

Comparison of Antimicrobial Property of Essential oil Extract from *Mentha* leaves with commercially available *Mentha* products

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ABSTRACT

Medicinal plants, since times immemorial, have been used in virtually all cultures as a source of medicine. Thus, the purpose of this work is to compare the antimicrobial activity of the dried and fresh leaves of Mentha arvensis with commercially available products of Mentha arvensis. From the above study, it is concluded that the plant extracts have a potential as antimicrobial compounds against the enteric pathogens but the commercially available products of Mentha arvensis have a great potential than plant extracts as antimicrobial agents against enteric pathogens. Antimicrobial activity is due to the presence of the phytochemical. They have been used for their safety, efficacy cultural acceptability and lesser side effects. Therefore, they can be used in the treatment of various diseases.

Keywords: *Mentha arvensis*, phytochemical, antimicrobial

Introduction

Nature has bestowed upon us a very rich botanical wealth and a large number of diverse types of plants grow wild in different parts of our country. In India, the use of different parts of several medicinal plants to cure specific ailments has been in vogue from ancient times. India is rich in medicinal plant diversity. All known types of agro-climatic, ecologic and edaphic conditions are met within India. Medicinal plants, since times immemorial, have been used in virtually all cultures as a source of medicine. The widespread use of herbal remedies and healthcare preparations, as those described in ancient texts such as the Vedas and the Bible and obtained from commonly used traditional herbs and medicinal plants, has been traced to the occurrence of natural products with medicinal properties. The use of traditional medicine and medicinal plants in most developing countries, as a normative basis for the maintenance of good health, has been widely observed. It is continue to be an important therapeutic aid for alleviating the ailments of humankind.

Mentha arvensis is one of the traditional medicinal plants which are used as antiseptic, carminative, refrigerant, stimulant in indigestion, rheumatic pains and headache. The plant extract of *Mentha arvensis* and standard drugs produces a decrease in the ulcer number, total acidity volume of gastric juice. Diarrhea is often treated with antibacterial drugs but this treatment is generally ineffective due to the presence of drug resistant strain and failure to identify drug sensitivity. This fact has underscored the need of quick development of antibacterial drugs against the enteric bacteria that are more effective than those currently in use. Since medicinal plants play a fundamental role in traditional medicine. So, the pharmacological industries has been produced a commercially available product of *Mentha arvensis*. These products have a great antibacterial potential against the enteric pathogen and are used for the treatment of various diseases. There, has been very little systematic work done on their antimicrobial activity. Thus, the purpose of this work is to compare the antimicrobial activity of the dried and fresh leaves of *Mentha arvensis* with commercially available products of *Mentha arvensis*.

Materials and methods

a) Collection of sample

Plant sample (leaves) was collected from the farm of the Amravati district. Washed with 0.5% HgCl₂ and then washed twice with distilled water. Air dried the leaves in a shadow and grinded in a mixer. Fresh leaves were macerated in different solvent by mortar and pestle. The commercially available products were collected from market.

b) Extract preparation

For extract preparation, 10 gm powder dissolved in 100 ml distilled water or organic solvents like aqueous, ethanol, methanol, acetone, petroleum ether, benzene and soaked for 24 h. This mixture was then refluxed in soxhlet apparatus. The extracts were filtered. Filtrate was evaporated under controlled temperature condition.

c) Standardization of inoculum

The standard pathogenic bacterial cultures were procured from IMTECH, Chandigarh, India and used in the present study. The bacteria rejuvenated in Mueller-Hinton broth (Hi-media laboratories, Mumbai, India) at 37°C for 18h and then stoked at 40°C in Mueller-Hinton agar. Subcultures were prepared from the stock for bioassay. The pathogenic bacterial culture was isolated into sterile nutrient broth and incubated at 37°C for 3h until the culture attained a turbidity of 0.5 McFarland units. The final inoculum size was standardized to 10⁵ CFU/mL with the help of SPC and Nephlo-turbidometer.

d) Preparation of disc

Blotting paper disc were prepared by using a punch of diameter 10mm. these discs were sterilized in autoclave. The sterilized discs were soaked in various solvent extract and commercially available products. Dried and tested for their antimicrobial activity against the bacterial pathogen by disc diffusion method.

