INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE & TECHNOLOGY
© VISHWASHANTI MULTIPURPOSE SOCIETY (Global Peace Multipurpose Society) R. No. MH-659/13(N)
www.vmsindia.org

STUDY OF CINNAMON OIL AS NATURAL ANTIMICROBIAL AGENT

K.Misar*, S. Kulkarni, V. Meghre and A. Chandak
Dept. of Cosmetic Technology, L.A.D. & Smt. R.P. College for Women, Seminary Hills, Nagpur –06
Corresponding Author – Mrs. Ketki S. Misar, Email address - ketkimisar@yahoo.com

ABSTRACT :
The aim of this study is to investigate the "antimicrobial activity" of Cinnamon oil by agar diffusion method and measurement of zone of inhibition. Cinnamon bark (Dried bark of *Cinnamomumzeylanicum*, family Lauraceae) was collected from local market of Nagpur, Maharashtra, India, & subjected to steam distillation, by using Clevenger apparatus to obtain cinnamon oil [1,2]. The results showed that the oil is effective against various microorganisms used in study i. e.Pseudomonasaeruginosa, Escherichia coli, Staphylococcus aureus, ,Candidaalbicans, Aspergillusniger, *Staphylococcus epidermidis*.
Key words :-Cinnamonoil, microorganisms , antimicrobial activity

INTRODUCTION :

Spices are one of the most commonly used natural antimicrobial agents in foods and have been used traditionally since long time by many cultures for preserving foods and a food additive to enhance aroma and flavor. The antimicrobial properties of some spices and their components have been documented. Studies done previously confirm that cinnamon and other spices inhibit the growth of both Gram-positive and Gram-negative pathogens or spoilage bacteria, yeasts and molds [3].

Cinnamon consists of dried inner bark of the shoots of trees of *Cinnamomumzeylanicum*, family Lauraceae. Cinnamon bark contains about 0.5 - 1 % of volatile oil; & cinnamon oil contains 60-70 % of cinnamaldehyde, 5-10% eugenol, benzaldehyde, cuminaldehyde& other terpenes like phellandrene, Pinene, cymene, caryophyllene, etc[4].

Cinnamon has been used in foods since long time. It is routinely used in perfumery. Hence, in this study attempt is made to assess the antimicrobial activity of cinnamon oil against various microorganisms so as to use it as natural antimicrobial agent for different preparations.

MATERIAL AND METHODS :

The dried inner bark of cinnamon was collected from the local market of Nagpur, Maharashtra, India and was authenticated from the Department of Botany, RashtrasantTukdojiMaharaj Nagpur University, Nagpur. The authentication number is 9864.

Extraction

Dried bark of cinnamon was subjected to size reduction & then subjected to steam distillation for the separation of volatile constituents from crude drugs. It was done by the distillation of 100 gm of powdered Cinnamon with water (300 ml) by using Clevenger's apparatus [1, 2]. Distillation was continued for 5 hours and the oil thus obtained was stored in refrigerator in dark at 4^0C until use.

Extraction results are shown in Table 1

Table 1 - % Extractive values of Oil of Cinnamon

Sr. No.	Name of Oil	Wt. of Crude Drug	Wt. of Oil Obtained	% Extractive value
1.	Cinnamon Oil	100 gm	0.5159 gm	0.5159 %

Qualitative Analysis of Cinnamon Oil

The qualitative analysis of the laboratory extracted cinnamon oil was carried out for color, odor, specific gravity [5], and refractive index [6]. The results are shown in Table 2.

Table 2 Qualitative analysis of Laboratory Extracted Cinnamon oil

Sr. No.	Parameter	Standards [7]	Laboratory Extracted Oil
1.	Color	Pale yellow	Pale yellow
2.	Odor	Strong aromatic Spicy	Strong aromatic Spicy
3.	Refractive Index at 20^0 C	1.562 to 1.582	1.570
4.	Specific Gravity	1.00 to 1.030	1.010

Evaluation of Anti microbial activity of Cinnamon oil

Five different concentrations of Cinnamon oil were subjected to well agar diffusion method to evaluate their anti microbial activity. This method is based on zones of inhibition [8].

The cultures of six microorganisms namely *Pseudomonas aeruginosa*(MTCC 1688), *Escherichia coli*(MTCC 1687) , *Staphylococcus aureus*(MTCC737), ,*Candida albicans*(MTCC 227), *Aspergillusniger*(MTCC 10180), *Staphylococcus epidermidis*(MTCC 6810), were procured from MTCC (Institute of Microbial Technology , Chandigarh, India) , and maintained on suitable growth medium, for prescribed time interval.The growth medium and time interval for incubation of microorganisms are given in Table 3.

