Growth inhibition of oral bacteria by plant juices II

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ABSTRACT

- Twenty four bacterial strains were isolated and identified from human oral cavities. These strains were identified as genus 8 Moraxella, 1 Neisseria, 1 Proteus, 6 Bacillus, 4 Staphylococcus, 3 Branhamella and 1 Enterobacter. Two genuses are Gram-positive and four genuses are Gram-negative. In order to search for antimicrobial substances from natural plants, twenty one plant materials being made of perilla leaf as well as spices including garlic and ginger were used. The effects of these plant juices on the growth of oral bacterial strains were investigated. Only garlic juice inhibited the growth of seventeen bacterial strains belonging to 6 kinds of genus.

keyword

inhibition, oral bacteria, plant

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 garlicis 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 cavities and identified as genus level.

MATERIALS

Garlic (Allium scorodorpasumvar. Viviparum Regel), Radish (Rapha -nus sativus), Onion (Allium cepa), Leek (Allium tuberosum), Pine needles (Pinus densiflora), Pyogo mushroom (Lentinus edodes), Bean (Glycine max), 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), Chamch -wi (Aster scaber), Ginger (Zin -giber officinale), Black pepper (Piper nigrum), Pumpkin leaf (Cucurbita sp p.), Crown daisy (Chrysanthemum coronarium var. spatiosum).

METHODS

Identification of oral bacteria
↓
Blending vegetables squeezed in sterilized gauze
↓
Centrifugation ; 3000rpm, 30min
↓
Sterilization by filtration
↓
Oral bacteria spreading ; LB medium, 100ul
↓ (20min wait)
Put a disk on a medium
↓
Vegetable juice dropping ; 10ul
↓
Incubation ; 37℃, o/n
↓
Observation

RESULTS

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

Microbial character	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	*Bacillus megaterium*	*Bacillus megaterium*	*Bacillus subtilis*	*Bacillus megaterium*	*Bacillus megaterium*	*Bacillus megaterium*	*Bacillus megaterium*	*Bacillus megaterium*	*Staphylococcus aureus.*	*Bacillus megaterium*

Microbial character	MS11	MS12	MS13	MS14	MS15	MS16	MS17	MS18	MS19	MS20
Form	Short rod	Short rod	Short rod	Rod	Rod	Coccus	Coccus	Coccus	Coccus	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	*Bacillus megaterium.*	*Bacillus megaterium.*	*Bacillus megaterium.*	*Bacillus megaterium.*	*Bacillus megaterium.*	*Staphylo coccus saprophyticus..*	*Staphylo coccus saprophyticus.*	*Staphylo coccus aureus.*	*Staphylo coccus aureus.*	*Bacillus megaterium.*

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
Onion	0	0	8	0	0	0	0	0	0	0
Spring onion	0	0	8	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	8	8	8	8	8	8	8	8	8	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	8	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	8	8	8	8	8	8	8	8	8

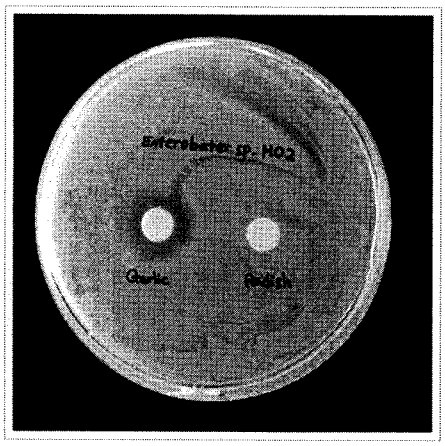

Fig 1. Inhibition circle of Garlic and radish

CONCLUSIONS

1. Twenty bacterial strains from human oral cavities were identified as genus 6 Moraxella 1 Neisseria, 1 Proteus, 4 Bacillus, 4 Staphylococcus, Branhamella and 1 Enterobacter.

2. Twenty one plant materials were used in order to search for antimicrobial sub -stances from natural plants having no problems of safety at all.

3. Onions, gingers and red peppers reported having antimicrobial activities did not inhibit any bacterial strains.

4. Only garlic juice inhibited the growth of seventeen bacterial strains belonging to 6 kinds of genus.

REFERENCES

1. Choi, H. K. 2001. A study on the antibacterial activity of garlic against Escherichia coli O157.Journal of Korean Practical Arts Education 14:159-167.

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