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4. Date Palm: An Antimicrobial Agent with Its Nutritional Benefits

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ABSTRACT

Date palm trees are known as the population of the Eastern zone, give a portion of food for human antibiotic resistant. Most of the natural products have an antibacterial effect which use in clinical purpose. Date palm is an essential nourishing source in the Eastern zone. The extraction of Date seed powder was done by using hexane and ethyl acetate solvents. Date palm pits show antibacterial activities on two bacteria (Klebsiella pneumonia and Escherichia coli) and its function is reducing the side effect on neurotransmitter are that brain, hormone, testosterone, muscle of male albino rats. The proper aim of this study is to use the nuclei dates as an antimicrobial on Klebsiella pneumonia and Escherichia coli than the pursuit of perfect antibiotics. It was identified that the methanol extract of date seed contains alkaloids, carbohydrates, phenols, flavonoids, protein, amino acid, tannins, and anthraquinones except steroids, saponins, and cardiac glycoside. The metabolic extract of date seed has also shown moderate inhibition on the growth of Gram-positive and Gram-negative bacteria.

KEYWORDS

Resistant, Extraction, Neurotransmitter, Pursuit.

Introduction

Antibiotic resistance is a biggest threat to global health. Approximately 5 lakhs persons of the world are infected by drug-resistant tuberculosis and Human Immuno Deficiency Virus. The Date palm (Phoenix dactylifera L.) is one of the most noteworthy sources of food which have antibacterial potential. The percentage of reducing sugar is 88% in varieties and the percentage of non-reducing sugars is 3.82%. Dates are contemplated a tonic. The flower of the plant is used as economic source. Date palm cures male fertility by increasing sperm number and quality.

Date Palm: An Antimicrobial Agent with Its Nutritional Benefits

Dates (Phoenix dactylifera) are an important nutritional source in many countries of the world, because of the Dates containing different nutrients such as carbohydrates, vitamins, and minerals. Date palm flowering and fruiting were also valuable. All of the Dates accommodate the various qualitative and quantitative amounts of phytochemicals.

Natural phytochemicals, such as phenolic compounds, which need for human health, showed the most antioxidant activity. In addition to antioxidant activity that helps the study demonstrated the antibacterial activity of phenols and phenolic compounds. The seed powder is also used as a coffee replacement and as food involves.

The seed also yields essential fatty acids such as Palmitic acid, Stearic acid, Lauric acid, Oleic acid, and Linoleic acid. As Date Palm have different anticancer property, it is important to phytochemical analysis of Date Palm to find what agent is actually responsible for its function. The aim of the study is to profile to Date palm fruits and leaves and evaluate their functional significance such as antimicrobial activities to their nutritional benefits.

Taxonomic Position:

Kingdom: Plantae
Clade: Tracheophytes
Clade: Angiosperms
Clade: Monocots
Clade: Commelinids
Order: Articles
Family: Arecaceae
Genus: Phoenix
Species: P. dactylifera

Fig 1: Date Palm

Materials and Methods:

The Date seed was extracted by using Ethyl acetate and Hexane.

Collection of seeds:

Design Implementation

- The Date seed (Phoenix dactylifera) was selected for the study of antimicrobial activity and phytochemical analysis. The seeds were collected from the fruit market in Arambagh, West Bengal, India. Phoenix dactylifera seeds were collected. First seeds were washed with cold water and then with hot water. Then seeds were dried in room temperature at 37 degree Celsius for 7-10 days.

Then seeds were air dried and powdered. Date seed powder of 200g was added to 400ml hexane and incubated in a shaker at room temperature. After 24 h incubation, the solvent was filtered from the mixture and the powder was dried and used again for extraction using 400 ml ethyl acetate by incubating for 24 h in a shaken. The solvent was filtered and stored in a bottle.

Fig 2: Date Palm Seed

Fig 3: Seed Extracts of Date Palm

Site of Experiments:

The whole experiments were carried out in the laboratory room of Rabindra Mahavidyalaya, Champadanga, Hooghly, and West Bengal, India.

Collection of Microorganisms:

The tested microorganisms are Escherichia coli and Klebsiella pneumonia.

Preparation of Different Seed Extracts

Benzene Extract:

About 5 g of dried seeds were taken and powdered to store. Then dispersed in 25 ml of benzene solution and shake it for 10 minutes. Then used with paper and tied with the rubber band. Few holes were made in the paper air circulation and took it in room temperature at 370C, maintenance for 4 days.

