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Use Of Essential Oils Extracted From Spices For Food Preservation

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Abstract- Spoilage of food is increasing due to change in environmental conditions which make it unfavourable for consumption. Essential oil was extracted from jeera, shah jeera and saunf. Antibacterial and antioxidant assays were performed, out of the three oils extracted from spices methanolic extracted oil from jeera showed optimum results for antimicrobial and antioxidant activity. Essential oils and / or their components are becoming increasingly popular as natural antimicrobial agents to be used for a wide variety of purposes, including food preservation as flavor and colour enhancer, complementary medicine and natural therapeutics.

IndexTerms-*spices,antimicrobial,antioxidant.*

1. INTRODUCTION

Spices are obtained from plant seeds, flowers, roots, Leaves or bark that are added to food to improve flavour, taste, colour, or act of minimize the rate of rancidity and as preservatives that suppress microbial activities (1). Every spices has a unique aroma, flavour and antimicrobial activities which are phytochemicals. Spices are strongly flavoured parts of plants usually rich in essential oils used in fresh or dry forms.Spices has been used in the prevention of cardiovascular, carcinogenesis, inflammation, and many more diseases(2,3) .Natural antioxidants are known to protect cells from damage induced by oxidative stress, which is generally considered to be a cause of aging and degenerative diseases. The present study aim to study the antimicrobial and antibacterial activity of essential oils.

2. MATERIALS AND METHODS

Plant Material: Common spices *Cuminum cyminum (jeera),Nigellasativa(shahjeera),Foeniculum vulgare(saunf)* were used for oil extraction

2.1. *EXTRACTION OF OIL USING PETROLEUM ETHER*

10grams of saunf, jeera and shah jeera powder was added to 100ml petroleum ether and then it was kept overnight .On second day mixture was kept on rotator for 30 minutes.After that mixture was centrifuged at 10,000rpm for 10minutes at room temperature .After that supernatant was taken and kept in water bath for 5 hours at 80°C.

2.1.1 EXTRACTION USING METHANOL

5.0grams of saunf, jeera, shah jeera,were mixed with 50ml methanol then it was kept on shaker for 30minutes and after that it was centrifuged at10,000rpm for 10minutes at room temperature. Supernatant was taken and pellete was discarded.

2.1.2. EXTRACTION USING DISTILLED WATER

5.0grams of saunf ,jeera and shah jeera were mixed with 50ml of distilled water .After that it was kept on rotator for 30minutes and it was centrifuged at 10,000rpm for 10 minutes at room temperature. Supernatant was taken and pellete was discarded.

2.1.3. ANTIMICROBIAL ASSAY

Antimicrobial activity was determined by agar plate method. A bacterial strain is grown in pure culture (*S.aureus and E.coli).* Using sterile swab, a suspension of the pure culture is spread evenly over the face of a sterile agar plate. The wells were made by using borer and then sample was poured into wells. The agar plate is incubated for 24hours at 37^0C

2.1.4. DPPH assay

In DPPH assay dilutions were made of 3 concentration of each sample. From each concentrations 100 µl sample was taken then 1ml DPPH was added and it was incubated for 20minutes in dark at room temperature.

2.1.5 FRAP ASSAY

Dillutions were made of 3 concentration of each sample. From each concentrations 100µl sample was taken then 1ml FRAP was added and it was incubated for 20minutes in dark at room temperature.

2.1.6. PHENOL ASSAY

2grams aluminum chloride was dissolved in 100ml methanol and volume was made up to 100ml.1ml aluminium chloride was added to 100µl sample .Then it was incubated at room temperature. Readings were taken.

2.1.7 FLAVONOID ASSAY

2grams aluminum chloride was dissolved in 100ml distilled and volume was made up to 100ml. 1ml aluminum chloride was added to 100µl sample .Then it was incubated at room temperature.

