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Effect of Dietary Intake of Lutein Rich Foods on the Retina and its Associated with Retinopathy Among Diabetic Patients

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Abstract

Background: Diabetic retinopathy (DR) is a common micro-vascular consequence of diabetes mellitus that affects the eyes. If untreated, DR cause damage to the retinal blood vessels and result in blindness or visual loss Hyperglycemia over long period of time results in increases inflammatory oxidative stress and protein kinase C pathways that eventually retinal capillary endothelial damage and pericyte loss occurred. Lutein is a carotenoid with anti-inflammatory and antioxidant properties.

Objective: To determine the protection roles of dietary intake of lutein rich foods on the retina and it's associated with retinopathy among diabetic patients.

Patients and Methods: A cross-sectional study was conducted in the Ophthalmology Department of Imamein Kadhimein Medical City, Baghdad, Iraq, from July to November 2023, involving a total of 100 diabetic patients. Questionnaire list was used which consist of sociodemographic information, socioeconomic status, dietary sources of lutein, anthropometric measures and ophthalmic examination and investigations which include optical coherence tomography for macular assessment and HbA1c assessment.

Results: The current study showed that 64% of the diabetic patients had retinopathy and 36% had normal retina. The study showed that 91.7% of diabetic patients with normal retina were consume 3-7 serving/week tomato, 75% were consume 7-35 serving/week egg, 75% were consume 1-7 serving/week zucchini, 72% were consume 1-3 serving/week spinach, 63.9% were consume 3-7 serving/week green pepper, 63.9% were consume 3-7 serving/week basil, 61% were consume 3-7 serving/week parsley, 58% were consume 3-7 serving/week leek, 52.8% were consume 3-7 serving/week lettuce, 41.7% were consume 1-2 serving/week nut and 30.6% were consume 1-2 serving/week pistachio with significant p-value.

Conclusion: Patients with diabetes can avoid retinal damage by consuming the recommended weekly servings of lutein-rich foods especially tomato, eggs, zucchini, spinach, green pepper, basil, parsley, leek, lettuce, nut and pistachio.

Keywords: Diabetic retinopathy, lutein, visual impairment.

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Introduction

The eye is an important organ that need special care (1). Diabetes and its consequences are growing more prevalent worldwide (2). By 2030, it is anticipated that over 191 million individuals globally will suffer from diabetic retinopathy, with over 55 million of them experiencing visual impairment (2). There are 1.4 million type 2 diabetics in Iraq, where the disease affects 8.5% to 13.9% of the population (3). In Iraq, the prevalence of diabetic retinopathy ranged from 28.1% to 32.8%, with proliferative alterations observed in 11.27% of cases (4). Globally, 22.27% of people had DR (5). Diabetic retinopathy is a microvascular disorder that destroys retinal blood vessels and can lead to blindness or visual loss if untreated (6 – 8). Hyperglycemia over long period of time results in increases inflammatory oxidative stress and protein kinase C pathways that eventually retinal capillary endothelial damage and pericyte loss were occurred. Retinal capillary changes causing capillary occlusion, retinal non perfusion and endothelial barrier decompensation which leads to serum leakage and retinal edema (macular edema). These changes occur in both superficial and deep retinal capillary vessels and worsen in more sever diabetic retinopathy. Retinal neovascularization may develop due to increase level of intravascular endothelial growth factor (VEGF) from ischemic retinal tissue (7, 8). Diabetic retinopathy (DR) is a leading cause of vision loss globally, ranking sixth in terms of preventable blindness and fifth in terms of moderate-to-severe visual impairment between 1990 and 2020 (9). A third of individuals with diabetes mellitus have vision-threatening retinopathy, which is characterized by either proliferative or severe non-proliferative DR or the presence of diabetic macular edema (7, 8, 10). Approximately one in three individuals with diabetes mellitus have DR (11). DR is estimated to be the most frequent cause of new cases of blindness among adults 20-74 years of age (12). Studies had been demonstrated that daily ingestion of a multi-component formula combining antioxidants and xanthophyll pigments improves perimetry, color discrimination, macular pigment optical density, and contrast sensitivity in diabetic individuals with and without retinopathy (13). Lutein and zeaxanthin are carotenoids that have anti-inflammatory, antioxidant (14-16) and neuroprotective effects (17). Unique carotenoids that are concentrated in the human macula (center of retina) are: lutein, zeaxanthin, and meso-zeaxanthin (16-19). Lutein and zeaxanthin are obtained from dietary sources such as green leafy vegetables and orange and yellow fruits and vegetables, while meso-zeaxanthin is rarely found in diet and is believed to be formed at the macula by metabolic transformations of ingested carotenoids (17, 19). Several studies have proved that lutein and zeaxanthin are an essential element for eye health (1, 14 – 21). Elevated levels of the food-dependent plasma carotenoids lutein and zeaxanthin are thought to offer protection against diabetic retinopathy (13 – 15). Consuming lutein and zeaxanthin has been shown to help diabetic patients with non-proliferative retinopathy, macular edema and improve their contrast sensitivity and visual acuity (13 – 15). Lutein and zeaxanthin may have protective effect for macula in

