

CONSUMPTION OF FOODS RICH IN ANTIOXIDANTS IN OUTPATIENTS WITH DIABETIC RETINOPATHY AT LA CARLOTA HOSPITAL DURING 2021

CONSUMO DE ALIMENTOS RICOS EN ANTIOXIDANTES EN PACIENTES AMBULATORIOS CON RETINOPATÍA DIABÉTICA DEL HOSPITAL LA CARLOTA DURANTE EL 2021

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ABSTRACT

Introduction: The objective of this work was to assess the quality of the consumption of foods rich in antioxidants such as vitamin C, E and selenium, in a sample of 28 patients with diabetic retinopathy (DR) who attended outpatient consultation at the Institute of Vision, of the La Carlota Hospital, in February 2021. **Methods:** The research was observational, descriptive, cross-sectional, with an analytical component. Patients older than 20 years with DR were included, who agreed to participate in the food survey applied by hospital professionals. Sociodemographic and ophthalmological variables and food consumption were measured. Results: 60% of the cases were men, the mean age was 56 ± 13 years. Proliferative diabetic retinopathy (PDR) was the most frequent diagnosis. Regarding food consumption, the most frequently mentioned were eggs, onion, garlic, parsley, orange, banana, lemon, corn tortillas, chili peppers, avocado. **Discussion:** It was almost zero intake of whole fiber, nuts and vegetable oils. The median consumption of vitamin C was 87.5 mg, vitamin E 13.9 mg, and selenium 36.7 mcg. Deficient consumption of these micronutrients was found in 63% of cases, especially in men. In this research, no statistically significant association was found between poor consumption of foods rich in antioxidants and PDR ($X^2 p=0.2$). **Conclusion:** There is a marked deficit in the consumption of foods with a high contribution of antioxidants in patients with RD, but this situation does not affect the severity of the disease.

Keywords: Diabetic Retinopathy, Eating Habits, Antioxidants. (Source: MeSH NLM).

RESUMEN

Introducción: El presente trabajo tuvo como objetivo valorar la calidad del consumo de alimentos ricos en antioxidantes como la vitamina C, E y selenio, en una muestra de 28 pacientes con retinopatía diabética (RD) que acudieron a consulta ambulatoria en el Instituto de la Visión, del Hospital La Carlota, en febrero del 2021. La investigación fue observacional, descriptiva, transversal, con componente analítico. **Metodología:** Se incluyeron pacientes mayores de 20 años con RD, quienes aceptaron participar de la encuesta alimentaria aplicada por profesionales del hospital. Se midieron variables sociodemográficas, oftalmológicas y el consumo alimentario. Resultados: El 60% de los casos eran hombres, la edad media fue de 56 ± 13 años. La retinopatía diabética proliferativa (RDP) fue el diagnóstico más frecuente. En cuanto al consumo alimentario, los mencionados con mayor frecuencia fueron huevo, cebolla, ajo, perejil, naranja, plátano, limón, tortillas de maíz, chiles, aguacate. Fue casi nula ingesta de fibra integral, frutos secos y aceites vegetales. **Discusión:** La mediana de consumo de vitamina C fue de 87,5 mg, de vitamina E 13,9 mg y de selenio 36,7 mcg. Se comprobó consumo deficiente de estos micronutrientes en el 63% de los casos, especialmente en los hombres. En esta investigación, no se encontró asociación estadísticamente significativa entre el consumo deficiente de alimentos ricos en antioxidantes y la RDP ($X^2 p=0,2$). **Conclusión:** Existe un marcado déficit en el consumo de alimentos con alto aporte de antioxidantes en los pacientes con RD, pero esta situación no incide en la gravedad de la patología.

Palabras Claves: Retinopatía Diabética, Hábitos Alimentarios, Antioxidantes. (Fuente: DeCS BIREME).

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INTRODUCTION

Diabetes mellitus (DM) is one of the pathologies with the most significant health impact due to its prevalence, incidence, and socioeconomic consequences for public health derived from its complications and increased morbidity and mortality.⁽¹⁾

One of the least desired complications of DM is diabetic retinopathy (DR), which is considered among the top three causes of blindness in the world in people between 16 and 64 years of age and is reported in approximately 14% of the diabetic population. Generally, several authors state that it usually begins five years after diabetes onset and is present in 50% of people with diabetes after ten years⁽³⁾.

