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EXTRACTION AND DETERMINATION THE OF BETA CAROTENE CONTENT IN CARROTS AND TOMATO SAMPLES COLLECTED FROM SOME MARKETS AT ELBEIDA CITY, LIBYA

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Abstract:-
Beta carotene an antioxidant compound, it is a substance that inhibits the oxidation of other molecules. Free radicals damage cells through oxidation. Eventually, the damage caused by free radicals can cause several chronic illnesses, in our study Beta carotene was extracted by ethanol / dichloro methane (solvents) from the carrots and tomato samples which collected from some markets in ElBeida City (Libya). The Beta carotene contents were measured by using a spectrophotometer. The UV spectrophotometric method which carried in this study gave excellent linearity standard curve (r^2= 0.993) in the concentrations a range of (10 - 80 ppm), the concentrations of extracted Beta carotene ranged from (4.9-72.63 ppm). A compassion between the contents of Beta carotene in fresh and storage vegetables was studied, in addition the comparison between Libyan and Egyptian carrots and tomato samples. The results of compassion not showed wide difference.

Keywords:- *Beta carotene, Free radicals and spectrophotometer*

INTRODUCTION

Beta-carotene is an important functional ingredient among the carotenoid family, providing vitamin A activity from vegetable sources in the human food supply [1] it is a wellknown active phytochemical with many health-promoting properties [2]. Physiologically, βcarotene had a similar chemical structure with Vitamin A, could change to be vitamin A in the human body, which was considered to be the safest and most effective vitamin A EPH - International Journal of Applied Science | ISSN: 2208-2182precursors. Meanwhile, for some chronic diseases, such as atherosclerosis, cancer, cardiovascular disease [3 and 4]. Nowadays the major interest of carotenoids, which are found in plants, is not only due to their pro vitamin A activity, but also to their antioxidant action by scavenging oxygen radicals and reducing oxidative stress in the organism [5]. The term carotenoids" refers to a family of more than 600 different plant pigments, which are responsible for many colors (red, orange and yellow, etc.) of plant leaves, fruits and flowers, as well as the colors of some birds, insects, fish and crustaceans [6]. According to their system of conjugated double bonds carotenoids are extremely reactive and consequently unstable. Precaution steps taken during the isolation and analysis include the protection from light, avoiding the exposure to oxygen, use of antioxidants (e.g. BHT, pyrogallol, vitamin E), operation at reduced temperatures and the need for completing the analysis in the shortest possible time [7]. Many natural antioxidants from fruit and vegetables are beneficial food components, they protect the food from rancidity and have the potential of reducing oxidative damage in humans [8] .Antioxidants have also been of interest to chemists and health professionals because they may help the body to protect itself against damage caused by reactive oxygen species [9-11] β - Carotene is commonly known as a radical scavenger and a physical scavenger of singlet oxygen and is believed to play an important role in the inhibition of the initial stages of lipid per oxidation. The β - carotene content of different foods is of nutritional importance and of additional interest since β - carotene is believed to have a protective role against cancer [8]. Quantitative determination of β-carotene accurately is particularly important in nutrition application. There were many ways to quantify β-carotene, among which, high-performance liquid chromatography and UV spectrophotometry were frequently used [1 and 4]. The objective of this study is using a simple and sensitive method for the extraction and determination the β-carotene contents in carrots and tomato samples collected from some markets at El-Beida City , Libya by UV-VIS spectrophotometer .

MATERIALS AND METHODS

Standard β - carotene pure material was obtained from BDH Company, dichloromethane, ethanol, anhydrous sodium sulfate (Na_2SO_4) and Saturated NaCl solution was used during the extraction.

Standard preparation

The standard stock solution of (1000 ppm) concentration was prepared by dissolved the β – carotene in chloroform. The working standard solutions were ranged (10 - 80 ppm), were prepared in the same solvent and kept until analysis.

Samples collection:

Carrot and tomato samples were collected from local farms in El-Beida City.