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patients with DR because of their biochemical structure and function that neutralize reactive oxygen species and prevent oxidative damage to the retina (biological antioxidants), neuroprotective and anti-inflammatory function in the retina, its position in the center of retina (macula), and its ability to absorb oxidative blue light (2, 14 – 17). Carotenoids that are present in large quantities in egg yolks, orange and yellow fruits, and dark green vegetables (Leek, Parsley, Lettuce, green pepper), tomato and nut are lutein and zeaxanthin (18, 20-22). It is also one of just two carotenoids that are present in the human eye, where it serves to shield the retina from damaging light and oxidation (18). Dietary factors have a significant impact on DR risk modification, as evidenced by the protective effects of a Mediterranean diet, high consumption of fruits, vegetables, and fish, and low calorie intake (22 – 24). Depending on a fact that lutein has antioxidant, anti-inflammatory and neuroprotective effects. Hence, the objective of this study was to determine the protection roles of dietary intake of lutein rich foods on the retina and it's associated with retinopathy among diabetic patients.

Patients and Methods

The Department of Ophthalmology of Imamein Kadhimein Medical City, Baghdad, Iraq was the site for data collection of the current cross-sectional study, for five months duration from the 1st of July to 1st of December 2023. One-hundred diabetic patients were collected from outpatient in ophthalmology department of this hospital; Patients were only included if they met the inclusion criteria which are all diabetic patients aged between 35- 90 years.

Questionnaire list was used in current study and consist of sociodemographic information, socioeconomic status, and dietary sources of lutein, anthropometric measures and ophthalmic examination.

1. Sociodemographic information consist of age, sex, education, occupation and marital status.

2. Socioeconomic status was determined based on standard equation: Education + Occupation + house ownership ×0.5 +car ownership × 0.1 (25).

3. Dietary sources of lutein: Serving size is used for detecting the dietary sources of lutein. It is a standardized amount of food and used to quantify recommended amounts of food groups, or represent quantities that people typically consume on a Nutrition Facts label. One serving size is equal to: one medium sized egg, one cup of cooked spinach, one large green pepper and one cup of raw (tomato, leek, parsley and lettuce), one medium sized orange and one third cup or handful nuts (12). Recommended level for eye health: 10 milligrams (mg)/day for lutein and 2 mg/day for zeaxanthin (26). The lutein contents of one cup of Spinach, one egg yolk, half cup of parsley and one ounce of pistachios are containing about 20.4 mg (26), 0.1, 1.2 mg and 1.4 mg respectively (1, 27, 28).

4. Anthropometric measures (body weight, height) were measured by stadiometer, and the formula used to determine body mass index (BMI) was weight in kilograms divided by square height in meters. Class I obesity (BMI 30-34.9), class II obesity (BMI 35-39.9), class III obesity (BMI ≥ 40), underweight (BMI < 18.5), normal weight (BMI = 18.5 -24.9), and overweight (BMI = 25-29.9) were the BMI classifications assigned to the patients (29-

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32). Mid upper arm circumference was measured by tape measure (MUAC). Normal MUAC for adult are >23 cm for male and >22cm for women (33).