In Mexico, approximately 71% of the population with diabetes has DR; the non-proliferative form (NPDR) has been identified in 37%, the proliferative form (PDR) in 63%, and 16% with macular edema. On the other hand, it is estimated that the national prevalence of blindness in Mexico varies from 0.4 to 1.5%, and 2.4 to 7% of the population has a visual impairment⁽²⁾.

The literature reports that hyperglycemia induces a high production of free radicals, manifested by increased lipid peroxidation products. Several studies have shown this phenomenon in diabetes, especially TBARS (thiobarbituric acid reactive substances) or isoprostanes⁽³⁾. The increase in peroxidation products has been correlated with the presence of microangiopathies. At the same time, a decrease in antioxidant defenses has been reported in the course of diabetes since a reduction of total plasmatic antioxidant capacity was observed in both type I and type II diabetic patients⁽⁴⁾. Decreased levels of superoxide dismutase and glutathione reductase have been observed in people with DR and correlate with deficient vitamin C in the blood^(5,6).

Given the preliminary results published, and without conclusive data on the role of antioxidants provided through the diet in the improvement or progression of DR^(7,9), it becomes essential to evaluate the nutritional impact of patients with this pathology to know if it is adequate in the daily intake of vitamin C, E, and selenium. This way, it seeks to correct possible deficiencies and monitor the influence of a diet rich in antioxidants. Therefore, this study aims to assess the quality of consumption of foods rich in antioxidants such as vitamins C, E, and selenium in patients with diabetic retinopathy.

METHODS

An observational, descriptive, cross-sectional study

was carried out on 28 patients with DR from the Instituto de Visión, Hospital La Carlota de Montemorelos, Monterrey, in February 2021. All outpatients diagnosed with DR, older than 20 years, male or female, who signed the informed consent and responded to the dietary survey were included. Hospitalized patients and those with some physical or cognitive impediment to answering the survey were excluded.

In order to know the intake of antioxidants through the diet, a survey of the frequency of consumption validated to be used in the Mexican population was utilized. The average food intake was established as daily, weekly, and monthly. For this research, the weekly frequency was used. To calculate the average intake of vitamins C, E, and selenium, the Nutricloud computer program was used as it determines the diet quality index. The cut-off points established to determine adequate consumption was based on the daily intake recommendations: Vitamin C for men 90 mg and women 75 mg; Vitamin E 15 mg in the form of α -tocopherol; Selenium 55 mcg. An intake between 90 and 110% was considered adequate, <90% deficient, and >110% excessive⁽¹⁰⁾.

The data obtained from the surveys was placed in an Excel 2007 sheet and analyzed with the Epi Info TM software (CDC, Atlanta). Descriptive statistics were used to summarize data; quantitative variables were expressed as means and standard deviation (SD) according to their adjustment to normality; qualitative variables were expressed as percentages (%) and absolute frequencies (n). The X² test and Fisher's exact test were used to determine the association of two categorical variables. A value of $p < 0.05$ was considered statistically significant for the hypothesis contrast.

The Ethics Committee of La Carlota Hospital approved the research. Before applying informed consent, the patients were informed about the objectives and scope of the study in a talk offered by the research team.

RESULTS

Twenty-eight patients diagnosed with DR were surveyed, the mean age observed was 56 ± 13 years, and there was a predominance of males (Table 1).

Table 1. Sociodemographic data of the sample studied.

Variables	n	%
Sex		
Male	17	61
Female	11	39
Age Range		
<40 years	5	18
41 a 50 years	5	18
51 a 60 years	8	29
61 a 70 years	6	21
>70 years	4	14

Regarding the diagnosis of DR when evaluating the eye, the most frequent stage was advanced DR (52%); it was also possible to observe four cases of amaurosis due to neovascular glaucoma (8%), which is one of the complications of advanced PDR.

In addition, 57% (n=16) presented the same diagnosis in both eyes, returning to find advanced PDR more frequently. The male sex was the one that presented the most cases of PDR in this sample (Table 2).

Table 2. Most frequent diagnoses observed in the sample.

