Research Paper

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Antimicrobial and antioxidant activity of different vegetables on pathogens

Computer Science

KEYWORDS : Antimicrobial activity, antioxidant capacity, Spinach (Spinacea olerasia), Ginger (disambiguation),Tomatoes

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ABSTRACT

This study was undertaken to assess the antioxidant capacity and Antimicrobial Activity of different vegetables namely Spinach (Spinacea olerasia), Ginger (disambiguation),Tomatoes, Dill (Anethum graveolens) in case of Antimicrobial Activity test Pathogens was used Staphylococcus aureus and Salmonella typhi .The antioxidative and antimicrobial effects of extracts from different vegetables, were studied in vitro using total antioxidant capacity and Antimicrobial Activity Test. The total antioxidant capacity And antimicrobial activity was found to be varied in different vegetables.

INTRODUCTION

Epidemiological studies show that the consumption of vegetables can protect humans against oxidative damage by inhibiting or quenching free radicals and reactive oxygen species Oxidants, commonly known as "free radicals," is a molecule with one or more unpaired electrons in the outer orbital. Many of these free radicals, which are the harmful byproducts generated during normal cell aerobic respiration in the form of reactive oxygen and nitrogen species, are an integral part of normal physiology . The importance of reactive oxygen species and free radicals has attracted increasing attention over the past decade. An over production of these reactive species can occur, due to oxidative stress brought about by the imbalance of the bodily antioxidant defense system and free radical formation.

The present study shows that all vegetable extracts exhibited increased antioxidant activity or decreased prooxidant activity with increasing concentration. However, their behavior differed according to the type of vegetable and volume of extract added to the system.

The increasingly high numbers of bacteria that are developing resistance to classical antibiotics drive much of the current interest on natural antimicrobial molecules in hope that they may provide useful leads into anti-infective drug candidates.

Several antimicrobial agents were isolated from plant including secondary metabolites as essential oil and terenoides, amongst which can be cited xanthones, benzophenones, coumarins and flavonoids *(H.Belguith et al., 2010*).

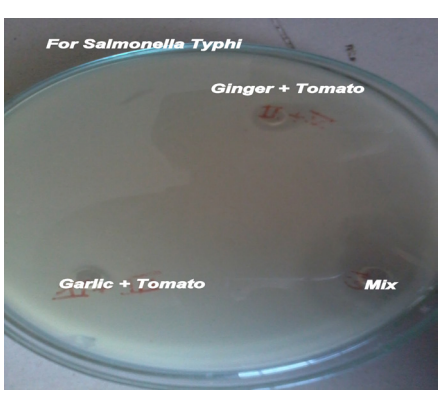

Figure 1: Antimicribial Activity of Vegetabeles against Salmonella Typhi.

Materials And Methodology

Antimicrobial Activity Test:

Preparation of Extract: About 10gm of the selected vegetables were macerated or extracted with 70% methanol and distilled water in a conical flask at wrist action rotary shaker for 48 hours. The whole extract wasthen filtered with the help of whatman no. 4 filter paper. The collected solvent was then evaporated to dryness with rotary vaccum evaporator at 40 °C to afford a thick residue. The thick residue was then converted in dried powder in a dessicator. This dried mass was dissolved to get 20 mg/ml concentration of extract.

The Antimicrobial susceptibility testing was done by using the Agar well diffusion method to detect the presence of anti bacterial or anti fungal activities of the samples (R.C.Jagessar et al., 2008). The sterile Nutrient Agar media is poured into the Petri plates. As soon as the agar was solidified a well is prepared into the plates with the help of a borer that was sterilized with alcohol and flame. A sterile swab was used to evenly distribute bacterial or fungal culture over the surface of the sterile nutrient agar plates. The plates were allowed to dry for 15 minutes before use in the test. The test samples were introduced into the wells.The antibiotics were introduced into the centre of the well for control. The plates were labeled and incubated overnight at 37 °C. Microbial growth was determined by measuring the diameter of zone of inhibition. The diameter of inhibition zones was measured in mm and the results were recorded.