e) Disc diffusion method

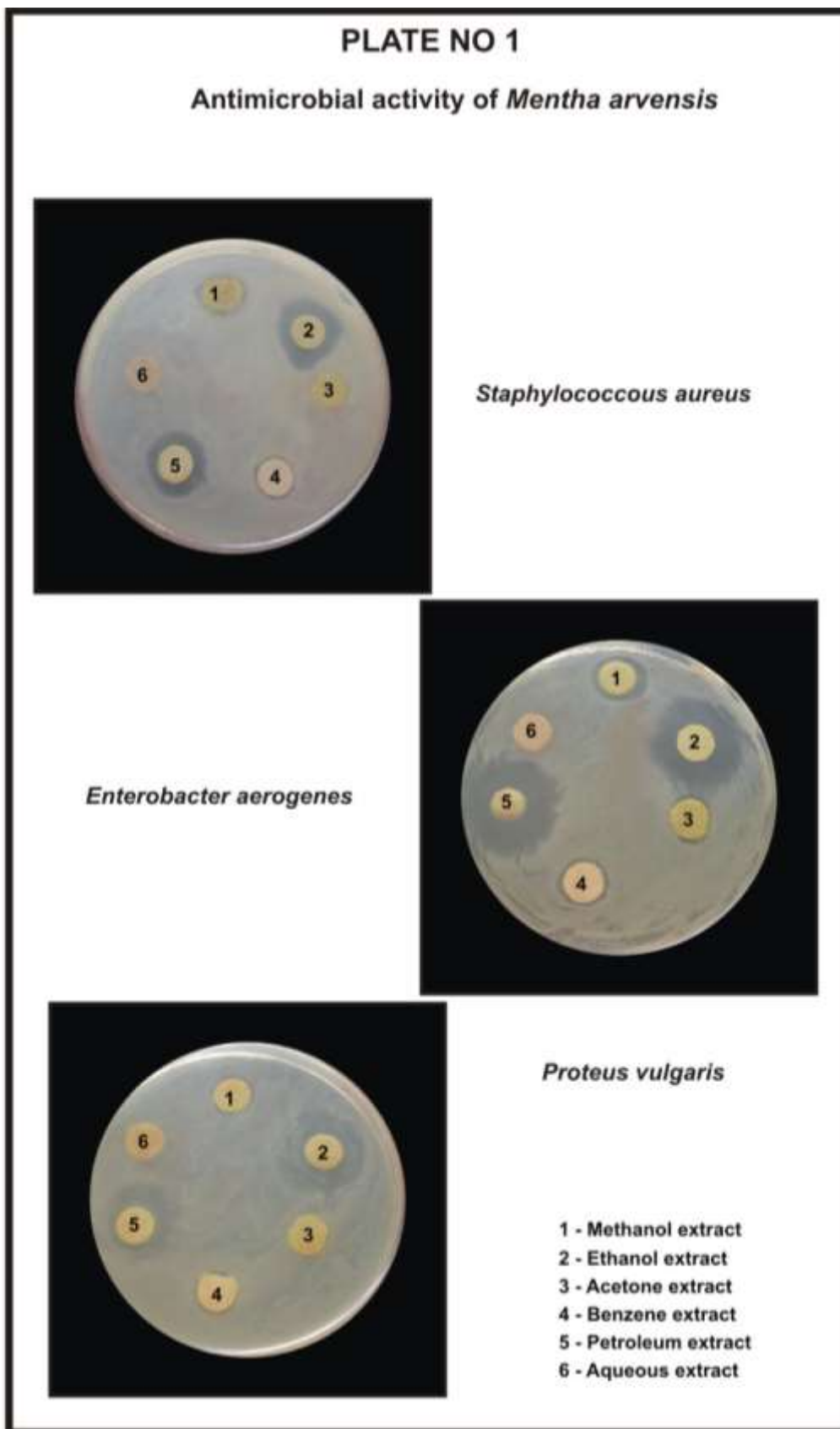
For antibacterial properties, 0.1ml bacterial suspension of 10⁵ CFU/ml was uniformly spread on nutrient agar plate to form a lawn culture. The soaked discs and 10µg of ampicilin containing disc as a positive control alone with a disc in a solvent as a negative control were placed on a lawn and kept in a refrigerator for diffusion of extract for 30min then incubate the plate for 24h at 37°C. After incubation the zone inhibition were of meseasured in mm.

