

# Saudi Punica granatum L Peel Extract Achievement in Eradicating Zoonotic Pathogens

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## Abstract:

Punica granatum peel extract is anti-zoonotic pathogens and energetic role in the zoonotic health field. It contains anti-zoonotic pathogens as phenolic acid, flavonoids, and Tannins. The aim was to conduct a laboratory experiment to test Saudi Punica granatum peel extract against zoonotic pathogens in order to demonstrate the extract's role in zoonotic health. The methodology was for an experiment exposing zoonotic pathogens to Saudi Punica granatum peel extract. The results of group A was included *Escherichia coli*, *Listeria monocytogenes*, and *Candida albicans*, after 12 hours eradications were (72.0%, 72.5% and 70.2%), and after 24 hours were (96.3%, 95.0%, and 95.2%), in range (95%-100%). Group B was included *Staphylococcus aureus*, and *Bacillus cereus*, after 12 hours were (60.5%, and 61.2%), and after 24 hours were (90.7%, and 91.8%), in range (90%-95%). Group C was included *Clostridium* sp., *Campylobacter* sp., and *Shigella* sp., after 12 hours were (56.3%, 57.6%, and 57.0%), and after 24 hours were (86.2%, 87.1%, and 86.0%), in range (85%-90%). Group D was included *Brucella* sp., and *Salmonella* sp., after 12 hours were (61.4%, and 58.8%), and after 24 hours were (80.7% and 82.4%), in range (80%-85%). It was concluded that Saudi Punica granatum peel extract was capable to eradicate zoonotic pathogens pose a human's health risk, can be transmitted to humans and cause zoonotic diseases. It also protected animals and animal products, thus possessing cross-health protection properties for both humans and animals. It was recommended that Saudi Punica granatum peel extract using of in appropriate medicinal quantities to maintain zoonotic health.

**Keywords:** punica granatum peel extract; escherichia coli; listeria monocytogenes; candida albicans; staphylococcus aureus; bacillus cereus; clostridium sp; campylobacter sp; shigella sp; brucella sp; salmonella sp

## Introduction

Punica granatum L is under "Subfamily Punicoideae", Punica granatum peel has a good position in the zoonotic health. Punica granatum peel extract is using as anti-zoonotic pathogens and plays an energetic role in the zoonotic health field. Punica granatum peel extract contains anti-zoonotic pathogens as phenolic acid, flavonoids, Tannins etc., that have been found very effective in the zoonotic health field. Due to the presence of anti-zoonotic pathogens action is authoritative for the zoonotic health improvement. The anti-zoonotic function is acting against various zoonotic pathogens [1].

Punica granatum peel extract contains compounds 5-hydroxy-methyl-furfural (36.6%), D-sucrose (23.2%), sorbitol (6.7%), palmitic acid  $\beta$ -mono-glyceride (5.6%), 2-furan-carboxal-dehyde (3.5%) and  $\beta$ -D-glucopyranose (3.3%) [2]. Punica granatum peel extract contains substantial quantities of poly-phenols as ellagic tannins, gallic acid, and ellagic acid [3].

Punica granatum peel extract contains active compounds control zoonotic pathogens activities [4]. Punica granatum peel extract contains active mixtures demonstrated as anti-zoonotic pathogens activity [5]. Punica

granatum peel extracts due to content of high levels of phenolics and exhibited as antibacterial activity against zoonotic bacteria [6].

Punica granatum peel extract was very effective to control various zoonotic pathogens *Staphylococcus* sp. [7]. Punica granatum peel extract was effective against zoonotic bacteria *Salmonella* sp., *Escherichia coli*, and *Staphylococcus aureus*, control the production of enterotoxin [8]. Punica granatum peel extract had anti-zoonotic properties against *Shigella* sp. [7]. Punica granatum peel extract was highly susceptible to zoonotic bacteria *Shigella* sp. [9]. Punica granatum peel extract had anti-zoonotic pathogens activities *Staphylococcus aureus* NCTC 6571 [10]. Punica granatum peel extract was preventing zoonotic bacteria *Escherichia coli*, and *Staphylococcus aureus* [8]. Punica granatum peel extract had anti-zoonotic bacteria on *Escherichia coli*, and *Listeria monocytogenes* [11]. Punica granatum peel extracts had anti-zoonotic activity against *Bacillus* sp., *Staphylococcus aureus*, *Escherichia coli*, and *Salmonella* sp. Gram-positive bacteria were more sensitive to the extracts than Gram-negative [12]. Punica granatum peel extract used as anti-

zoonotic microbial activity against enteropathogenic zoonotic bacteria *Escherichia coli*, *Salmonella sp.*, and *Shigella sp.* [13].

*Punica granatum* peel extract had yeast anti-zoonotic on *Candida albicans* infection [14]. *Punica granatum* peel extract had positive anti-zoonotic on *Candida albicans* from family *Saccharomycetaceae* [15]. *Punica granatum* peel extract had preventing various zoonotic pathogens *Candida albicans* [16].