3. RESULTS

Microorganisms and their waste products cause objectionable changes in odour and texture and taste. This makes fruits and vegetables to get mushy or slimy or meat to develop bad odour. There are different spoilage bacteria which grow well at room temperature. In this present study we collected spices viz. jeera, shahjeera and saunf in order to check their antioxidant and antimicrobial activity. DPPH radical scavenging assay and FRAP assay were done for checking the antioxidant property. It is shown in graph 4.1 and 4.2 respectively. It reveals varying degress of scavenging capacities. In figure 4.1 for all concentrations (methanolic extract) jeera is having higher activity in comparison to shah jeera and saunf.The lowest activity was showed by saunf. In graph 4.1.2 out of all spices saunf has showed highest activity in comparison to jeera and shah jeera. Graph 4.2.1 shows the total falvonoid content , in methanolic extract and distilled water there is no significant difference. For distilled water extract shah jeera has exhibited highest flavonoid content. Saunf has showed lowest flavonoid content. Total phenolic and flavonoids contents of spices has been shown in the present study with cury,ginger, and jeera having higher phenolic contents compared to paprika and white pepper and higher flavonoids in white pepper,corroborate, the report of kim.It is also in agreement with the findings that spices are rich sources of phenolics and flavonoids known to be strong antioxidants.(4,5,6,7,8)

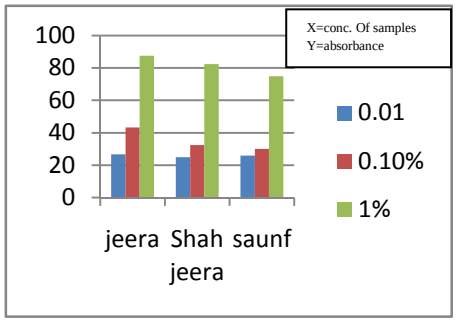
Total phenoloic content and Flavonoid assay was done. It is shown in graph 4.3 and 4.4 respectively.In graph 4.3.1 for methanolic extract saunf has showed highest absorbance in comparison to jeera and shah jeera. In graph 4.3.2 for distilled water shah jeera has showed highest absorbance .In graph 4.4.1 for flavonoid assay of methanolic extract jeera has showed highest absorbance in comparison to shah jeera and saunf. In graph 4.4.2 distilled water shah jeera has showed highest absorbance .The

Antimicrobial activity was done for all the extracts against *S. aureus* and *E. coli*. It is shown in table 4.5.

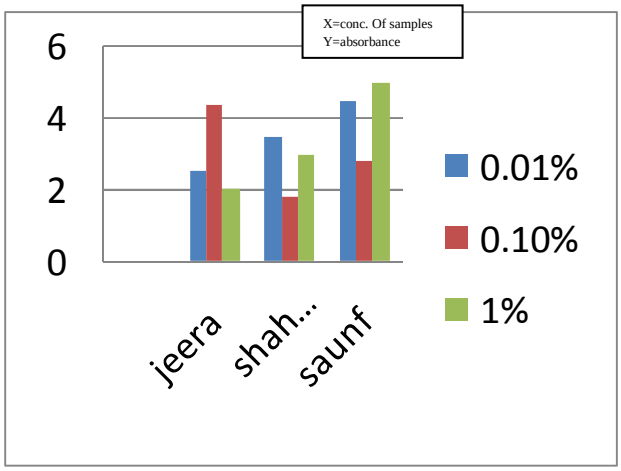
A research over spices namely ginger powder, curry powder, jeera powder, paprika powder, and pepper powder were done showing good antimicrobial and antioxidant activity (1) and the same results were obtained in present study.