Total Antioxidant Capacity

TestPreparation of extracts After selection, each fresh vegetable was washed under running tap water followed by washing with distilled water to remove the surface impurities. Exactly 500g of vegetables were collected and weighed.The vegetables were minced using a mixer grinder and finely macerated. After homogenization, it was extracted in 500 mL of chloroform water (1.25ml CHCl and volume is made up to 500ml distilled water) for 7 days in the room temperature with intermittent shaking. After incubation, the whole extracts were filtered through filter paper. The filtrate is maintained in dark. To the marc, 300mL-fresh solvent was added and refluxed for 90 min.The whole extracts were again filtered and both the filtrate is mixed together and concentrated. The yield of crude extracts obtained from solvent were noted, stored in desiccators for maximum of 3 days; later preserved in a deep freezer (-20 C) for further use.

Phytochemicalinvestigation: The preliminary qualitative phytochemical studies were performed for testing the different chemical groups present in aqueous extracts of five different vegetable extracts .

The total antioxidant capacity was measured by spectrophotometeric method of Prieto At different concentration ranges, aqueous extracts were prepared in their respective solvents and combined in an eppendorf tube with 1ml of reagent solution (0.6M H SO , 28mM sodium phosphate, 4mM ammonium molybdate mixture). The tubes were incubated for 90min at 95ºC.

The mixture was cooled to room temperature and the absorbance was read at 695nm against blank.Ascorbic acid equivalents were calculated using standard graph of ascorbic acid.The experiment was conducted in triplicates and values as are equivalents of ascorbic acid in g /mg of extract

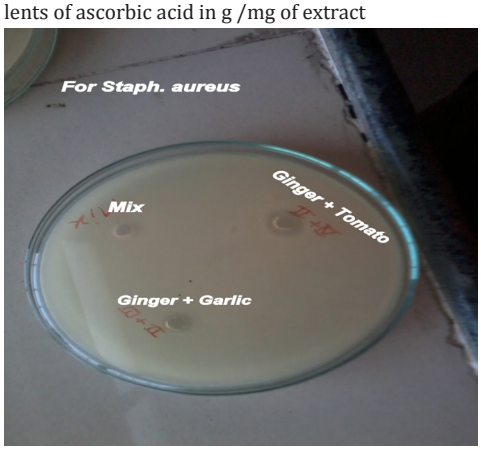

Figure : Antimicribial Activity of Vegetabeles against staphalococcus aurious.

Result and Disscusion –

Anti microbial Activity-On the basis observation it is resulted that , In particular the antimicrobial action of each compound was different in intensity and specificity. The extract from Spinach (Spinacea olerasia), Ginger (disambiguation), Garlic (disambiguation), Tomatoes, Dill (Anethum graveolens) shows the effective and determinative anti-microbial activity against the selected bacterial strains (*Staphylococcus aureu, salmon and Salmonella typhi*). aquase was extracted with methanol.(**Table 1 and 2 present the results of antimicrobial activity against selected microbes.)**

Table 1:Result of Anti microbial Activity of Vegetabeles against *salmonella typhi*

Sr. no.	Name of sample (10 µl)	Zone of inhibition (cm)			
		1	2	3	mean
1	Spinach	0.4	0.5	0.5	0.46
2	Ginger	0.6	0.5	0.7	0.6
3	Dill	0.5	0.4	0.3	0.4
4	Garlic	0.6	0.5	0.6	0.56
5	Tomatoes	0.5	0.6	0.5	0.53
6	Spinach + Dill	0.4	0.3	0.4	0.36
7	Spinach + ginger	0.6	0.7	0.8	0.7
8	Spinach + tomato	0.4	0.3	0.4	0.36
9	Spinach + Garlic	0.5	0.6	0.7	0.6
10	Ginger + Garlic	0.6	0.6	0.5	0.56
11	Ginger + Dill	0.5	0.4	0.3	0.4
12	Ginger + Tomato	0.5	0.2	0.5	0.4
13	Dill + tomato	0.2	0.4	0.3	0.3
14	Dill + garlic	0.4	0.3	0.5	0.4
15	Mixer of all	0.5	0.6	0.4	0.5
16	Antibiotics(Control)	0.8	0.7	0.8	0.76