Hexane Extract:

About 5 g of dried seeds were taken and powdered to store. Then dispersed in 25 ml of hexane solution and shake in for 10 minutes. Then used with paper and tied with the rubber band. Few holes were made in the paper air circulation and took it in room temperature at 370C, maintenance for 4 days.

Chloroform Extract:

About 5 g of dried seeds were taken and powdered to store. Then dispersed in 25 ml of chloroform solution and shake in for 10 minutes. Then used with paper and tied with the rubber band. Few holes were made in the paper air circulation and took it in room temperature at 370C, maintenance for 4 days.

Ethyl acetate Extract:

About 5 g of dried seeds were taken and powdered to store. Then dispersed in 25 ml of ethyl acetate solution and shake in for 10 minutes. Then used with paper and tied with the rubber band. Few holes were made in the paper air circulation and took it in room temperature at 370C, maintenance for 4 days.

Methanol Extract:

About 5 g of dried seeds were taken and powdered to store. Then dispersed in 25 ml of methanol solution and shake in for 10 minutes. Then used with paper and tied with the rubber band. Few holes were made in the paper air circulation and took it in room temperature at 370C, maintenance for 4 days.

Preparation of Extract Concentration:

Four extracts of Benzene, Chloroform, Hexane and Ethyl acetate of 50µg/ml, 100µg/ml, 200µg/ml and 400µg/ml concentration were mixed respectively by using DMSO to analyse the extract which were most effective to inhibit bacteria.

Microbiological Assay by Agar Disc Diffusion Method:

For antimicrobial screening of seed extract Phoenix dactylifera 3 gm of each extracts were dissolved in 10 ml Dimethyl Sulphoxide (DMSO) from 25µg/ml, 75µg/ml, 150µg/ml, and 300µg/ml concentration were taken for the antimicrobial activity. A hollow tube was heated and inoculated in the agar plate. It was removed as soon as possible by making a good plate each plate was for only one DMSO control.

Medium:

3.8 gm. of Mueller Hinton Agar (MHA) was added to 100ml of water and autoclaved at 1210C for 20 minutes at 15 lb./inch square and transferred to a sterile Petri dish and clotted the agar at low temperature.

Inoculum and Incubation:

Inoculate 1gm of culture in Agar plate for 5min then as per previous concentrations kept it at 370C temperature for 24-48 hours. Measured the diameter of zone of inhibition area accurately. As per this method made each extracts of required concentrations.

Phytochemical Estimation:

Extract Preparation:

20 gm. of dry powder was dispersed in methanol, ethyl acetate, hexane, benzene, and chloroform in a conical flask and shaken for 20 hours. Then the precipitation was collected.

Phytochemical Studies:

The methods described by air borne microorganisms were used to test for the presence of ingredients in the test sample.

Test of Steroids:

About 10 ml of seed extract (methanol, ethyl acetate, hexane, benzene, chloroform) was taken to dry mass, and the mass is dissolved in 0.5 ml of chloroform.

Test for Alkaloids:

The seed extract (methanol, ethyl acetate, hexane, benzene, chloroform) was mixed with 5ml of 1% HCL on a steam bath. The solvent was filtered, and 1 ml of the filtrate was treated with Mayer's reagent.

Test for Tannins: About 1 g of plant extract powder was baked and 10 ml of distilled water added. The mix up was boiled 10 minutes. Two drops of 5% FeCl3 were added.

Test for Flavonoids: A drop of NH solution is added to the seed extract in a test tube for observation of yellow colour.

Test for Reducing Sugar: To 0.5 ml extract solution, 1 ml of water and 8 drops of Fehling's solution were added at hot water and then red precipitation was observed.

Fig 4: Zone of Inhibition of Escherichia Coli Against Ethanol Extract

Phytochemicals	*Phoenix dactylifera L.*		
	Chloroform	**Methanol**	**Ethanol**
Alkaloids	-	-	-
Anthraquinones	-	++	-
Catechin	-	+++	+++
Flavonoids	-	-	-
Glycosides	-	+++	+++
Phenolic groups	-	++	+
Reducing sugars	-	+++	-
Saponins	-	+++	+++
Tannins	-	+++	+++
Terpenoids	++	-	-

