Editorial

What to eat and drink in glaucoma? Evidence from human studies

¿Qué comer y qué beber en el glaucoma? Evidencias a partir de estudios en humanos

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Sometimes, patients who visit the glaucoma practice center ask us what they can do to prevent glaucoma progression apart from complying with the eyedrops treatment. Specifically, they ask “should I abstain from eating certain foods or drinking?” It is hard to give a professional answer to this question. In fact, as Professor Francisco Grande Covíán, father of dietetics in Spain, used to say: “we are what we eat”, and to this we can add that the only food or drink that has no effect is that which remains on the plate or the glass. The question regarding the influence of different foods or drink can have on glaucoma remains an open-ended question and, even though this field has not been analyzed in depth in available scientific literature, some evidence can be found to address the issue at least partially.

What is the influence of fruits and vegetables?

Three American epidemiological studies have researched the effects of fruits and vegetables on glaucoma treatment, using food consumption frequency validated questionnaires. The oldest one, developed in Harvard, did not find a significant relationship between intake of carotenoids, vitamins C and E, fruits and vegetables with the risk of developing glaucoma. However, the design of this study was flawed by a biased selection as it considered individuals to be glaucomatous solely on their own statement and subsequently examined them to verify their condition, considering all the rest as non-glaucomatous. The authors did not take into account that a


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significant proportion of patients with glaucoma are not aware that they have the condition. The other 2 studies, comprised within the "Study of Osteoporotic Fractures" program, did not exhibit said selection bias because the patients were classified as glucosomatous or non-glucosomatous on the basis of an ophthalmological examination. In this case they did find a protective effect of fruits and vegetables against the risk of developing glaucoma, and recommended high consumption rates of green leaves and vegetables (cabbage), fruits and fruit juice in general (particularly peaches, oranges and carrots). These findings were attributed to the antioxidant properties of these products.\textsuperscript{2,3}

What about other food products?

A recent epidemiological European study (the Rotterdam study) suggested that individuals with high intake of antioxidants such as retinol (abundant in liver or in daily consumption products such as milk, cheese or butter) or vitamin B1 (abundant in grain-derived products such as bread or rice, as well as in potatoes) exhibit half the risk of developing glaucoma when compared to individuals with low intake of these food products.\textsuperscript{4}

Are fats bad for glaucoma?

Overall, fat intake does not appear to have a direct relationship with the risk of glaucoma.\textsuperscript{5} However, high fat consumption could involve increase in body mass index (BMI). Obesity increases blood viscosity and episcleral venous pressure and accordingly inhibits aqueous humor drainage. However, despite a demonstrated association between obesity (in terms of increased BMI) and increased intraocular pressure (IOP), results on the direct relationship between obesity and glaucomatous optic neuropathy are less conclusive.\textsuperscript{6} A special type of fat with anti-inflammatory and vascular flow regulator properties is the polyunsaturated fatty acids (PFA) of the omega-3 type present in blue fish, dried fruit and enriched food products such as milk. These are counteracted by PFA with pro-inflammatory effects of the omega-6 type (found in meat and sunflower oil).

The results of the 2 epidemiological studies which have endeavored to relate these types of PFA with glaucoma are contradictory. One of the studies concludes that there is no association between the risk of glaucoma and the consumption of omega-3, to the extent of suggesting that a high ratio of omega-3/omega-6 consumption predisposes to glaucoma.\textsuperscript{5} The other study reported an association between low consumption of omega-3 (in terms of blue fish and nuts) and increased risk of glaucoma.\textsuperscript{7} Additional studies are necessary to elucidate the function of omega-3 PFA in glaucoma progression.

Is it convenient to limit the intake of salt in glaucoma?

The right onset depends on some parameters. A high intake of salt is associated to blood pressure increases.\textsuperscript{8} In turn, arterial pressure (systolic and diastolic) is associated to discrete IOP increases.\textsuperscript{9} Therefore, it is not advisable for patients with hypertensive glaucoma to ingest a lot of salt. However, in normotensive glaucoma, arterial hypotension or nighttime pressure dips could involve low optic nerve perfusion and progression of damages. In these cases, it is advised to add salt to the diet (1–5 g per day).\textsuperscript{10}

What are the effects of liquid intake on glaucoma?

Since the late twenties it is known that drinking quickly 1 L of water causes IOP increase which becomes evident 30 min later. This is the basis of the Water Drinking Test.\textsuperscript{11} The cause seems to be increased resistance of the trabecular mesh although it has also been suggested it could be due to choroidal expansion as recently demonstrated by means of OCT.\textsuperscript{12,13} Accordingly, drinking large amounts of water all of a sudden is not advised; instead, it is better to drink small amounts spread over time.

What about wines and spirits?

The epidemiological studies have not found an association between consumption of alcohol (even with moderate or severe consumers) and the risk of suffering glaucoma.\textsuperscript{7,14–18} In addition, increased risk has not been determined for specific alcohol-containing drinks.\textsuperscript{17,18} Even so, if we had to choose an alcoholic drink as the less damaging one, that would be red wine due to its high content in polyphenol flavonoids and their powerful antioxidant effects. Other food products rich in these compounds include black chocolate, coffee and tea.\textsuperscript{19}

Are coffee and tea beneficial?

Coffee contains antioxidant polyphenols but it also contains caffeine. A recent meta-analysis has confirmed that caffeine intake does not produce IOP increases in normal patients but it does produce a mean IOP increase of 2 mmHg (which can range between 1 and 4 mmHg) after 90 min in patients with glaucoma or ocular hypertension (OHT).\textsuperscript{20} This should be taken into account in glaucoma practices when performing tonometry on patients who could have taken a cup of coffee a short while ago. Therefore, although the effect of coffee on visual field deterioration is not demonstrated, it seems reasonable to avoid caffeine-containing drinks in patients with glaucoma or OHT in order to avoid temporary IOP increases. As regards tea, there is no information about the effect of tannin on IOP or glaucoma progression. However, green tea deserves special consideration due to its epigallocatechin content, a powerful antioxidant which seems to have a beneficial effect on retinal function in patients with OHT and glaucoma, at least in the short term.\textsuperscript{21}
Final recommendations

To conclude, on the basis of direct or indirect findings of studies on humans, it seems reasonable to advise the following 7 points:

1. Consume abundant amounts of fruit and vegetables (carrots, green leaf vegetables, fruit).
2. Avoid high intake of salt in patients with hypertensive glaucoma (although in normotensive glaucoma patients it could be beneficial).
3. Refrain from high calorie diets (restricting fat) to avoid BMI increase.
4. Consider eating fish or nuts rich in omega-3 PFA, although the results of studies on their effects on glaucoma seem contradictory.
5. Avoid drinking large amounts of liquid in a single take. It is preferable to drink small amounts in the course of the day.
6. Prudent consumption of red wine, black chocolate and green tea could be beneficial.
7. Avoid coffee and caffeinated drinks in order to avoid tension peaks.

We can hope that new studies to be published in the near future will provide additional information about healthy eating habits for glaucoma, a fascinating subject about which there is a lot to discover.

REFERENCES