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Biomedical potential of Lycopene

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Abstract

A new advance study explains the biomedical uses of Lycopeneto cure the diseases. The Lycopene is a carotenoid which found in fruits and vegetables. The Lycopene molecules have strong anti-oxidant property, as the research say if the percentage of free radical increase it leads to different cancers and diseases and today's research told that, Lycopene is able to minimize the cancers like breast, prostate and kidney. The Lycopene is also help in curing diabetic and heart attack problems, improve liver function and digestive system. This paper explain the biomedical properties of *Lycopene* which is studied by different parameter like scavenging effect by using Hydrogen peroxide and 2,2-diphenyl-1-picrylhydrazyl (DPPH), RNA damage etc. Its shows that Lycopene decreases the free radical which are more damaging the cell.

Keyword: *Lycopene,* 2,2-diphenyl-1-picrylhydrazyl **(DPPH)**, Hydrogen peroxide (**H_2O_2**), RNA damage etc.

Introduction

Lycopene is a carotenoid pigment; it is a natural compound that creates the colors of fruits and vegetables. Research shows that lycopene is the most powerful antioxidant in the carotenoid family. Chemically it is 40 carbon acyclic carotenoid which contains 11 conjugated double bonds and belongs to a sub-group of carotenes consisting only of hydrogen and carbon atoms. The higher level of antioxidants in the skin effectively reduces skin roughness. Tomato paste containing lycopene provides protection against photo damage. Diets rich in carotenoids can prevent cell damage, premature skin aging, and skin cancer.

Methods and Material

Hydrogen peroxide scavenging effect

The ability of the Lycopene to scavenge hydrogen peroxide was assessed by the method of Ruch *et al*,(**1989**). Phosphate buffer (0.1M, pH 7.4), **H_2O_2** (40mM) in phosphate buffer. A solution of H_2O_2 (40mM) was prepared in phosphate buffer. Lycopene of various concentration from stock as (0.1, 0.2, 0.3-1 mg/ml) were added to H_2O_2 solution and the total volume was made up to 3ml and absorbance recorded at 230nm. A blank solution containing phosphate buffer, without H_2O_2 was prepared.The extent of H_2O_2 scavenging of the tomato extract was calculated. **(Fig. No.1)**

$$\% \text{ scavenging of hydrogen peroxide} = \frac{(A_0 - A_1) \times 100}{A_0}$$

DPPH radical scavenging effect

The purple colored DPPH is a stable free radical, which is reduced to 2, 2-diphenyl-1-picrylhydrazine (yellow colored) by reacting with an antioxidant. A concentration of (30,,60 ,90, 120,150µg/ml)was prepared by adding each 150µl DPPH and each add 3mL methanol. After 30 min incubation period at room temperature, the absorbance was read against blank at 517 nm. The percentage inhibition free radical (DPPH) was calculated by

% free radical scavenging effect = [1-(A517 sample /A517 control)]×100

Estimation of RNA damage.

RNA,Tris buffer (30mM, pH 7.4) , H_2O_2 (30%),FeCl3 (500M),Agarose (1%) in 1X TAE buffer, EtBr (10mg/ml),Gel loading dye (0.25% bromophenol blue, 0.25% xylene cyanol, 50% glycerol)50X TAEbuffer (Tris base 24.2g, EDTA 18.612g, glacial

acetic acid 5.7ml, in a total volume of 100ml. Each reaction mixture contained 5µl of tris-buffer in RNA (2µg) and 5µl of tris buffer in Lycopene. FeCl3 (5µl) and 10µl of H_2O_2 were added to test samples and incubated at 37°C for 15 minutes for RNA. Estimation of RNA damage studied by agarose gel electrophoresis.

Result

Hydrogen peroxide scavenging effect

The absorbance of the reaction mixture was recorded at 230nm in a spectrophotometer, the highest percent of inhibition was found at 1.0 mg/ml of Lycopene concentration. **(Fig No.2)**

DPPH radical scavenging effect

In the DPPH radical scavenging activity of lycopene, the percent scavenging ability of methanolic fraction at 150µg/ml was higher (79.85). The results obtained in this investigation reveal that , the fraction of lycopene are free radical scavenger and able to react with DPPH radical ,which might be attributed to their electron donating ability. **(Observation table No.3)**

Estimation of RNA damage

Estimation of RNA damage studied by agarose gel electrophoresis, as shown in fig. in first well loaded(H_2O_2+RNA), In second well loaded (**H_2O_2+RNA+Lycopene sample**), and In third well loaded (control as std.RNA).The lycopene's antioxidant property was found to be effective against free radical of H_2O_2 that may be damage RNA. First band contain damaged RNA due to Hydrogen Peroxide which has very low frequency as compare to control sample. **(Fig.No.4)**