5. Ophthalmic examination: All patients were examined of visual acuity and intraocular pressure and senior ophthalmologist was examined posterior segment (vitreous and retina) using slit-lamp biomicroscopy.

6. Optical coherence tomography (OCT) for macular assessment: Is a non-invasive test that provides color-coded, cross sectional images of the retina to enable early detection and treatment of ocular disease that may develop without any noticeable symptoms. The OCT scan uses a low- coherence light to obtain higher resolution images of the layers of the retina and optic nerve. The color-coded images provide a wealth of information to measure the thickness of the retina and identify any optic nerve abnormalities (7).

7. Measurement of the level of glycosylated hemoglobin (HbA1c): was tested in laboratory of Imamein Kadhimein Medical City. The hemoglobin A1C (glycated hemoglobin, glycosylated hemoglobin, HbA1c) test is used to assess glucose control levels and diagnose diabetes. It is an average of the blood sugar level over for previous three months and represented in a percentage. Hemoglobin is a protein which only found in red blood cells. The main job of hemoglobin is to carry oxygen from the lungs to all the cells of the body. Hemoglobin becomes glycated or coated with glucose from the bloodstream. The amount of glucose that is present in the blood will attach to the hemoglobin protein, and increased glucose levels will reflect on the surface of the hemoglobin protein, thereby making a higher HbA1c level (34). HbA1c test below 5.7 % classify as normal, or in the non-diabetic range, HbA1c value of 5.7 % to 6.4 % is considered to be pre-diabetic, while HbA1c of 6.5% or higher can be diagnosed as diabetes (35).

Statistical Analysis

Data input and analysis were performed using the Statistical Package for Social Sciences, version 24 (SPSS 24) program. Simple frequency and percentage measures were used to display the data. The chi square test was used to determine the significance of the association between the variables, and Z test which is used for testing the significance of association between two proportions. A p value of 0.05 or less was deemed statistically significant.

Results

1- Age distribution:

This study showed 36% of diabetic patient had normal retina and 64% of them had diabetic retinopathy. Sex distribution was 41% male and 59% female. 50% of patients were with age 40-60 years and 49% were with age more than 60 years (Table 1).

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Table (1): Frequency distribution of age of diabetic patients.

Age (year)	No.	%
< 40	1	1.0
40-60	50	50.0
> 60	49	49.0
Total	100	100.0

2- Body mass index of diabetic patients:

Thirtyeight percent of patients were with class I obesity, 12% with class II and 7% with class III. While 24% of patients were with normal weight and 19% with overweight (Table 2).

Table (2): Frequency distribution of body mass index (BMI) of diabetic patients.

BMI	No.	%
Normal weight	24	24.0
Over weight	19	19.0
Obesity class I	38	38.0
Obesity class II	12	12.0
Obesity class III	7	7.0
Total	100	100.0

3- Diabetic retinal lesions and lutein rich diet consumption:

It is about 49% of diabetic patients had diabetic macular edema, 10% with non-proliferative diabetic retinopathy, 5% with proliferative diabetic retinopathy and 36% of patients had normal retina (Table 3).

Table (3): Frequency distribution of diabetic retinal lesions in diabetic patients.

Retinal lesion	No.	%
Normal retina	36	36.0
Non proliferative diabetic retinopathy	10	10.0
Diabetic macular edema	49	49.0
Proliferative diabetic retinopathy	5	5.0
Total	100	100.0