Table 1: Antibacterial activity of the *Phoenix dactylifera* in different bacteria for hexane extract in different concentration				
Test Microorganism	**Concentration(µg/ml)**			
	100µg/ml	**50µg/ml**	**25µg/ml**	**12.5µg/ml**
Escherichia coli	27.25±2.0	22.25±2.0	18.25±2.0	17.25±2.0
Bacillus subtilis	28.5±3.0	27.25±2.0	21.25±2.0	18.5±3.0
Staphylococcus aureus	36.1±3.0	27.4±3.0	23.7±2.0	20.0±2.0
Klebsiellapneumonia	32.3±2.0	28.2±3.0	23.0±2.0	19.5±2.0
Pseudomonas aeruginosa	34.5±2.0	31.7±2.0	26.0±2.0	21.2±3.0
Salmonella enteritis	29.0±2.0	26.2±3.0	23.1±2.0	19.4±3.0

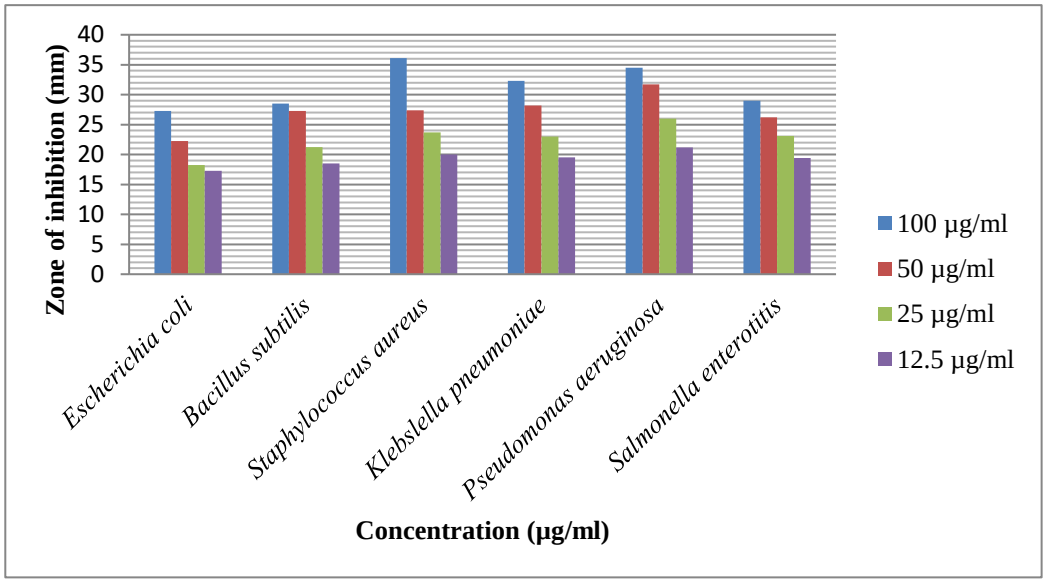

Fig 5: Antibacterial activity of the Phoenix dactylifera in different bacteria for hexane extracts in different concentration

Table 2: Antibacterial activity of the *Phoenix dactylifera* in different bacteria for chloroform extract in different concentration				
Test microorganism	**Concentration(µg/ml)**			
	100 µg/ml	**50 µg/ml**	**25 µg/ml**	**12.5 µg/ml**
Escherichia coli	27.2±2.0	22.5±2.0	18.25±2.0	17.25±2.0
Bacillus subtilis	32.5±3.0	29..25±2.0	22.25±2.0	19.5±2.0
Staphylococcus aureus	35.1±3.0	29.4±3.0	26.7±2.0	21.0±0.0
Klebsiella pneumonia	32.3±2.0	28.0±2.0	25.0±2.0	22.5±2.0
Pseudomonas aeruginosa	32.5±2.0	30.7±2.0	28.0±2.0	21.2±3.0
Salmonella enteritis	33.0±2.0	30.2±3.0	28.1±2.0	18.4±3.0