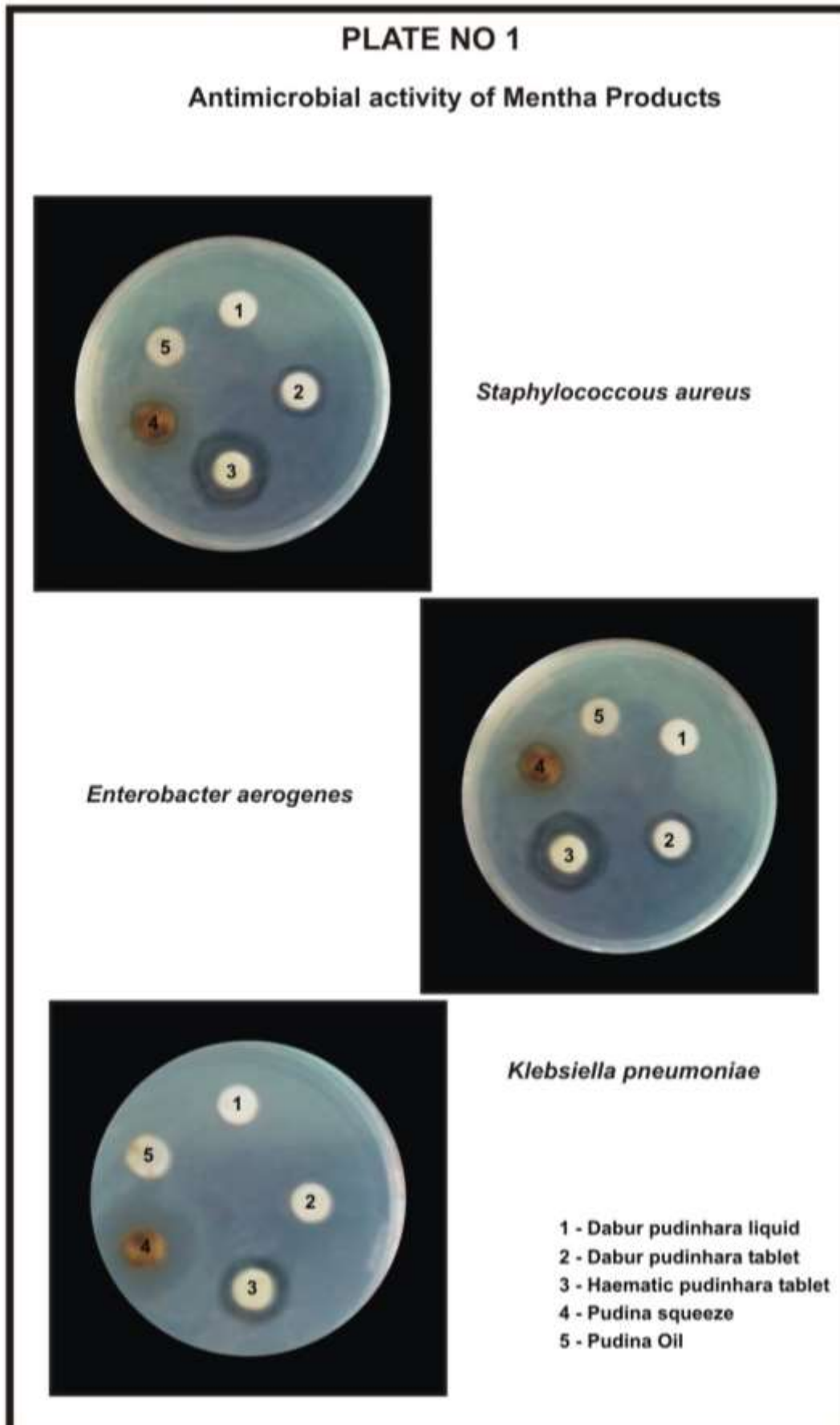
Result:

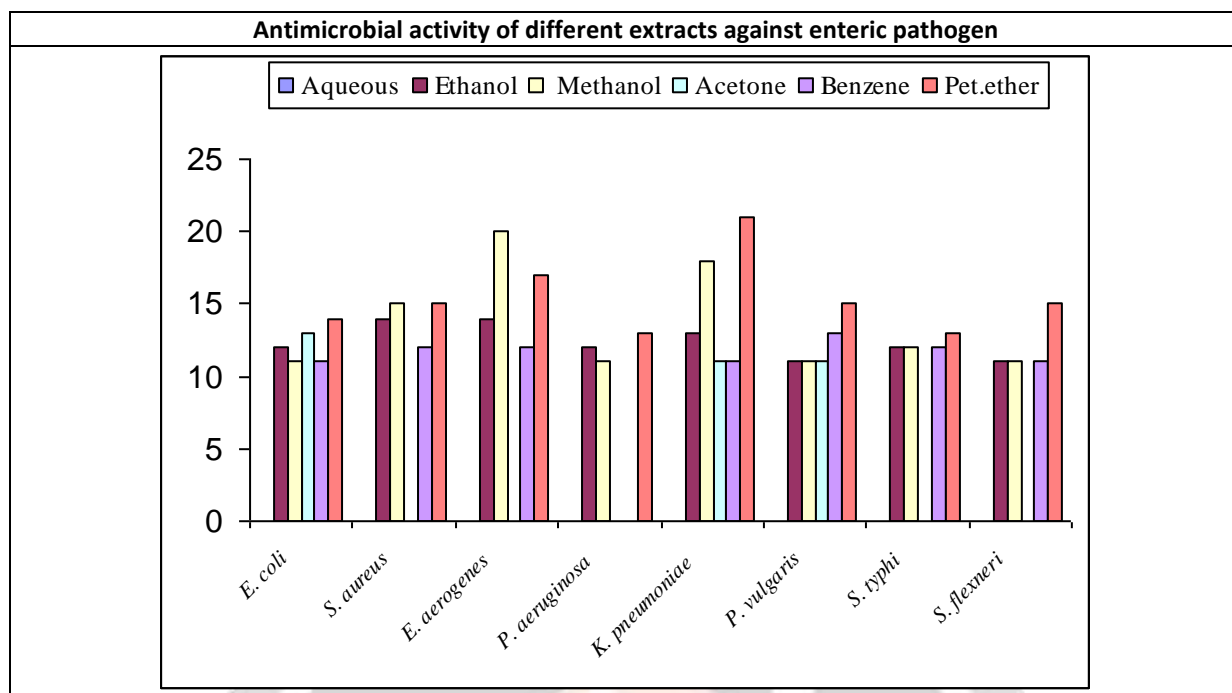
The present study is related to the antimicrobial activity of fresh and dried leaves of *Mentha arvensis* and commercially available mentha product. Among all the extracts aqueous and acetone extracts showed mild activity while benzene showed moderate activity and ethanol, methanol and petroleum ether extracts showed strong activity against the enteric pathogens.

Among all commercially available products Haematic pudinhara tablet showed strong activity than other products. The antimicrobial activity of different extracts of dried leaves of *Mentha arvensis* did not show any inhibitory activity against enteric pathogens.

Antimicrobial activity of <i>Mentha arvensis</i> by disc diffusion									
Sr.No	Plant extract and products	Zone of inhibition in mm							
		<i>E.coli</i>	<i>S.aureus</i>	<i>E. aerogenes</i>	<i>P. aeruginosa</i>	<i>K. pneumoniae</i>	<i>P. vulgaris</i>	<i>S. typhi</i>	<i>S. flexneri</i>
1	Mentha(Aqueous)	0	0	0	0	0	0	0	0
2	Mentha (Ethanol)	12	14	14	12	11	13	12	11
3	Mentha(Methanol)	11	15	20	11	11	18	12	11
4	Mentha (Acetone)	13	0	0	0	11	11	0	0
5	Mentha (Benzene)	11	12	12	0	13	11	12	11
6	Mentha (Pet.ether)	14	15	17	13	15	21	13	15
7	Dabur Pudinhara Tablet	13	15	14	12	22	14	15	14
8	Haematic Pudinhara Tablet	18	20	19	17	2	24	27	20
9	Dabur Pudinhara Liquid	13	13	12	11	0	12	13	15
10	Pudina Oil	11	11	0	0	0	0	0	11
11	Pudina Squeeze	12	11	13	11	0	13	14	0
12	Positive control	20	24	24	18	22	20	18	18
Range: 11-13- Mild activity, 14-19- Moderate activity, 20 - 28- Strong activity									