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The proportion of diabetic patients with normal retina which consume tomato, egg, green pepper, basil, spinach, parsley, leek, lettuce, orange and nut were 91.7%, 75%, 63.9%, 63.9%, 61.1%, 61.1%, 58.3, 52.8%, 30.6%, 33.3% respectively from total number of patients with normal retina, while the proportion of diabetic patients with retinopathy which consume tomato, egg, green pepper, basil, spinach, parsley, leek, lettuce, orange and nut were 76.6%, 46.9%, 32.8%, 9.4%, 28.1%, 20.3%, 7.8%, 4.7%, 14%, 10.9 respectively with significant p-values (0.004, 0.005, 0.003, 0.0001, 0.001, 0.0001, 0.0001, 0.0001, 0.04, 0.007) respectively. The proportion of diabetic patients with normal retina that consume 1-2 serving/week and 3-7 serving/week pistachio are 30.6% and 25% respectively, while the proportion of diabetic patients with retinopathy which consume 1-2 serving/week and 3-7 serving/week pistachio are 3.1% and 9.4% with significant p-value (0.0001, 0.03) respectively (Table 4).

Table (4): Proportion of lutein rich diet consumption among diabetic patients.

Type of Food	No. of serving/wee	Normal retina, n=36		Diabetic retinopathy, n=64		P value	Total
		No.	Proportion	No.	Proportion		
Egg	7-35	27	75	30	46.9	0.005*	100
Spinach	1-2	22	61.1	18	28.1	0.001*	
Green pepper	3-7	23	63.9	21	32.8	0.003*	
Tomato	3-7	33	91.7	49	76.6	0.004*	
Leek	3-7	21	58.3	5	7.8	0.0001*	
Parsley	3-7	22	61.1	13	20.3	0.0001*	
Lettuce	3-7	19	52.8	3	4.7	0.0001*	
Basil	3-7	23	63.9	6	9.4	0.0001*	
Orange	3-7	11	30.6	9	14	0.04*	
Nut	3-7	12	33.3	7	10.9	0.007*	
Pistachio	1-2	11	30.6	2	3.1	0.0001*	
	3-7	9	25	6	9.4	0.03*	

It is about 91.7% of diabetic patients with normal retina were consume 3-7 serving/week tomato, 75% were consume 7-35 serving/week egg, 75% were consume 1-7 serving/week zucchini, 72% were consume 1-3 serving/week spinach, 63.9% were consume 3-7 serving/week green pepper, 63.9% were consume 3-7 serving/week basil, 61% were consume 3-7 serving/week parsley, 58% were consume 3-7 serving/week leek, 52.8% were consume 3-7 serving/week lettuce, 41.7% were consume 1-2 serving/week nut and 30.6% were consume 1-2 serving/week pistachio, while 76.6% of diabetic patients with retinopathy were consume 3-7 serving/week tomato, 40.9% were consume 7-35 serving/week egg, 51.6% were consume 1-7 serving/week zucchini, 31% were consume 1-3 serving/week spinach, 40.6% were consume 1-2 serving/week green pepper, 14% were consume 1-2 serving/week basil, 29.7% were consume 1-2 serving/week parsley,

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12.5% were consume 1-2 serving/week leek, 17% were consume 1-2 serving/week lettuce, 21.9% were consume 1-2 serving/week nut and 3% were consume 1-2 serving/week pistachio with significant p-value (0.01, 0.006, 0.02, 0,0001, 0.005, 0.0001, 0.0001, 0,0001, 0.0001, 0.0001, 0.0001) respectively (Table 5).

Table 5: Frequency distribution of lutein rich diet consumption among diabetic patients.

Type of Food	Normal retina, n=36				Diabetic retinopathy, n=64				P value	Total
	No serving	Serving			No serving	Serving				
		Serving /week	No.	%		Serving /week	No.	%		
Egg	4	1-6	5	13.9	8	1-6	26	40.6	0.006*	100
		7-35	27	75		7-35	30	40.9		
Spinach	10	1-3	26	72	44	1-3	20	31	0.0001*	
Zucchini	9	1-7	27	75	31	1-7	33	51.6	0.02*	
Green pepper	5	1-2	8	22	17	1-2	26	40.6	0.005*	
		3-7	23	63.9		3-7	21	32.8		
Tomato	1	1-2	2	5.6	5	1-2	10	15.6	0.01*	
		3-7	33	91.7		3-7	49	76.6		
Leek	6	1-2	9	25	51	1-2	8	12.5	0.0001*	
		3-7	21	58		3-7	5	7.8		
Parsley	6	1-2	8	22	32	1-2	19	29.7	0.0001*	
		3-7	22	61		3-7	13	20		
Lettuce	5	1-2	12	33	50	1-2	11	17	0.0001*	
		3-7	19	52.8		3-7	3	4.7		
Basil	6	1-2	7	19	49	1-2	9	14	0.0001*	
		3-7	23	63.9		3-7	6	9.4		
Nut	9	1-2	15	41.7	43	1-2	14	21.9	0.0001*	
		3-7	12	33		3-7	7	10.9		
Pistachio	16	1-2	11	30.6	56	1-2	2	3	0.0001*	
		3-7	9	25		3-7	6	9.3		

