
Antimicrobial activity of vegetable and fruit juices on the scalp bacteria

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ABSTRACT

- Twenty bacterial strains were isolated and identified from human scalps. These strains were identified as 14 *Bacillus megaterium*, 1 *Bacillus subtilis*, 3 *Staphylococcus aureus* and 2 *Staphylococcus saprophyticus*. Two genres are Gram-positive. In order to search for antimicrobial substances from natural plants, eighteen plant materials being made of perilla leaf as well as spices including garlic and ginger were used. The effects of these vegetable and fruit juices on the growth of scalp bacterial strains were investigated. Garlic and lemon juices showed antimicrobial activities on the growth of twenty bacterial strains belonging to 4 kinds of species. Onion, spring onion and leek juices inhibited the growth of only one bacterial strains *Bacillus megaterium* MS13.

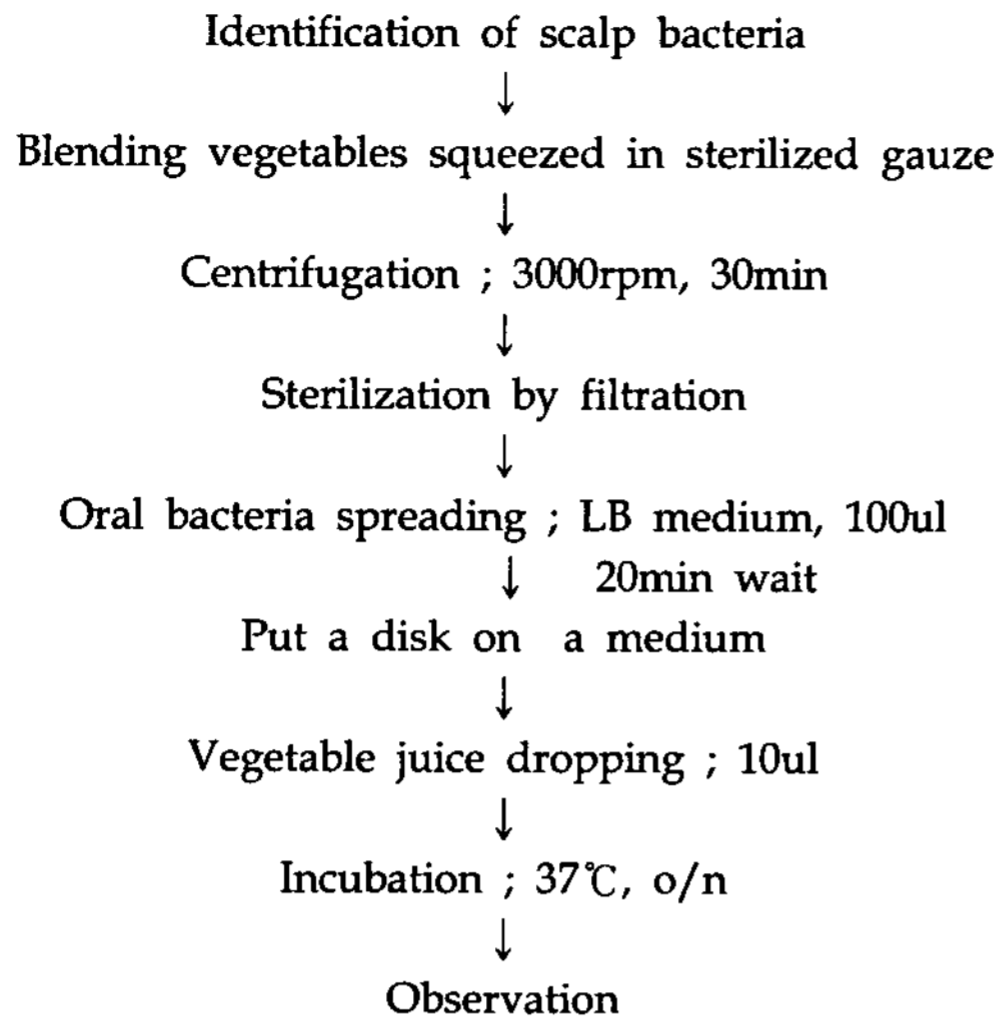
INTRODUCTION

- Many of food preservatives commonly used are Artificial synthetic compounds and their safeties become issues according to circumstances at present time. Therefore studies searching for antimicrobial agents are progressed from natural materials having no problems at all mainly Primary and secondary ingredients of foods currently. They include many spices. Spices have antioxidant and flavor-increasing effects. Garlics and Gingers are essential spices used for our dietary life for a long time. The antimicrobial activity of garlic has been recognized for many years. A number of reports have studied the antimicrobial activity of garlic to various types of Microorganisms. The principal antimicrobial compound of garlic was Discovered by Cavallito and Bailey, who named it allicin. These antimicrobial compounds are absent in intact garlic, but generated from their common precursor, alliin, through enzymatic hydrolysis when garlics damaged. In this study we search for new antibacterial substances from plant materials including many spices and ingredients of foods. And bacterial strains are isolated from human scalps and identified as species level.

MATERIALS

