml/mg, this result were in agreement with"[13], [14]". The antibacterial effect of *P. granatum* were more clear on the *P. aeruginosa* that may be due to containing large amount of tannins (25%). "[15], [16]" provide the present study who reported that Punica granatum extract has strong antibacterial activity against *Vibrio cholera*.

5 CONCLUSION

This study concluded that pomegranat juice have strong antibacterial activity especially for gram negative *P. aeruginosa* which is have resistant for most antibiotic.

ACKNOWLEDGMENT

The authors wish to thank Nursing and MLT Department of Halabja Technical Institute and SPU research center which supported this work.

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