

 <p>ISSN NO. 2320-5407</p>	<p>Journal Homepage: <a href="http://www.journalijar.com">www.journalijar.com</a></p> <p><b>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)</b></p> <p>Article DOI:10.21474/IJAR01/14313 DOI URL: <a href="http://dx.doi.org/10.21474/IJAR01/14313">http://dx.doi.org/10.21474/IJAR01/14313</a></p>	
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### RESEARCH ARTICLE

## ANTI OXIDANT, MICROBIAL AND PHYTO CHEMICAL STUDIES OF CARICA PAPAYA MILK: A NATURAL HAND SANITIZER

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### Manuscript Info

#### Manuscript History

Received: 21 December 2021

Final Accepted: 24 January 2022

Published: February 2022

### Abstract

In this study, the effect of Carica papaya against various microorganisms is evaluated using DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) assay for antioxidant activity. The focus is on employing the antimicrobial and antioxidant activities of papaya milk as a natural antimicrobial by preparing hand sanitizer. Papaya (Carica papaya Linn), a nutraceutical fruit well known for its nutritional values and potent medicinal properties such as antioxidant, anti-bacterial, anti-helminthic, anti-fungal, anti-hypertensive and anti-fertility, free radical scavenging activity [1-10]. The study includes extraction of C. papaya milk from C. papaya fruit and identification of phytochemical constituents by performing chemical tests. Preparation of sanitizer with 5ml and 7ml of C. Papaya Milk for 10 ml sanitizer. Evaluation of antimicrobial activity of prepared sanitizer on cultures from hand using spread plate method. Determination of sanitizing ability was done by calculating percent reduction in colony forming units (CFU) before and after sanitization. Evaluation of antioxidant activity by in vitro DPPH Scavenging method. The standard sanitizer had shown 75% effectiveness, isopropyl alcohol shows 90% effectiveness, and finally sanitizer which is prepared from papaya milk was found to be 58% effective against micro-organisms.

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### Introduction:-

The word "hygiene" is derived from the ancient Greek goddess "Hygeia" that means "goddess of healing." Hands are considered to be the primary route for transmitting microbes and infections to the individuals. Personal as well as hand hygiene is important to prevent many communicable diseases. In the traditional system of medicine, the plants have been considered as a rich source of bioactive compounds which recommended for its therapeutic values. Carica papaya Linn, belongs to family Caricaceae, is a monoecious, dioecious or hermaphrodite tree. It is named as nutraceutical fruit and can be used as an important and promising natural medicinal plant, because of its multiple properties like antioxidant, anti-bacterial, anti-helminthic, anti-fungal, anti-hypertensive and anti-fertility, free radical scavenging activity. Hence, C. papaya with its great potential pharmacological actions and medicinal uses of different parts of the papaya is considered as the king of medicine. The current article is focused on investigating the important antimicrobial and antioxidant aspects of papaya milk as a natural antimicrobial by preparing Hand sanitizer. A natural hand sanitizer was prepared by using papaya milk extract obtained from C. papaya. Identification of phytochemical constituents was done results in presence of antimicrobial activity in milk of papaya. The activity of papaya milk sanitizer was tested against microorganisms comparing with standard sanitizer and

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isopropyl alcohol. For testing Streak plate method was used to carry out the activity hands sanitizer. While following procedure the streak was collected from volunteers before and after sanitization. Finally, the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) inhibition was used to evaluate the antioxidant activity of phenolic content and absorbance.

### Materials and Methods:-

A nutrient agar medium was prepared for growth of micro-organisms. The constituents used for the preparation of culture media are agar peptone, beef extract, sodium chloride and distilled water. These provide nutrients to the micro-organisms which is essential for the colony growth [11]. Extraction of papaya milk from fruit of *C. papaya* into a glass vial is performed by making incisions on the fruit. Phytochemical tests were performed to know the presence of alkaloids, saponins, tannins, glycosides, flavonoids, steroids, and phenols [12-22]. Papaya milk extract sanitizer was prepared by taking 7ml papaya milk, to it add 1ml of glycerin is added and then finally make up with 2ml propylene glycol. After adding mixed uniformly using homogenizer for 30 minutes until transparent sanitizer is obtained [23].