Table 2:Result of Anti microbial Activity of Vegetabeles against *staphylococcus aureus*

Sr. no.	Name of sample (10 µl)	Zone of inhibition (cm)			
		1	2	3	mean
1	Spinch	0.5	0.6	0.7	0.6
2	Ginger	0.5	0.5	0.7	0.56
3	Dill	0.4	0.3	0.3	0.3
4	Garlic	0.6	0.4	0.6	0.53
5	Tomatoes	0.4	0.5	0.5	0.46
6	Spinach + Dill	0.4	0.2	0.4	0.33
7	Spinach + ginger	0.1	0.5	0.4	0.33
8	Spinach + tomato	0.3	0.2	0.1	0.2
9	Spinach + Garlic	0.3	0.5	0.6	0.46
10	Ginger + Garlic	0.5	0.6	0.6	0.56
11	Ginger + Dill	0.4	0.3	0.3	0.33
12	Ginger + Tomato	0.3	0.2	0.5	0.33
13	Dill + tomato	0.1	0.1	0.3	0.16
14	Dill + garlic	0.1	0.3	0.2	0.2
15	Mixer of all	0.4	0.5	0.3	0.5
16	Antibiotics (Control)	0.8	0.7	0.7	0.73

Total antioxidant capacity

The results showed that the antioxidant activities of different vegetables varied markedly and this may be due to the differences in structures of phenolic compounds and primarily related to their hydroxylation and methylation patterns.

However, vegetables may contain other antioxidants such as proteins, ascorbate, β carotene, β -tocopherol, and lycopene (a carotenoid without provitamin A) which could play some role in the increase of the total antioxidant activity.

Table 3: Result of Qualitative phytochemical analysis of aqueous vegetable extracts.

Phytochemical Tests	VEGETABLE EXTRACTS				
	Spinach	Ginger	dill	Garlic	Tomatoes
Carbohydrates	+	+	+	+	+
Proteins	+	+	+	+	+
Amino acids	+	+	+	+	+
Steroids	-	-	-	-	-
Glycosides	+	+	+	+	+
Saponins	-	-	-	-	-
Alkaloids	+	+	+	+	+
Flavonoids	+	+	+	+	+
Tannins and Polyphenols	+	+	+	+	+

Especially in the case of lycopene recent studies have shown its potential antioxidant activity as it almost completely prevented oxidative damage to DNA and liver necrosis in rats and reduced risk of prostate cancer.

Phytochemicals are plant chemicals or more appropriately defined as bioactive non-nutrient plant compounds in fruits, vegetables and other plant foods that have been linked to reduce the risks of major chronic diseases and cancers.

High consumption of vegetables containing phenolic antioxidants which inhibit the oxidation of LDLare said to slow down the process of atherosclerosis and may also reduce the risk of cancer and other diseases .

All the five aqueous vegetable extracts showed the presence of carbohydrates, proteins, amino acids, glycosides, flavonoids, tannins & polyphenols and revealed the presence of additional alkaloids whereas alkaloids were absent in vegetables Analysis also revealed that none of the vegetables under study gave positive observation for saponins in the aqueous extract (Table 3). Spinach (Spinacea olerasia), Ginger (disambiguation) Garlic (disambiguation). , Tomatoes and Dill (Anethum graveolens). The present study shows that all vegetable extracts exhibited increased antioxidant activity or decreased prooxidant activity with increasing concentration. However, their behavior differed according to the type of vegetable and volume of extract added to the system.

Conclusion

The results of the present study show that containing These vegetabels which are also sources of food have exhibited good antimicrobial and antioxidant properties These observations

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facilitate optimizing effective levels of the antimicrobial in vegetables films against pathogens. Studies are currently underway to test the effectiveness of fruit and vegetable films against contaminated meat .