The importance it was for an aim of the research was to conduct a laboratory experiment to test Saudi *Punica granatum* peel extract against zoonotic pathogens in order to demonstrate the extract's role in zoonotic health.

### Methodology:

#### Peel Extract:

Saudi *Punica granatum* sample was bought from the town market, the peel was manually peeled, was washed by distilled water, and 70% ethanol. The Saudi *Punica granatum* peel was extracted by "Hydro-Distillation" used "Clevenger-Type-Device". The dried peel was crushed by "Sterile-Mixer", was additional 30 g ground powder + 600 mL distilled water in 1000 mL bottle covering 600 mL, the mixture was boiling for 5 hours. Saudi *Punica granatum* peel extract was available as mL/100 g dry matter, then anhydrous  $\text{Na}_2\text{SO}_4$  was dehydrated and dark glass container kept at 4°C [17].

### Zoonotic Pathogens:

The zoonotic pathogens isolates were collected from "Isolated-Lab.", were included *Staphylococcus aureus*, *Clostridium sp.*, *Bacillus cereus*, *Brucella sp.*, *Salmonella sp.*, *Escherichia coli*, *Campylobacter sp.*, *Shigella sp.*, *Listeria monocytogenes*, and *Candida albicans*. They were cultured in "Muller-Hinton-Broth", were incubated at 37°C for 18 hours, then were subculture for pure colony on "Muller-Hinton-Agar" at 37°C for 18 hours. Then pure isolates were made in "Muller-Hinton-Broth", ( $1 \times 10^8$  CFU/mL) [18].

### Laboratory Test:

An equal quantity of Saudi *Punica granatum* peel extract and pure isolates suspension were placed in each hole of "Micro-Titration-Plate", and were made three holes for each isolate. The plate was mixed by "Electric-Vibrator." The plate was incubated at (35-37) °C, then was checked at (12 and 24) hours. A mixture loopful was taken from each hole for culture on "Molar-Hinton-Agar" was incubated for 24 hours at (35-37) °C, the colony count was made [11].

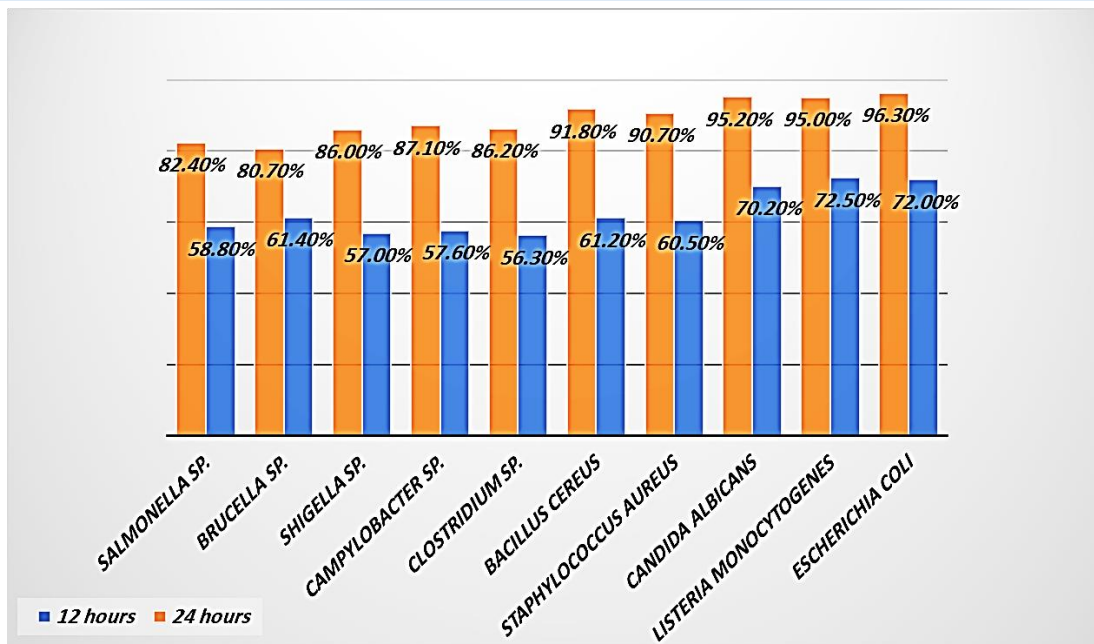
### Statistical Analyses

The results were made in triple trials, were existed as mean with standard errors. These final results were calculated by "Microsoft Excel Software" [19].