Severity	Right Eye	Left Eye	Total	%
Moderate NPDR	2	1	3	5%
Severe NPDR2	2	1	3	5%
PDR without high-risk characteristics	1	4	5	9%
PDR with high-risk characteristics	6	6	12	21%
Advanced PDR	15	14	29	52%
Advanced PDR + Amaurosis	2	2	4	8%
Total	28	28	56	100%

*NPDR: Nonproliferative Diabetic Retinopathy; PDR: Proliferative Diabetic Retinopathy.

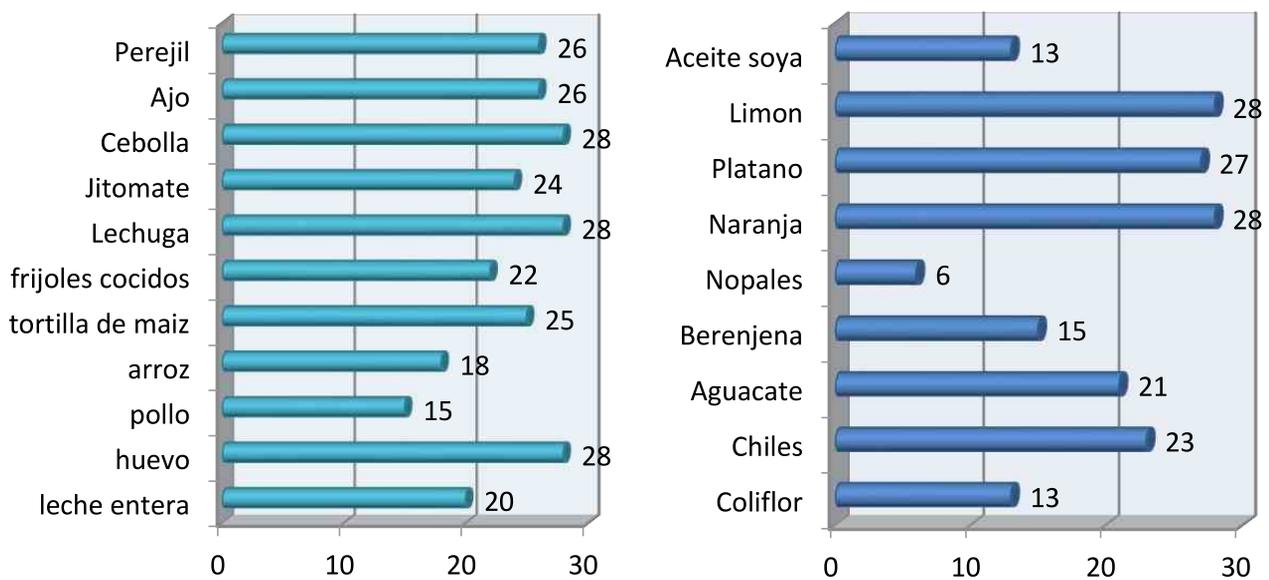
Figures 1 y 2 highlight the foods that patients preferably consume at a frequency of three to five times a week. The egg was the food of animal origin with the highest intake among the respondents. Regarding vegetables, alliaceous foods such as onion and garlic were consumed almost daily, as well as parsley. Regarding the flour, the corn tortilla was the one that was most frequently part of the menu.

Citrus fruits such as oranges and lemons ranked first among the fruits preferred by patients, followed by bananas. In addition, more than 70% consumed some chili with their main meals. Avocado was also highlighted as one of the foods with the most significant demand in the sample. On the other hand, an almost zero intake of whole fiber, nuts, and oils were observed.

Regarding the average consumption of antioxidants from the diet, table 3 se resumen summarizes the values. There is a deficit in the daily intake of vitamin C (40%),

E (70%), and selenium (80%) in the sample. However, women generally meet their vitamin C requirements much more efficiently than men (Figure 3).

Figure 1 and 2. Frequency of weekly consumption of foods rich in antioxidants (n=28).



BRIEF ORIGINALS

Table 3. Consumption of micronutrients in the diet of the sample studied.

Micronutriente	Median	Range
Vitamin C	87.5 mg.	18,5 - 111 mg.
Vitamin E	13.9 mg.	0,11 - 38 mg.
Selenium	36,7 mcg.	0,17 - 62 mcg.