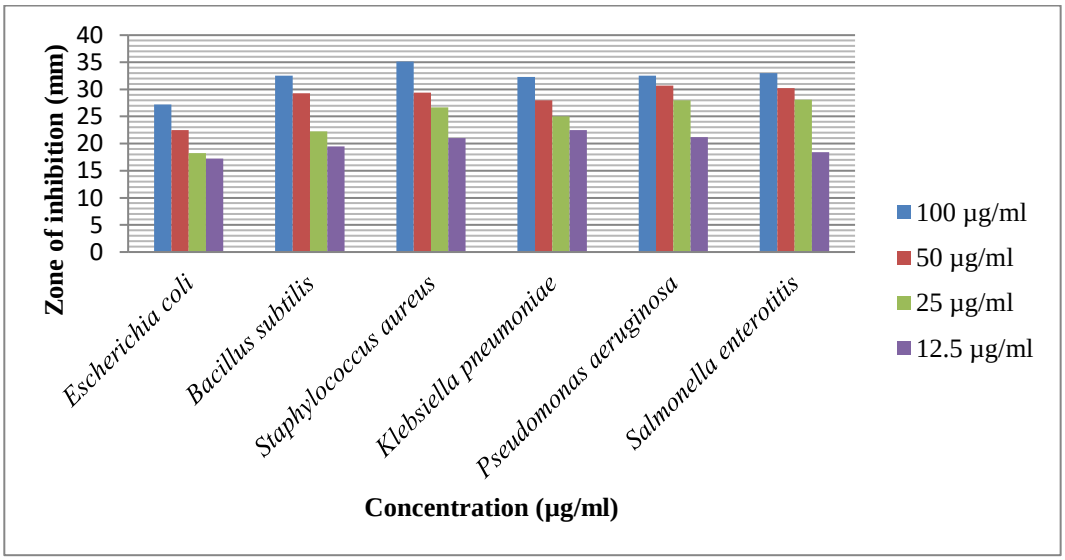

Fig 6: Antibacterial activity of the Phoenix dactylifera in different bacteria for chloroform extract in different concentration.

Table 3: Antibacterial activity of the *Phoenix dactylifera* in different bacteria for benzene extract in different concentration				
Test microorganism	**Concentration(µg/ml)**			
	100 µg/ml	**50 µg/ml**	**25 µg/ml**	**12.5 µg/ml**
Escherichia coli	27.2±2.0	22.5±2.0	18.25±2.0	17.25±2.0
Bacillus subtilis	32.5±3.0	29..25±2.0	22.25±2.0	19.5±2.0
Staphylococcus aureus	35.1±3.0	29.4±3.0	26.7±2.0	21.0±0.0
Klebsiella pneumonia	32.3±2.0	28.0±2.0	25.0±2.0	22.5±2.0
Pseudomonas aeruginosa	32.5±2.0	30.7±2.0	28.0±2.0	21.2±3.0
Salmonella enteritis	33.0±2.0	30.2±3.0	28.1±2.0	18.4±3.0

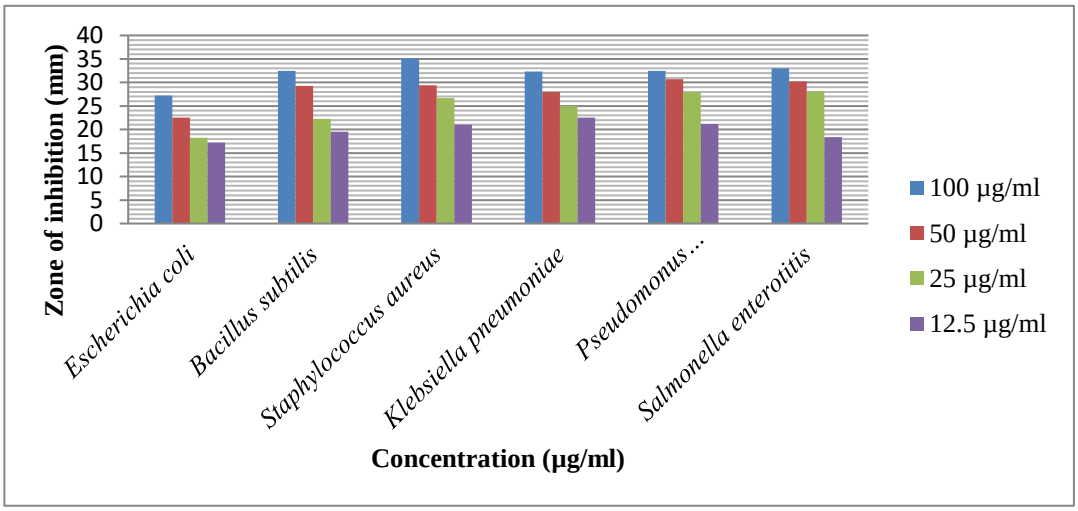

Fig 7: Antibacterial activity of the Phoenix dactylifera in different bacteria for benzene extract in different concentration