### Antimicrobial activity

Spread plate method is employed to assess the antimicrobial activity of the sanitizer. Swab cultures from different hand samples were collected before and after 10 minutes of sanitization. The swab culture was streaked on agar plates were incubated for 24 hours at 37 degrees Celsius and number of CFU produced were determined using colony counter. Sanitizers used for the assay include 70% isopropyl alcohol, standard sanitizer and prepared sanitizer made with papaya milk. Then the antioxidant activity was determined by DPPH assay. A solution of 0.1 mM DPPH in methanol was prepared, and 2.4 mL of this solution was mixed with 1.6 mL of extract in methanol at different concentrations (12.5–150 µg/mL). The reaction mixture was vortexed thoroughly and left in the dark at RT for 30 min. The absorbance of the mixture was measured spectrophotometrically at 520 nm. Percentage DPPH radical scavenging activity was calculated by the following equation [24-26].

$$\text{DPPH scavenging effect (\%)} = \{A_o - A / A_o\} \times 100$$

Where,

$A_o$  = Absorbance of control

$A$  = Absorbance of standard

### Results:-

Antimicrobial activity of the sanitizer was checked by determining reduction in number of colonies produced after sanitization. The petri dishes inoculated with cultures from palms of volunteers produced colonies. The CFU produced with control (without sanitization) and test 10 min after sanitization was determined using colony counter. The CFU produced with control is  $50 \pm 2$  which is 70%, for isopropyl alcohol, marketed sanitizer and sanitizer (papaya milk) was  $15 \pm 2$ ,  $8 \pm 2$ ,  $13 \pm 2$  respectively. The reduction in number of CFU on first day is 70%, i.e., 30%, 8%, 28% for isopropyl alcohol, marketed and prepared sanitizers respectively, while on second day it is 90%, 58%, 75% respectively. This indicates that papaya milk had significant sanitization effect compared to marketed sanitizer.

**Table no1:-** Phytochemical tests and results.

Chemical constituents	Presence/Absence
Alkaloids	+
Glycoside	+
Saponins	+
Tannins	+
Reducing sugars	+
Steroids	+
Phenols	+

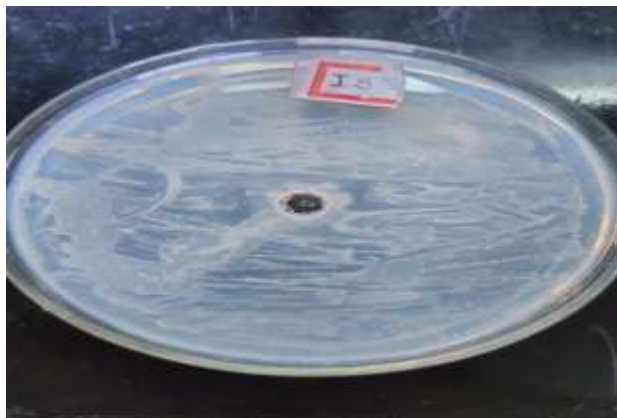
Chemicals/ Products	No. Of Colony Forming Units(CFU) with Sanitization				% Reduction in CFU after Sanitization	
	1st Day		2nd Day			
	Before	After	Before	After	1st Day	2 <sup>nd</sup> Day
Marketed Sanitizer(Apollo)	70	13	142	43	28%	75%
Papava Milk	69	8	170	32	8%	58%

Isopropyl alcohol	30	15	48	10	30%	90%
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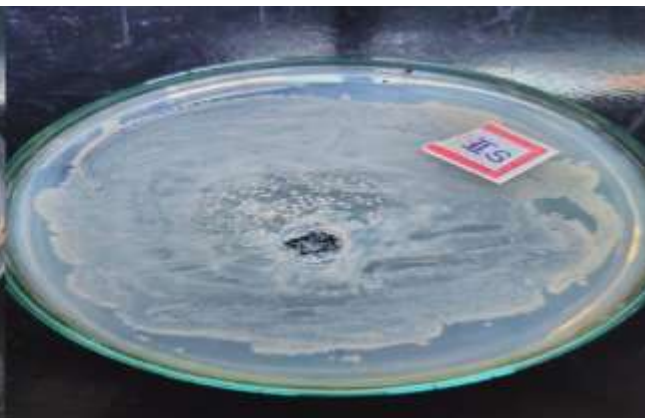
**Table no 2:** - Results of antimicrobial activity of test sanitizer, marketed sanitizer and isopropyl alcohol.