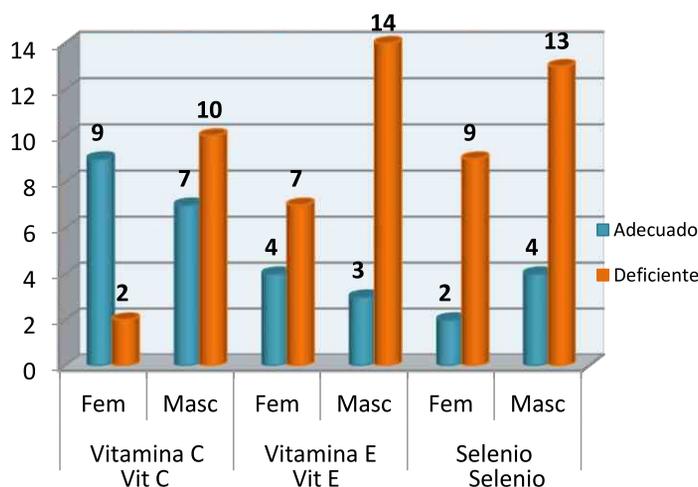


Figure 3. Distribution of antioxidant consumption according to gender (n=28).

DISCUSSION

The role of antioxidants as protective agents in the progression of DR is currently being studied since it has been shown that hyperglycemia triggers the increased production of free radicals at the retinal level. Although the results are still controversial, some authors have reported the beneficial effect of consuming and supplementing antioxidants such as vitamins C, E, and selenium^(11,12).

For example, in China, vitamin E (OR 0.97 95% CI, $p=0.036$) and selenium (OR 0.98, 95% CI, $p=0.017$) are protective factors for DR (13). In this preliminary investigation of patients with DR, the quality of the diet has been assessed, based on a dietary survey, since it is known that the Mexican adult population has a preferential consumption of foods of animal origin, leaving relegated to fruits and vegetables, excellent sources of antioxidants. The deficient or inadequate consumption of vitamins C, E, and selenium observed in this sample is around 63%. Despite this, it was not significantly associated with RDP ($p=0.2$), perhaps due to the small sample size. Nevertheless, it is essential to highlight that most inadequate intakes were observed in patients with PDR.

There is not much literature that longitudinally and quantitatively assesses the eating habits of diabetic patients, much less in those with DR, that can be used to estimate the protective effect of antioxidants provided in food. For example, in Paraguay, Meza E. et al.⁽¹⁴⁾ evaluated the diet quality in patients with DR who attended a private clinic, finding a marked deficit in the consumption of fruits and vegetables.

Today, experts are focused on finding combinations of nutrients or nutraceuticals to help reduce the effects of enhanced oxidative stress in diabetes to prevent its progression and complications. However, no conclusive results have yet been reported on the protective effect of some foods rich in antioxidants in diabetes, as the trials are still in the experimental phase⁽¹⁵⁾.

However, a markedly harmful effect caused by oxidative stress on the retina of diabetics has been demonstrated since the presence of photosensitive molecules is combined with prolonged exposure to radiant energy, periods of high metabolic activity, and increased oxygen consumption, thus creating an environment where the production of free radicals is high and where the level of substrates for oxidative damage is high. In fact, incubating retinal cells under high glucose conditions has shown changes in the levels of polyunsaturated fatty acids (AGP) and an increase in lipid peroxidation (PL).

Despite the short study time and the small sample size, which prevents statistical inference in this investigation, it has been possible to observe a low consumption of foods that are sources of antioxidants in diabetic patients. This must be considered when determining the unfavorable evolution of the pathology since diabetes itself predisposes an internal inflammatory environment that multiplies oxidative stress, which results in the appearance of complications in the medium and long term scenarios. These preliminary results are intended to lay the foundations for future studies of greater methodological and casuistry scope, with the same line of research, in the population with DR.

CONCLUSION

Despite the short study time and the small sample size, which prevents statistical inference in this investigation, it has been possible to observe a low consumption of foods that are sources of antioxidants in diabetic patients. This must be considered when determining the unfavorable evolution of the pathology since diabetes itself predisposes an internal inflammatory

environment that multiplies oxidative stress, which results in the appearance of complications in the medium and long term scenarios. These preliminary results are intended to lay the foundations for future studies of greater methodological and casuistry scope, with the same line of research, in the population with DR.

Authors contributions: The authors participated in the genesis of the idea, project design, data collection and interpretation, analysis of results, and manuscript preparation of the present research work.

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