- Garlic (*Allium scorodorpasum* var. *Viviparum* Regel), Radish (*Raphanus sativus*), Onion (*Allium cepa*), Leek (*Allium tuberosum*), Pine needles (*Pinus densiflora*), Pyogo mushroom (*Lentinus edodes*), Chicory (*Cichorium intybus*), Cucumber (*Cucumis sativus*), Sedum (*Sedum sarmentosum*), Perilla leaf (*Perilla frutescens* var. *japonica*), Spring onion (*Allium fistulosum*), Red pepper (*Capsicum annuum*), Green pepper (*Capsicum annuum*), Ginger (*Zin-giber officinale*), Black pepper (*Piper nigrum*), Crown daisy (*Chrysanthemum coronarium* var. *spatiosum*), Lemon (*Citrus Limonium*)

METHODS



RESULTS

Table 1. Genus Identification of scalp bacteria. (NT : not test, - : negative, + : positive)

Bacteria Character	Bacteria									
	MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8	MS9	MS10
Form	Rod	Rod	Rod	Short rod	Short rod	Short rod	Short rod	Short rod	Coccus	Short rod
Gram test	+	+	+	+	+	+	+	+	+	+
Catalase test	+	+	+	+	+	+	+	+	+	+
Citrate test	-	-	-	-	-	-	-	-	-	+
Mannitol test	+	+	+	+	+	+	+	+	+	+
VP test	-	-	+	-	-	-	-	-	-	+
Methyl red test	-	-	+	-	-	-	-	-	-	-
H2S test	+	+	+	+	+	+	+	+	+	+
Urea test	-	-	-	-	-	-	-	-	-	+
Starch test	+	+	+	+	+	+	+	+	-	+
Spore formation	+	+	+	+	+	+	+	+	+	+
Nitrate reduction test	+	+	+	+	+	+	+	+	+	+
Lipid test	+	+	-	+	+	+	+	+	+	+
Sucrose test	-	-	+ -	-	-	-	-	-	-	-
Dextrose test	-	-	+ -	-	-	-	-	-	-	-
Glucose test	-	-	+ -	-	-	-	-	-	-	-
Lactose test	-	-	+ -	-	-	-	-	-	-	-
Identification	<i>Bacillus megaterium.</i>	<i>Bacillus megaterium.</i>	<i>Bacillus subtilis</i>	<i>Bacillus megaterium.</i>	<i>Bacillus megaterium.</i>	<i>Bacillus megaterium.</i>	<i>Bacillus megaterium.</i>	<i>Bacillus megaterium.</i>	<i>Staphylococcus aureus.</i>	<i>Bacillus megaterium.</i>

Bacteria Character	Bacteria												
	MS11	MS12	MS13	MS14	MS15	MS16	MS17	MS18	MS19	MS20	MS21	MS22	MS23
Form	Short rod	Short rod	Short rod	Rod	Rod	Coccus	Coccus	Coccus	Coccus	Rod	Short rod	Short rod	Rod
Gram test	+	+	+	+	+	+	+	+	+	+	+	+	+
Catalase test	+	+	+	+	+	+	+	+	+	+	+	+	+
Citrate test	+	+	+	+	+	+	+	+	+	+	+	+	-
Mannitol test	+	+	+	+	+	-	-	+	+	+	+	+	+
VP test	-	-	-	-	-	-	-	-	-	-	-	-	+
Methyl red test	-	-	-	-	-	-	-	+	+	-	-	-	+