3.1 DPPH RADICAL SCAVANGING ACTIVITY

3.1.1 FOR METHANOLIC EXTRACT

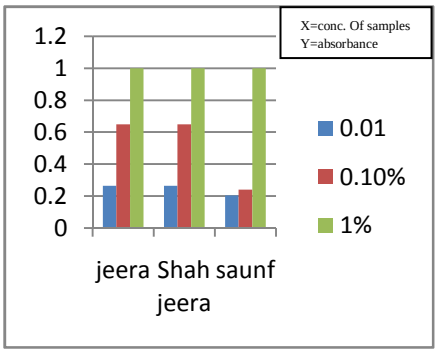


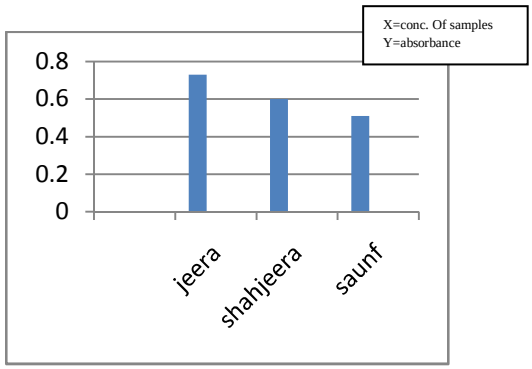
3.1 2 FOR DISTILLED WATER EXTRACT



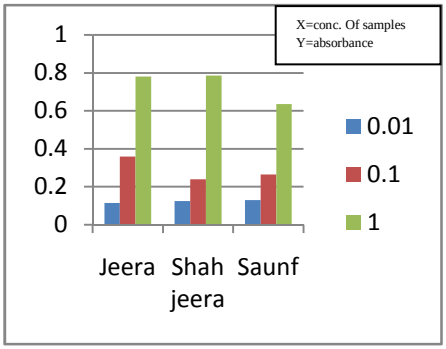
3.2 FRAP ASSAY

3.2.1 FOR METHANOLIC EXTRACT



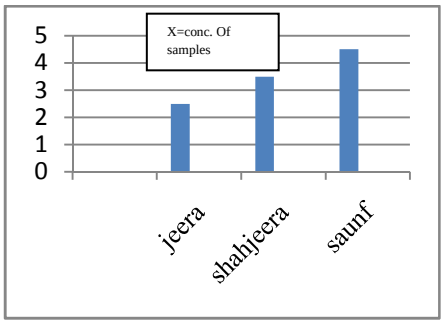


3.2.2 FOR DISTILLED WATER EXTRACTS

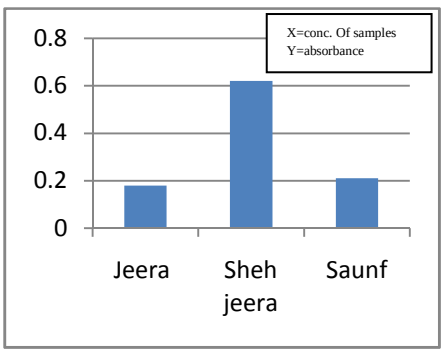


3.3 TOTAL PHENOLIC CONTENT

3.3.1 FOR METHANOLIC EXTRACTS



3.3.2 FOR DISTILLED WATER EXTRACTS



3.4. FLAVONOID ASSAY

3.4.1 FOR METHANOLIC EXTRACT

3.5. ZONE OF INHIBITION

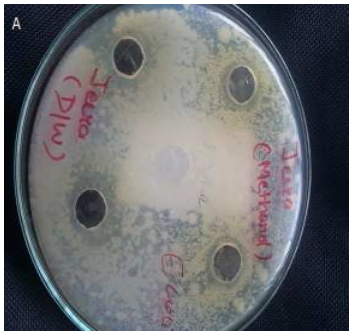


Figure 1. Jeera *E.coli* **(d/w & methanol)**

Figure 1. Jeera *S.aureus* **(d/w &methanol)**

Figure 2. Shah jeera *E.coli* **(d/w & methanol)**

Figure 3. Shah jeera *S.aureus* (d/w & methanol)

Figure 4. Saunf *E.coli* (d/w & methanol)

Figure 5 saunf *S.aureus* (d/w & methanol)

A. Jeera oil (*E.Coli*)
B. Jeera oil(*S.aureus*)
C. Shah Jeera oil(*E.Coli*)
D. Shah Jeera oil (*S.aureus*)
E. Saunf oil(*E.Coli*)
F. Saunf oil(*S.aureus*)

Organism ↓ / Extract →	Saunf (in mm)		Jeera (in mm)		Sheh Jeera (in mm)	
	D/W	Methanolic	D/W	Methanolic	D/W	Methanolic
E. coli	-	1	6	-	9	-
S. Aureus	5	8	1	9	5	7

Table 1. Zone of Inhibition in mm

4. CONCLUSION

Methanolic extract of Jeera showed highest antioxidant activity and antibacterial activity aginst *S. aureus*. Distilled water extract of Sheh Jeera showed highest antibacterial activity against *E.coli*. It also showed highest flavonoid content. Methanolic extract of Saunf showed highest Phenolic content**.**

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