Table 4: Antibacterial activity of the *Phoenix dactylifera* in different bacteria for ethyl acetate extract in different concentration				
Test microorganism	**Concentration(µg/ml)**			
	100 µg/ml	**50 µg/ml**	**25 µg/ml**	**12.5 µg/ml**
Escherichia coli	37.2±2.0	32.5±2.0	28.25±2.0	24.25±2.0
Bacillus subtilis	42.5±3.0	39.25±2.0	32.25±2.0	29.5±2.0
Staphylococcus aureus	44.1±3.0	39.4±3.0	36.7±2.0	33.4±0.0
Klebsiella pneumonia	41.3±2.0	38.0±2.0	35.0±2.0	32.5±2.0
Pseudomonas aeruginosa	35.3±2.0	33.7±2.0	28.0±2.0	25.2±3.0
Salmonella enteritis	43.0±2.0	35.2±3.0	33.1±1.0	29.9±3.0

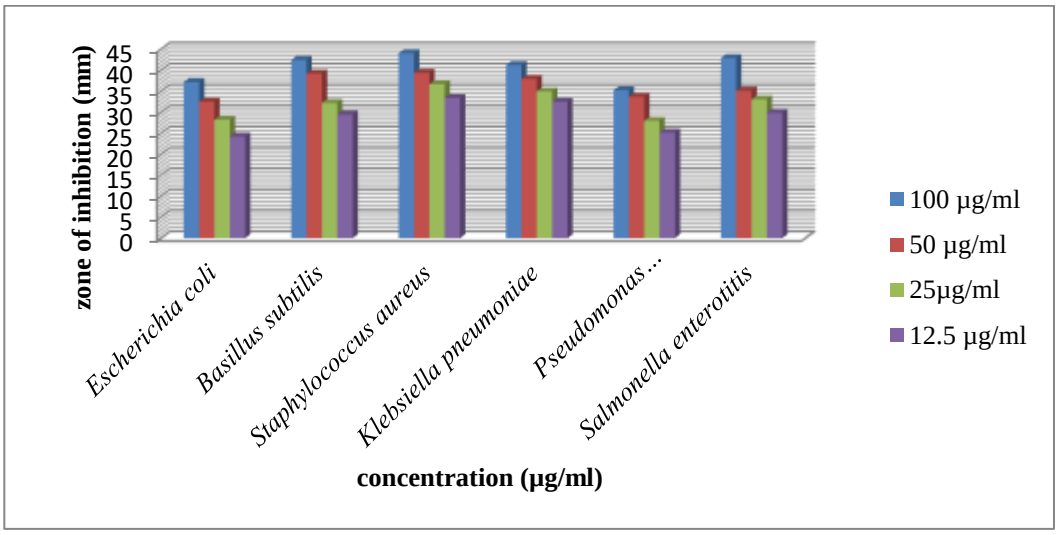

Fig 8: Antibacterial activity of the Phoenix dactylifera in different bacteria for ethyl acetate extract in different concentration

Conclusion:

Many plants, their fruits, and their seeds have many medicinal values that help in our health and other purposes. The study on Date seeds extract shows many antibacterial activities on different bacteria. The antibiotics treated to resist many bacteria, ampicillin, the plant extract as the same concentrations inhibit many bacteria. In this research, we observed the result of phytochemicals in my study. It is an inference that Phoenix dactylifera L. seed powders contain the chemical constituents like alkaloids, saponins, flavonoids, terpenoids, glycosides, steroids and phenolic compounds in this plant seed. However, it recommended that further work can be carried out to isolate the bioactive constituents in Phoenix dactylifera L.

Sing various extraction solvent with a view characteristics the presence of chemical such as the plant seed. This plant seed plays an important role in the fields of pharmaceutical and medicine and also treats infectious disease among the plant the best result respectively.

Future Aspects:

As plants have no side effects for human health, it can be used in treatment of many diseases. Date seeds are found useful in treating blood sugar related problems, diabetes, and related complications. According to recent research, Date seeds have shown potential for protective effects against early diabetic complications of both liver and kidney. Date seed oil is obtained from Date seeds through a Soxhlet extraction technique. Date seed oil is mainly composed of the four fatty acids namely oleic, linoleic, Lauric, and Palmitic acid. Listed below are some of the well-known health benefits of using Date seed oil. Some people use Date seeds as an additive to coffee. Add Date syrup into the warm water with lemon and drink as a tea or infused water. Try to make healthy bread spread. Just blend Date syrup with honey or Jaggery. Use this instead of jam.

Add Date powder into your smoothies or juices. Add Date palm seed powder into your baking dishes like cookies, cakes, etc. Add Date syrup while making the salad dressing for extra health benefits.

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