### Zone of inhibition activity

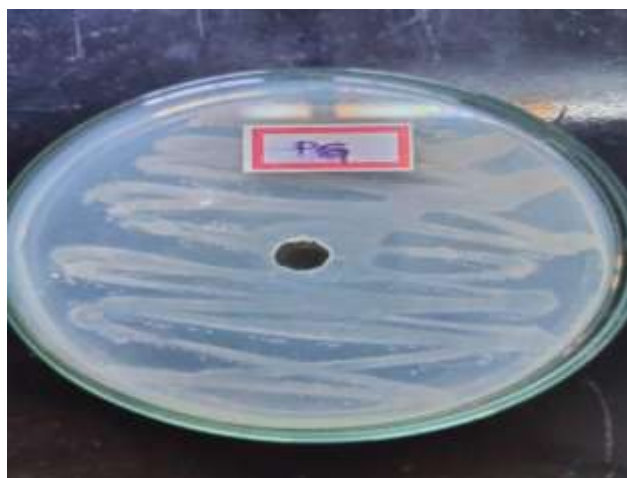
The standard sanitizer had shown 75% effectiveness, Isopropyl alcohol shows 90% effectiveness and finally sanitizer which is prepared from papaya milk was found to be 58% effective against micro-organisms.



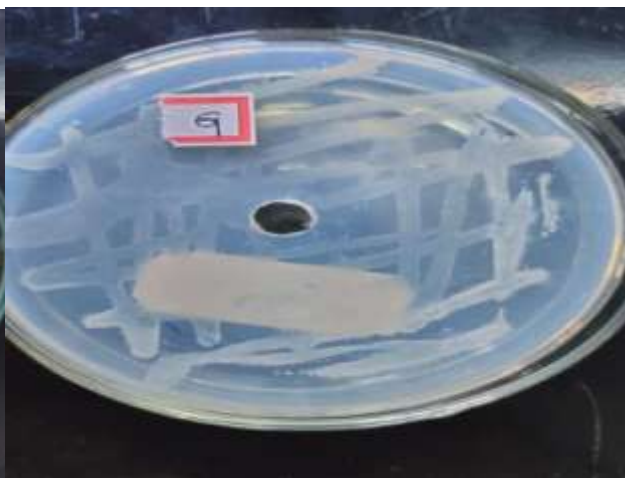
**Fig No.1:-** C.PapayaMilk: 5% Dilution.



**Fig No 02:-** Papaya Milk:7% Dilution.



**Fig No 03:-** Propylene Glycol.



**Fig No 04:-** Glycerine.

### Discussion:-

The study mainly focused on the secret behind the papaya milk. Papaya (*Carica papaya* Linn.) is well known for its nutritional and medicinal properties. It is named as nutraceutical fruit and can be used as an important and promising natural medicinal plant, because of its multiple properties like Antioxidant, Anti-bacterial, Anti-helminthic, Anti-fungal, Anti-hypertensive and Anti-fertility, free radical scavenging activity. The current article is focused on investing the important antimicrobial and antioxidant aspects of papaya milk as a natural antimicrobial by preparing Hand sanitizer. Papaya milk contains Proteolytic enzymes, papain, chemo papaine, Lysosomes, peptidase A and B a chemical constituent. These constituents make papaya milk as Antimicrobial agent.

### Conclusion:-

In conclusion, this study indicates that *C. papaya* milk, might be a promising source having a potent antioxidant activity. All the above references strongly support our work on *Carica Papaya* milk as potent Anti-bacterial and Anti-Oxidant properties. These effects may be due to the presence of potent chemical constituents in milk such as proteolytic enzymes, papain, chemopapain, glutamine cyclotransferase, chymopapains A, B and C, Peptidase A and

B and Lysozymes. All these results demonstrate the importance of C. papaya milk as a medicinally important plant. Activities from leaves and milk had displayed the presence of important molecules. The active milk extracts need to be characterized further for identification of the active molecules with antibacterial and antioxidant activities

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