Discussion

Diabetes mellitus is a group of metabolic diseases that all have a hyperglycemic phenotype, and may associated with obesity which is a major public health problem worldwide (36- 38). Visual impairment is a global issue, particularly in developing nations and among the most common causes of avoidable blindness and moderate-to-severe visual impairment from 1990 to 2020, diabetic retinopathy ranks fifth globally. It is also one of the main causes of vision loss (9, 39). Common carotenoid pigments include lutein and zeaxanthin, which are present in high concentrations in egg yolks, orange and yellow fruits, and dark green vegetables. Because of its antioxidant qualities, position inside the retina, and capacity to absorb oxidative blue light, lutein may offer protection against DR (2). Age-related macular degeneration (AMD) and DR are treated and prevented with dietary and lifestyle changes (40). The current study showed that 75% of diabetes individuals with normal retinas consume 7–35 servings of eggs per week, and this intake was substantially correlated with normal retinal exams in these patients. Previous studies showed that egg

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lutein content has been linked to eye health, the egg yolk provides an excellent dietary source of lutein and zeaxanthin because the bioavailability from the yolk matrix is much higher than from the leaves of green vegetables. The high bioavailability of a fat-soluble nutrient such as zeaxanthin from the egg is due to the rich lipid matrix of the yolk. Egg yolk is a good dietary source of both zeaxanthin and lutein, particularly as part of a typical western diet, which is poor in vegetables and fruits. A high intake of lutein can also increase the macular content of meso-zeaxanthin because the lutein can convert to meso-zeaxanthin in the central retina (1, 26, 27). In the current study consuming spinach, zucchini, green pepper, tomato, leek, parsley, lettuce, basil, oranges, nuts, and pistachios is significantly linked to normal retina function. A weekly consumption of 1-2 serving\week (1-2 cups) of cooked spinach was reported by 61.1% of patients with normal retinal examinations. Previous studies showed that lutein and zeaxanthin are the most common xanthophylls in green leafy vegetables like spinach which had important role in eye health (1). In this study, 63.9% of patients consumed 3-7 servings (one and a half cups) of chopped green pepper or one large bell pepper were with normal retina. Peppers are one of the most widely consumed foods throughout the world owing to their attractive colors and strong flavor, green peppers get their unique yellow and orange hue from lutein, a chemical substance that's abundant in them. Research has demonstrated that lutein, an antioxidant, enhances eye health (41, 42). Carotenoids act as antioxidants and deactivating free radicals. Nutritional supply of carotenoids with ocular health benefits such as lutein and zeaxanthin, with potential health benefits for humans (41, 42). Each week, about 91.7% of people consumed three to seven servings (one cup) of chopped or sliced fresh tomatoes. Lutein is becoming increasingly important in preventive medicine due to its possible role in maintaining good vision. Research has demonstrated that a unique pigment found in tomatoes called lutein serves as a filter to shield the eyes from harmful light and oxygen which showed higher antioxidant capacity that protect the retina and lens against ultraviolet and blue spectrum light. Study in Panama City at 2017 showed that the most consumed lutein and zeaxanthin food sources in the study population were tomatoes, egg yolks and green peppers. Lutein and zeaxanthin, both oxygen-containing carotenoids in tomatoes and tomato-based food products are considered to play vital roles in promoting ocular development and maintaining eye health (28, 43- 45). Among the study group of diabetes patients, those who consumed 3-7 servings (one cup) of raw leek per week accounted for 58% of normal retinal tissue. Previous studies showed significant eye problems can be avoided and maintained with the use of leafy green vegetables like leek. Lutein and zeaxanthin are dietary carotenoids derived from dark green leafy vegetables, orange and yellow fruits that form the macular pigment of the human eyes. It was assumed that they protect against visual disorders such as hypoxia induced retinopathy and diabetic retinopathy. The mechanism by which they are involved in the prevention of eye diseases may be due their local antioxidant activity and physical blue light filtration properties which are the direct biological effects of lutein and also improve normal ocular function by