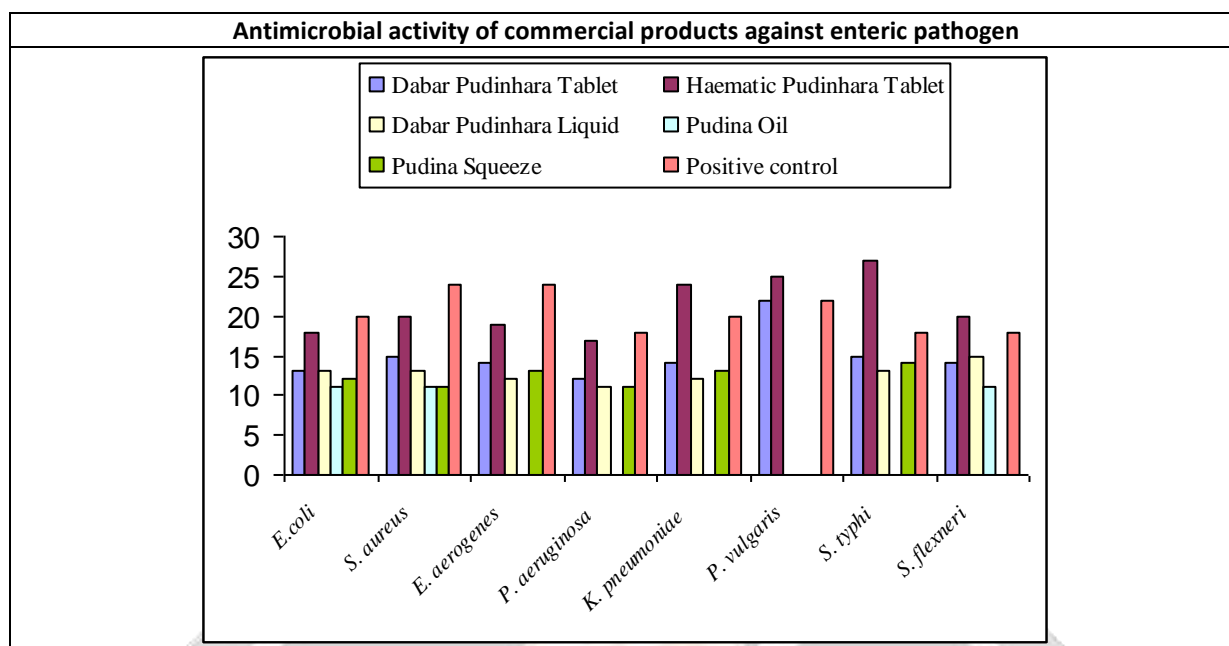


The antimicrobial activity of different extracts of fresh leaves of *Mentha arvensis* were prepared in aqueous, ethanol, methanol, acetone, benzene, and petroleum ether were tested against enteric pathogens.i.e *E. coli*, *S. aureus*, *K. pneumoniae*, *P. vulgaris*, *E. aerogenes*, *P. aeruginosa*, *S. typhi*, *S. flexneri* by disc diffusion method.

Sr.No	Extracts	Flavonoids	Steroids	Cardiac glycoside	Anthraquinone glycosides	Alkaloids	Tannins and Phenolic Compounds	Fat and Oil
1	Aqueous	+	-	+	-	-	-	-
2	Ethanol	+	+	-	+	-	+	-
3	Methanol	+	-	-	+	-	+	-
4	Acetone	+	-	-	+	-	+	-
5	Benzene	-	-	-	+	-	+	-
6	Petroleum ether	+	-	+	+	-	+	+

Aqueous extract of *Mentha arvensis* contains flavonoids, steroids, cardiac glycosides. Ethanol extract contains flavonoids, steroids, anthraquinone glycosides, tannins and phenolic compounds. Flavonoids, anthraquinone glycosides, tannins and phenolic compounds were present in methanol extract. Acetone extract contains flavonoids, anthraquinone glycosides, tannins, and phenolic compounds. Benzene extract also contains

anthraquinone glycosides, tannins and phenolic compounds. Petroleum ether extract contains flavonoids, cardiac glycosides, anthraquinone glycosides, tannins and phenolic compounds, fats and oil.



From the result, it is clear that the commercially available products showed strong activity against enteric pathogens than extracts. The commercially available products of *Mentha arvensis* i.e. Dabur pudinhara tablet, Haematic pudinhara tablet, Dabur pudinhara liquid, Pudina oil. Among the commercially available products Haematic pudinhara tablet showed strong inhibitory activity than other products. The concentration of essential oil in the extract of *Mentha arvensis* is lower than the commercially available products. This is due to the contact of plant extract with air during the process of extraction causing evaporation of essential oils which reduces the antibacterial activity of plant extract. While, in the case of commercial products they are prepared in large scale with proper precaution which prevent the evaporation of essential oils.

Conclusion

From the above study, it is concluded that the plant extracts have a potential as antimicrobial compounds against the enteric pathogens but the commercially available products of *Mentha arvensis* have a great potential than plant extracts as antimicrobial agents against enteric pathogens. Antimicrobial activity is due to the presence of the phytochemical. They have been used for their safety, efficacy cultural acceptability and lesser side effects. Therefore, they can be used in the treatment of various diseases.

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