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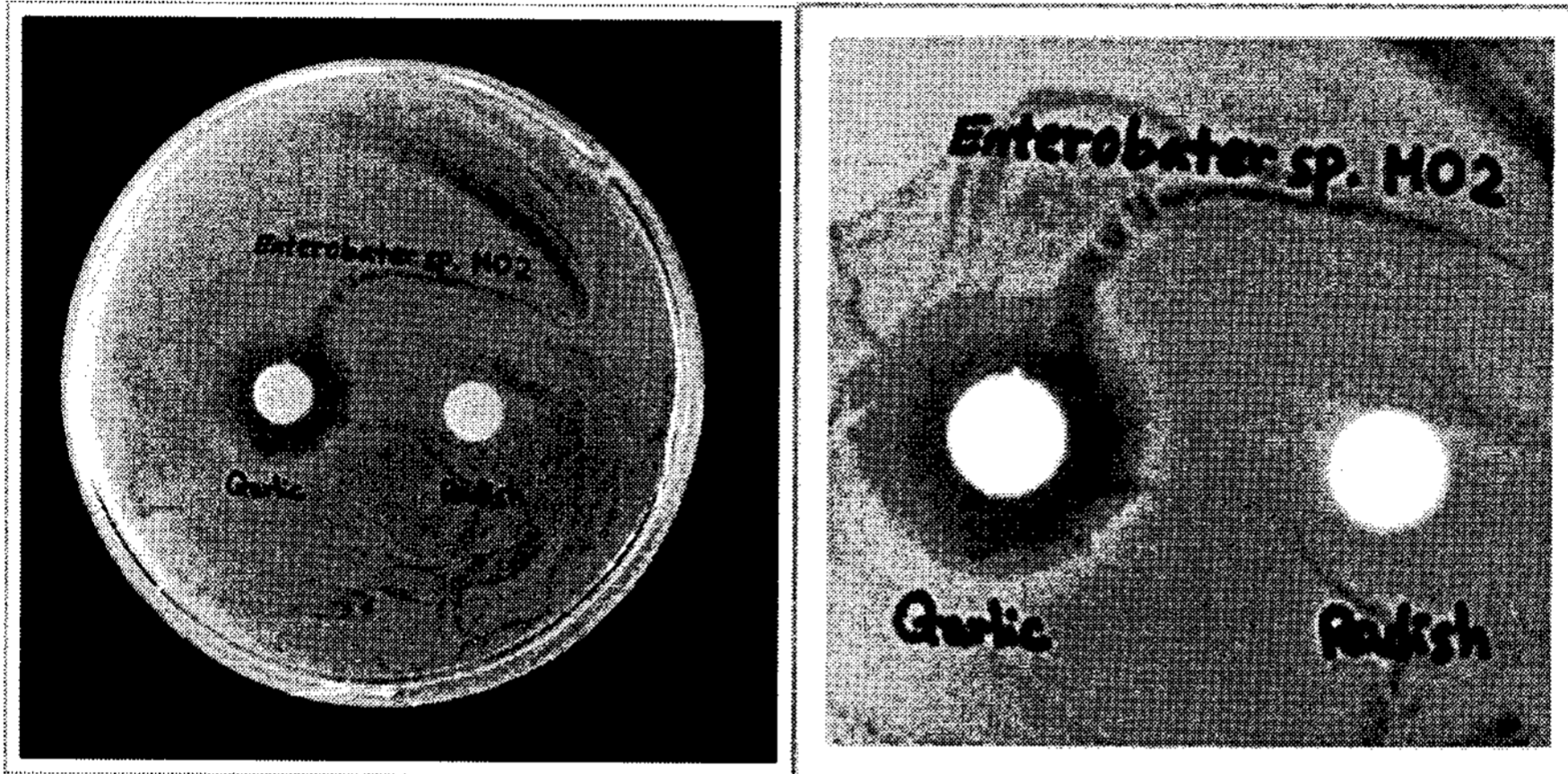
H ₂ S test	+	+	+	+	+	-	-	-	-	+	+	+	+
Urea test	+	+	+	+	+	-	-	+	+	+	+	+	-
Starch test	+	+	+	+	+	-	-	+	+	+	+	+	+
Spore formation	+	+	+	+	+	+	+	+	+	+	+	+	+
Nitrate reduction test	+	+	+	+	+	-	-	+	+	+	+	+	+
Lipid test	+	+	+	+	+	+	+	+	+	+	+	+	-
Sucrose test	-	-	-	-	-	-	-	-	-	-	-	-	+-
Dextrose test	-	-	-	-	-	-	-	-	-	-	-	-	+-
Glucose test	-	-	-	-	-	-	-	-	-	-	-	-	+-
Lactose test	-	-	-	-	-	-	-	-	-	-	-	-	+-
Identification	<i>Bacillus megateriu m.</i>	<i>Bacillus megateriu m.</i>	<i>Bacillus megateriu m.</i>	<i>Bacillus megateriu m.</i>	<i>Bacillus megateriu m.</i>	<i>Staphylo coccus saprophyt icus..</i>	<i>Staphylo coccus saprophyt icus.</i>	<i>Staphylo coccus aureus.</i>	<i>Staphylo coccus aureus.</i>	<i>Bacillus megateriu m.</i>	<i>Bacillus megateriu m.</i>	<i>Bacillus megateriu m.</i>	<i>Bacillus subtilis</i>