Table 3 Growth medium and incubation period for microorganisms

Sr. No.	Micro organisms	Growth medium used for preparing stock cultures and working culture slants	Medium used for Screening antimicrobial activity	Incubation Period	Incubation Temperature
1.	*P. aeruginosa*	Nutrient Agar Medium	Muller Hinton Agar Medium	24 Hours	37^{0}C
2.	*E. coli*	Nutrient Agar Medium	Muller Hinton Agar Medium	24 Hours	37^{0}C
3.	*S. aureus*	Nutrient Agar Medium	Muller Hinton Agar Medium	24 Hours	37^{0}C
4.	*C. albicans*	Malt Yeast Agar	Malt Yeast Agar	48 Hours	25^{0}C
5.	*A. niger*	Potato Dextrose Agar	Potato Dextrose Agar	7 Days	37^{0}C
6.	*S. epidermidis*	Nutrient Agar Medium	Muller Hinton Agar Medium	24 Hours	37^{0}C

Following concentrations of cinnamon oil were used –

I) 1% Cinnamon oil v/v in sterile Tween 80 (Himedia)
II) 0.75% Cinnamon oil v/v in sterile Tween 80 (Himedia)
III) 0.50% Cinnamon oil v/v in sterile Tween 80 (Himedia)
IV) 0.25% Cinnamon oil v/v in sterile Tween 80 (Himedia)
V) 100% Cinnamon oil
VI) 100% Tween 80

For *P. aeruginosa, S. aureus, S. epidermidis, E. coli* Muller Hinton Agar medium was used for screening antimicrobial activity. The melted and cooled medium was inoculated at 45^{0}C with 24 hours fresh cell suspension of respective microorganisms (0.2ml suspension was used for 20 ml agar medium).For *C. albicans*Malt Yeast Agar medium and 48 hours cell suspension was used for inoculation. For *A. niger*Potato Dextrose Agar Medium was used and it was inoculated with 7 days old spore suspension. Inoculated media was poured in petri plates and allowed to solidify. By using sterilized cork borer of 8 mm diameter wells were bored on solidified agar plates of different microorganisms and these wells were filled with different concentrations of Cinnamon oil mentioned above by using sterile pipettes. The experiments were performed in triplicates. The plates were then incubated at prescribed temperature and time interval.

The activity of the test samples was indicated by a clear zone of inhibition around the wells, diameter of zones of inhibition were measured and recorded.

RESULT AND DISCUSSION :

The results are summarized in table 4.

Table 4 – Evaluation of anti- microbial activity of Cinnamon oil

Sr. No.	Micro organism	Concentration of Cinnamon Oil					100% Tween 80 (Control)
		1%	0.75%	0.5%	0.25%	100%	
1.	*P. aeruginosa*	17	16	15	14	31	-
2.	*E. coli*	15	14	13	11	21	-
3.	*S. aureus*	15	13	12	11	23	-
4.	*C. albican*	18	16	15	13	24	-
5.	*A. niger*	-	-	-	-	-	-
6.	*S. epidermidis*	14	12	11	10	25	-

Diameter of cork borer used – 8 mm ; ' -' – indicates no zone of inhibition

All zones of inhibition are in mm

CONCLUSION :

From the study of cinnamon oil against six microorganismsit was found that cinnamon oil was effective against five microorganisms namely *P. aeruginosa, S. aureus, S. epidermidis, E. coli,* and *C. Albicans*except against *A. niger*. All the four concentrations namely 0.25 %. 0.5%, 0.75%, and 1% of cinnamon oil showed activity against the five microorganisms. The activity was found to be increasing with the increasing concentrations of oil used.

Hence, it can be concluded that cinnamon oil possesses antimicrobial activity. Therefore further studies can be directed towards the use of cinnamon oil as natural antimicrobial agent for different preparations.

REFERENCES :

1. Agrawal S. S. ; Paridhavi M. (2012) : Herbal Drug Technology ; 2nd edition ; Universities Press (India) Private Limited , 336 -337
2. Baj T. , Ludwiczuk A. , Sieniawska E. , Skalickawozniak K. , Widelski J. , Zieba K. , Glowniak K. (2013) : GC-MS Analysis of Essential oils from *Salvia officinalis* L, Comparision of extraction methods of the volatile components , Lublin, Poland , ActaPoloniacPharmaceutica – Drug Research, Vol. 70 No.1 : 35-36
3. Hoque M.M., Bari M. L., Juneja V. K. ,Kawamoto S. , (2008) : Antimicrobial activity of cloves and cinnamon extracts against food borne pathogens and spoilage bacteria , and inactivation of *Listeria monocytogenes* in ground chicken meat with their essential oils , USA, Rep. Nat'l , Food Res. Inst , ; No. 72 : 9-21
4. Kokate C.K. , Purohit A.P. , Gokhale S.B. ,(2010) : Pharmacognosy , Volume II; 45th edition , India , NiraliPrakashan Pp. 1.46 - 1.47
5. Indian Pharmacopoeia; The controller of Publication , Government of India, Volume 2; 3rd edition; Appendix 8.15; A-99
6. Indian Pharmacopoeia; The controller of Publication , Government of India, Volume 2; 3rd edition; Appendix 8.12; A-96
7. Kokate C.K. , Purohit A.P, Gokhale S.B. (2010) : Pharmacognosy ; Volume II; 45th edition , India , NiraliPrakashan , Pp. 1.48
8. KulkarniS. ,Meghre V . , (2011) : Practical Cosmetic Microbiology , 1st edition ; India , Dennet& Company , Pp. 82-83.

❖❖❖❖