### Results and Discussions:

Zoonotic pathogen	Item	Time			Group	
		Zero hours	12 hours	24 hours		
<i>Escherichia coli</i>	Colony count	82±3	23±2	3±2	A	
	lived percent	100%	28.0%	3.7%		
	Eradicated percent	00.0%	72.0%	96.3%		
<i>Listeria monocytogenes</i>	Colony count	80±3	22±2	4±2		
	lived percent	100%	27.5%	5.0%		
	Eradicated percent	00.0%	72.5%	95.0%		
<i>Candida albicans</i>	Colony count	84±3	25±2	4±2		
	lived percent	100%	29.8%	4.8%		
	Eradicated percent	00.0%	70.2%	95.2%		
<i>Staphylococcus aureus</i>	Colony count	86±3	34±2	8±2	B	
	lived percent	100%	39.5%	9.3%		
	Eradicated percent	00.0%	60.5%	90.7%		
<i>Bacillus cereus</i>	Colony count	85±3	33±2	7±2		
	lived percent	100%	38.8%	8.2%		
	Eradicated percent	00.0%	61.2%	91.8%		
<i>Clostridium sp.</i>	Colony count	87±3	38±2	12±2		C
	lived percent	100%	43.7%	13.8%		
	Eradicated percent	00.0%	56.3%	86.2%		
<i>Campylobacter sp.</i>	Colony count	85±3	36±2	11±2		
	lived percent	100%	42.4%	12.9%		
	Eradicated percent	00.0%	57.6%	87.1%		
<i>Shigella sp.</i>	Colony count	86±3	37±2	12±2		
	lived percent	100%	43.0%	14.0%		
	Eradicated percent	00.0%	57.0%	86.0%		
<i>Brucella sp.</i>	Colony count	83±3	32±2	16±2	D	
	lived percent	100%	38.6%	19.3%		
	Eradicated percent	00.0%	61.4%	80.7%		
<i>Salmonella sp.</i>	Colony count	85±3	35±2	15±2		
	lived percent	100%	41.2%	17.6%		
	Eradicated percent	00.0%	58.8%	82.4%		

**Table 1: An estimated percentage of zoonotic pathogens after contact to Saudi *Punica granatum* peel extract**



**Figure 1: An estimated percentage of zoonotic pathogens after contact to Saudi Punica granatum peel extract**

Table (1), and Figure (1) were showed an estimated percentage of zoonotic pathogens after contact to Saudi Punica granatum peel extract. Because Saudi Punica granatum peel extract contains active compounds that eradicated zoonotic pathogens [1-6].

Group A were contained zoonotic pathogens included Escherichia coli, Listeria monocytogenes, and Candida albicans. The results after twelve hours were showed the eradicated percent were (72.0%, 72.5% and 70.2%), and the results after twenty-four hours were showed the eradicated percent were (96.3%, 95.0%, and 95.2%). The results indicated that Saudi Punica granatum peel extract was eradicated group A in a range of (95%-100%) for zoonotic pathogens [8, 11-16].

Table (1), and Figure (1) were showed group B were contained zoonotic pathogens included Staphylococcus aureus, and Bacillus cereus. The results after twelve hours were showed the eradicated percent were (60.5%, and 61.2%), and the results after twenty-four hours were showed the eradicated percent were (90.7%, and 91.8%). The results indicated that Saudi Punica granatum peel extract was eradicated group B in a range of (90%-95%) for zoonotic pathogens [7-8, 10-12].

Table (1), and Figure (1) were showed group C were contained zoonotic pathogens included Clostridium sp., Campylobacter sp., and Shigella sp. The results after twelve hours were showed the eradicated percent were (56.3%, 57.6%, and 57.0%), and the results after twenty-four hours were showed the eradicated percent were (86.2%, 87.1%, and 86.0%). The results indicated that Saudi Punica granatum peel extract was eradicated group C in a range of (85%-90%) for tested zoonotic pathogens [9, 11, 13].

Table (1), and Figure (1) were showed group D were contained zoonotic pathogens included Brucella sp., and Salmonella sp. The results after twelve hours were showed the eradicated percent were (61.4%, and 58.8%), and the results after twenty-four hours were showed the eradicated percent were (80.7% and 82.4%). The results indicated that Saudi Punica granatum peel extract was eradicated group D in a range of (80%-85%) for zoonotic pathogens [11-13].

The results were showed the main components effects in Saudi Punica granatum peel extract had the property of zoonotic pathogens eradication that are present in the animal environment and can be transmit to humans. These affecting the shared environment and causing zoonotic humans'

diseases, especially farmers who are in close proximity to animals or workers handle animal products [1-6].

### Conclusions:

It was concluded that, the research had shown that Saudi Punica granatum peel extract was capable of eradicate zoonotic pathogens pose a human's health risk, as these zoonotic pathogens can be transmitted to humans and cause zoonotic diseases. It also protected animals and animal products, thus possessing cross-health protection properties for both humans and animals.

### Recommendations:

It was recommended that the using of Saudi Punica granatum peel extract in appropriate medicinal quantities to maintain zoonotic health.

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