Table 2. Inhibition test of plant juice (unit : mm)

bacteria vegetables	MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8	MS9	MS10
Onion	0	0	0	0	0	0	0	0	0	0
Spring onion	0	0	0	0	0	0	0	0	0	0
Slim Spring onion	0	0	0	0	0	0	0	0	0	0
Sedum	0	0	0	0	0	0	0	0	0	0
Green pepper	0	0	0	0	0	0	0	0	0	0
Red pepper	0	0	0	0	0	0	0	0	0	0
Garlic	5	8	8	7	7	7	9	7	6	8
Perilla leaf	0	0	0	0	0	0	0	0	0	0
Black pepper	0	0	0	0	0	0	0	0	0	0
Crown daisy	0	0	0	0	0	0	0	0	0	0
Leek	0	0	0	0	0	0	0	0	0	0
Pyogo mushroom	0	0	0	0	0	0	0	0	0	0
Cucumber	0	0	0	0	0	0	0	0	0	0
Pine needles	0	0	0	0	0	0	0	0	0	0
Ginger	0	0	0	0	0	0	0	0	0	0
Radish	0	0	0	0	0	0	0	0	0	0
Chicory	0	0	0	0	0	0	0	0	0	0
Lemon	8	6	6	6	5	5	6	6	6	8

bacteria vegetables	MS11	MS12	MS13	MS14	MS15	MS16	MS17	MS18	MS19	MS20	MS21	MS22	MS23
Onion	0	0	8	0	0	0	0	0	0	0	0	0	0
Spring onion	0	0	8	0	0	0	0	0	0	0	0	0	0
Slim Spring onion	0	0	0	0	0	0	0	0	0	0	0	0	0
Sedum	0	0	0	0	0	0	0	0	0	0	0	0	0
Green pepper	0	0	0	0	0	0	0	0	0	0	0	0	0
Red pepper	0	0	0	0	0	0	0	0	0	0	0	0	0
Garlic	8	8	8	8	8	8	8	8	8	8	8	8	7
Perilla leaf	0	0	0	0	0	0	0	0	0	0	0	0	0
Black pepper	0	0	0	0	0	0	0	0	0	0	0	0	0
Crown daisy	0	0	0	0	0	0	0	0	0	0	0	0	0
Leek	0	0	8	0	0	0	0	0	0	0	0	0	0
Pyogo mushroom	0	0	0	0	0	0	0	0	0	0	0	0	0
Cucumber	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine needles	0	0	0	0	0	0	0	0	0	0	0	0	0
Ginger	0	0	0	0	0	0	0	0	0	0	0	0	0
Radish	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicory	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon	8	8	8	8	8	8	8	8	8	8	8	8	8

Fig 1. Inhibition circle of Garlic and radish



CONCLUSIONS

1. These strains were identified as 14 *Bacillus megaterium*, 1 *Bacillus subtilis*, 3 *Staphylococcus aureus* and 2 *Staphylococcus saprophyticus*.
2. Eighteen plant materials were used in order to search for antimicrobial substances from natural plants having no problems of safety at all.
3. Gingers and red peppers reported having antimicrobial activities did not inhibit any bacterial strains.
4. Garlic and lemon juices showed microbial activities on broad range of scalp bacterial strains belonging to all kinds of 4 species.

REFERENCES

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2. Sheo, H. J. 1999. The antibacterial action of garlic, onion, ginger and red pepper juice. *J. Kor. Soc. Foodsci. Nutr.* 28:94-99.