Extraction of b carotene:

10 g tomato were transferred to volumetric flask, 10 ml of ethanol were added, and the mixture was heated for 5 minutes. The mixture then filtered and the filtrate was kept in a conical flask, the crude was collected in the bottom of the flask in round-bottom bottle, then 10 ml DCM was added. The solution was condensation for 5 min. Then separate the supernatant and add it to the first filtrate, this step was three times. The filtrate was collected in a separation funnel, then 10 ml of saturated NaCl solution was added, The contents were shaken gently then the lower layer were collected. Then 1 teaspoon anhydrous Na_2SO_4 was added and allow to stand for 5 minutes. After the filtration of contents was carried out and the samples were transferred into a dark bottle [12].

Instruments:

UV/ VIS – spectrophotometer was used.

RESULTS AND DISCUSSION

The results of the standard curve were shown in Figure (1).

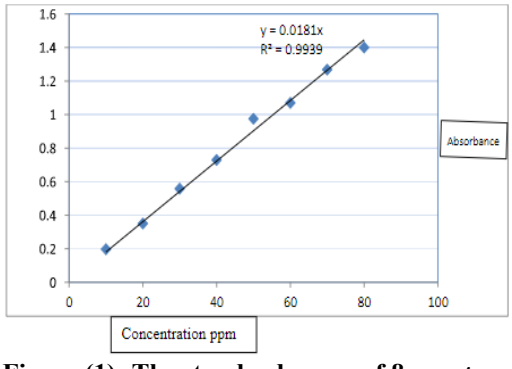

Figure (1): The standard curve of β-carotene

The values of the absorbance of the samples were given in Table (1). The concentrations of the β-carotene samples were given in Table (2). Where: A = Libyan tomato sample, B = Egyptian tomato sample, C = Libyan carrot sample, D = Egyptian carrot sample, E= Fresh tomato sample and F= Fresh carrot sample.

Table (1): The absorbance values of β-carotene of the studied samples.

Samples	Absorbance
A	0. 816
B	0.567
C	0.325
D	0.299
E	1.307
F	0.088

Table (2): The concentration of β-carotene of the studied samples

Samples	Concentration ppm
A	45.37 ppm
B	31.53 ppm
C	18.10 ppm
D	16.65 PPm
E	72.63 PPm
F	4.93 PPm

Identification

UV- VIS spectrum of β-carotene was scanned from 200 to 800 nm and the best absorption was obtained at 460 nm. This was absolutely the best wave length, which agrees with that which reported in literatures [13 and 14] . UV- VIS spectrum of extract β-carotene from carrots and tomatoes was on the same wavelength which is The standard solution was appeared which mean the extraction Method was successful and the extract contained β-carotene .

Method validation:

The linearity of the method was performed in a range of 10 - 80 ppm and the method showed good linearity regression ($r^2 = 0.993$) with. The liner equation is: $y = 0.018 x$, which is showing good linearity, precision, accuracy and sensitivity, which could be used for determination of β-carotene in carrot and tomatoes.

The amount of β-carotene in tomato samples ranged from 31.53 - 72 .6 ppm and in Carrot samples ranged from 18 .1 – 4.9 ppm. Carotenoids are compounds very sensitive to light, heat, air and other variables consequently their determination, involving the steps of extracting, can be accompanied by degradations and loss. For this reason it is important to make a careful evaluation of the analytical procedure and the validation of the response so as to avoid causes of variation and inaccuracies [15]. In this study Freeze-thawed samples were compared with fresh samples. The freeze-thawed samples exhibit a different value than fresh samples or each level of β-carotene, fresh samples read with a higher absorbance than frozen samples. This is likely due to protein and cell wall breakdown in the frozen tissue [16].

CONCLUSION

In this study the extraction of β-Carotene from tomatoes and carrot samples was Established by used different solvents, The spectrophotometric method was gave the highest sensitivity for the determination of β-Carotene, in tomato samples and a carrot. β- Carotene content in tomatoes and a carrot in tomatoes samples ranged from ranged from 31.53- 72 .6 ppm and in Carrot samples ranged from 18.1 – 4.9 ppm.

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