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enhancing contrast sensitivity and by reducing glare disability which is the photophobia and discomfort when intense light enters the eye (45- 50). Approximately 61.1% of diabetes patients with normal retinal function consumed three to seven servings (one cup of three-quarters bunch or one tablespoon of freshly chopped parsley) of parsley each week. Several studied documented that consumption of dark green leafy vegetables had a protective role against eye diseases. Parsley is an important culinary herb originated from the Mediterranean region. Its main constituent's carotenoids, flavonoids and it has anti oxidative activity (1, 51- 53).

Five to seven servings (two cups of raw chopped lettuce) were consumed weekly by 52.8% of the diabetic individuals in this study with normal retinal results. Numerous studies have identified lutein and zeaxanthin to be essential components for eye health, they constitute the main pigments found in the yellow spot of the human retina which protect the macula from damage by blue light, improve visual acuity and remove harmful reactive oxygen species. Parsley and lettuce are rich in antioxidants, lutein and zeaxanthin, which help shield the surface of the eyes and prevent eye diseases. A study in the US showed that a higher dietary intake of carotenoids, specifically lutein is associated with reduced eye diseases (1, 51- 53). In the current study, a weekly consumption of 3–7 servings (one cup fresh or 2 tablespoons chopped) of basil was reported by about 63.9% of normal retinal examinations. Basil supports eye health, and fights free radicals through its antioxidant and anti-inflammatory properties which is high in beta carotene, lutein and zeaxanthin (54- 57). About 30.6% of diabetic individuals with normal retinal examinations consumed oranges, consuming three to seven servings (one medium-sized piece) per week. Nutrition plays a vital role in human health with no exception to the eye. Healthy eyes provide good vision, which is essential for an enjoyable and productive lifestyle. Numerous studies have identified lutein and zeaxanthin to be essential components for eye health. Consumption of orange have protective effect on the retina. Orange is rich with lutein and zeaxanthin which have a strong antioxidant content (1, 18). Approximately 33.3% of diabetes patients with normal retinal examinations consumed 3–7 servings (equivalent to 1/3 of a cup or one handful) of nuts each week. In diabetes individuals, around 30.6% of normal retina were consumed in 1-2 servings (one handful or ten pieces) per week, while 25% consumed 3-7 servings per week. Of all nuts, pistachios contain the highest concentrations of zeaxanthin and lutein. These nutrients guard your eyes against macular degeneration, an eye condition that can cause vision loss as you age, and blue light damage (19, 21).

Other foods high in lutein, such as kale, which is not available in Iraq, collard greens, squash, broccoli, peas, orange pepper, corn, persimmon, tangerines, carrots, kiwis, grapes, and bananas, were not significantly associated with a protective effect on the retina. This could be because our patients did not have access to these foods or because their prices made them difficult to purchase in addition to their poor dentation.

Conclusions

Patients with diabetes can avoid retinal damage by consuming the recommended weekly servings of lutein-rich foods

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especially tomato, eggs, zucchini, spinach, green pepper, basil, parsley, leek, lettuce, nut and pistachio.

Recommendations

1. Suggested daily consumption of lutein rich foods for diabetic patients.
2. Encourage weight reduction.
3. Increase knowledge about types of lutein rich foods.
4. Routine ophthalmic examination.