Fig. No. 1

Sr. No.	Lycopene mg/mL	Phosphate buffer	O.D. at 230 nm	% of inhibition
1	0.1	2.9	1.132	0.70
2	0.2	2.8	1.109	2.71
3	0.3	2.7	0.997	12.54
4	0.4	2.6	0.820	28.07
5	0.5	2.5	0.712	37.54
6	0.6	2.4	0.634	44.38
7	0.7	2.3	0.596	47.71
8	0.8	2.2	0.590	48.24
9	0.9	2.1	0.590	48.24
10	1.0	2.0	0.487	57.28

Observation table. No.1

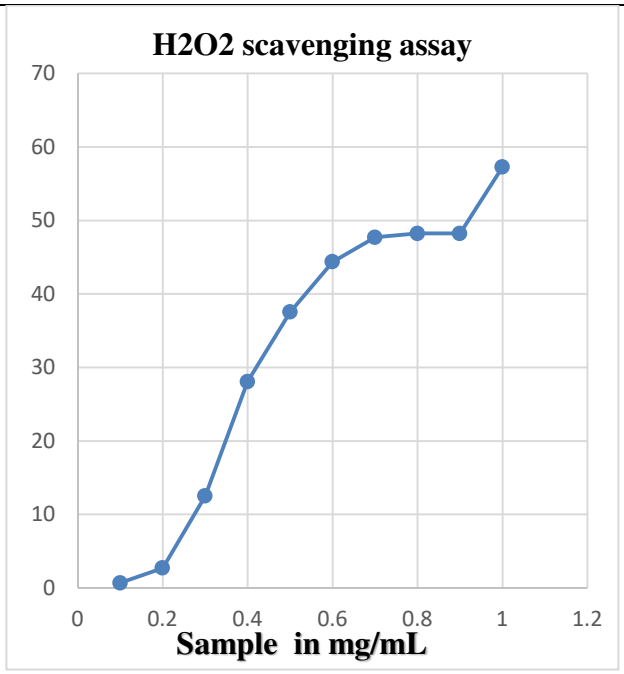

Fig. No. 2

Concentration (µg/ml)	DPPH µl	Methanol ml	O.D.at 517 nm	% of radical scavenging activity
30	150	3	0.205	23.507
60	150	3	0.169	36.94
90	150	3	0.119	55.597
120	150	3	0.070	73.881
150	150	3	0.054	79.85

Observation table. No. 2

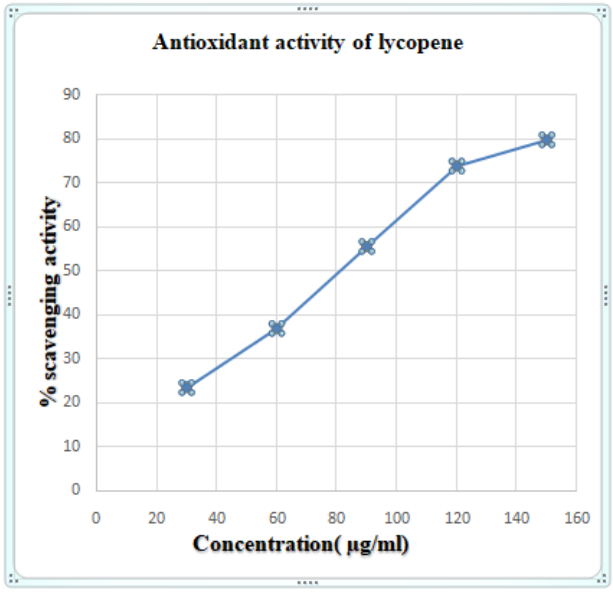

Fig. No. 3

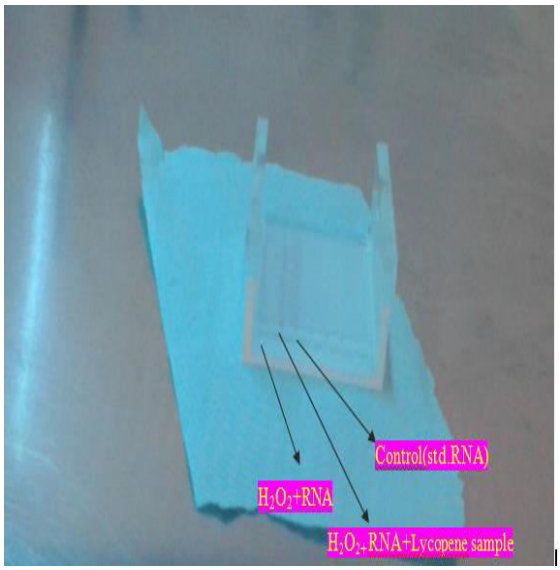

Fig.No.4

Conclusion

The free radical is very dangerous to cell, they destroy the cell. In cell free radical create the high oxidation reaction in which the anticancer proteins are damaged and lost the function of protein to avoid this body unable synthesized large amount of antioxidant. The Lycopene is key molecule which is high in tomatoes and it has anti-oxidant activity. The chemically analysis of Lycopene shows that it mostly involved in antioxidizing reaction process and help the cell to be survive long time and maintain anticancer protein from oxidizing free radical.

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