Source of Funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical Clearance: Imamein Kadhimein Medical City and the Arabic Council of Medical Specialization had granted their official approval. After informing the patients about the purpose and goals of the study, assuring their privacy, and ensuring that the questionnaires were completed anonymously, the patients gave their informed consent. (Document no. 2024HRS872).

Conflict of Interest: Non

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تأثير تناول الأطعمة الغنية باللوتين على الشبكية وارتباطه باعتلال الشبكية لدى مرضى السكري

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الملخص

خلفية الدراسة: اعتلال الشبكية السكري هو نتيجة شائعة للأوعية الدموية الدقيقة لمرض السكري الذي يؤثر على العينين. إذا لم يتم علاجه، يتسبب اعتلال الشبكية السكري في تلف الأوعية الدموية في شبكية العين ويؤدي إلى العمى أو فقدان البصر. يؤدي ارتفاع السكر في الدم على مدى فترة طويلة من الزمن إلى زيادة الإجهاد التأكسدي الالتهابي ومسارات بروتين كيناز C التي تؤدي في النهاية إلى تلف بطانة الأوعية الدموية في شبكية العين وفقدان الحويصلة. اللوتين عبارة عن كاروتين ذو خصائص مضادة للالتهابات ومضادة للأكسدة.

اهداف الدراسة: لتحديد الأدوار الوقائية للتناول الغذائي للأطعمة الغنية باللوتين على شبكية العين وارتباطها باعتلال الشبكية لدى مرضى السكري.

الحالات و المنهجية: أجريت دراسة مقطعية في قسم طب العيون في مدينة الإمامين الكاظمين الطبية، بغداد، العراق، في الفترة من يوليو إلى نوفمبر ٢٠٢٣، وشملت ما مجموعه ١٠٠ مريض بالسكري. تم استخدام قائمة الاستبيانات التي تتكون من المعلومات الاجتماعية والديموغرافية والحالة الاجتماعية والاقتصادية والمصادر الغذائية للوتين والقياسات البشرية وفحص العيون والتحقيقات التي تشمل التصوير المقطعي التوافقي البصري لتقييم البقعة الصفراء وتقييم نسبة HbA1c.

النتائج: أظهرت الدراسة الحالية أن ٦٤٪ من مرضى السكري يعانون من اعتلال الشبكية و٣٦٪ لديهم شبكية طبيعية. أظهرت الدراسة أن ٩١,٧٪ من مرضى السكري ذوي الشبكية الطبيعية كانوا يتناولون ٣-٧ حصص/أسبوع من الطماطم، و٧٥٪ كانوا يستهلكون ٧-٣٥ حصة/أسبوع من البيض، و٧٥٪ كانوا يستهلكون ١-٧ حصص/أسبوع من الكوسا، و٧٢٪ كانوا يستهلكون ١-٣ حصص/أسبوع من السبانخ، ٦٣,٩٪ يستهلكون ٣-٧ حصص/أسبوع من الفلفل الأخضر، ٦٣,٩٪ يستهلكون ٣-٧ حصص/أسبوع من الريحان، ٦١٪ كانوا يستهلكون ٣-٧ حصص/أسبوع من البقدونس، ٥٨٪ يستهلكون ٣-٧ حصص/أسبوع من الكراث، ٥٢,٨٪ يستهلكون ٣-٧ حصص/أسبوع من الخس,٤١,٧٪ يستهلكون ١-٢ حصة/أسبوع من المكسرات و٣٠,٦٪ يستهلكون ١-٢ حصة/أسبوع من الفستق مع القيمة الاحتمالية المعتد بها احصائيا.

الاستنتاجات: يمكن لمرضى السكري تجنب تلف الشبكية عن طريق تناول الحصص الأسبوعية الموصى بها من الأطعمة الغنية باللوتين وخاصة الطماطم والبيض والكوسا والسبانخ والفلفل الأخضر والريحان والبقدونس والكراث والخس والمكسرات والفستق.

الكلمات المفتاحية: اعتلال الشبكية السكري، اللوتين، ضعف البصر.

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