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Experience of VitroCap® use in vitreous degeneration

Abstract: The results of VitroCap® administration in 62 patients with vitreous degeneration are analysed in this article. 65.5% of patients report subjective improvement in symptoms following three months of taking the supplement.

Keywords: vitreous degeneration, collagen fibrils, L-Lysine, hesperidin.

Introduction.

Vitreous degeneration manifests with patients' complaints of visual discomfort, including appearance of floaters, or dynamic moving shadows, which can disturb driving, reading or focusing on the computer screen [1]. Patients often describe floaters as "flakes", "dots", "threads", "yellowish opacities" in the centre of an image, and complain of inability of one of the eyes to focus while reading etc.

These complaints are caused by the presence of opacities in the optical system of the eye, which hinder visual perception. It was demonstrated that, at an early stage of vitreous collagen fibril degeneration, the adhesion between these fibrils increases and the space for water and hyaluronic acid between the fibrils reduces. As this condition progresses to the later stages, the collagen aggregates become

concentrated in some areas and throw shadows on the retina which are perceived as moving dots, or floaters.

Floaters remain the main complaint associated with vitreous degeneration, and the presence of floaters has been a conventional description of this ophthalmic condition for the last two centuries.

Until now, patients received only psychosomatic help from their doctors, as the only advice for dealing with vitreous degeneration was to get used to it.

However, introduction of the new dietary food supplement VitroCap®, which was designed to protect the vitreous from degeneration and treat the already developed degeneration, allows us to re-evaluate our options for managing this condition.

Daily dose of VitroCap® (one capsule) contains 125mg of L-lysine, 40mg of Vitamin C (which is 50% of recommended daily amount), 25mg of grape seed extract, 60mg of citrus flavonoids (hesperidin).

It was demonstrated that, due to its lysine content, this supplement slows down the glycation of collagen fibrils by 76% [2]. Flavonoids in VitroCap® prevent the enzymatic degradation of hyaluronic acid and collagen, and counteract the formation of collagen aggregates [3].

Grape seed (*Vitis vinifera*) procyanidines inhibit collagenase, hyaluronidase and elastase activity [4]. Ascorbic acid and procyanidines are potent water-soluble antioxidants, which prevent oxidative damage of collagen fibrils [5].

Aims

The purpose of this study was to evaluate the effect of VitroCap® on vitreous degeneration.

Methods

62 patients (124 eyes) with vitreous degeneration were recruited at the 3rd City Clinical Hospital in Minsk and followed from October 2013 to January 2015. They were divided into two groups. The treatment group (group I) consisted of 29 patients (58 eyes) who were assigned to supplementation with VitroCap®, one capsule per day with the meal. The control group (group II) included 33 patients (66 eyes), who did not receive treatment for vitreous degeneration. Age and medical parameters were similar between the two groups.

The exclusion criteria were: axial length (AL) longer than 25mm, refractive error greater than -3D, ocular fundus pathology, history of eye disease and previous ocular surgery.

The mean age was 57 (41.5-62.4) years in the treatment group, and 54 (40.5-63.5) years in the control group (ME [25%-75%]).

All participants underwent the following procedures: visual acuity measurement, autorefraction, biomicroscopy (including biomicroscopy with a fundus lens), ocular ultrasonography (A- and B- mode), and optical coherence tomography (OCT).

Best-corrected visual acuity in all participants was better than 0.9-1.0. 22 (37.9%) eyes in the treatment group and 22 (33.3%) eyes in the control group were emmetropic, 20 (34.5%) eyes in the treatment group and 26 (39.4%) eyes in the control group were hypermetropic. Low-grade myopia was present in 16 (27.6%) eyes in the treatment group and in 18 (27.3%) eyes in the control group.

AL was 23.8mm (22.1-25.0) in the treatment group and 24.1mm (22.5-25.0) in the control group (ME [25%-75%]).

All patients had complaints of floaters, which were described as “threads, dots, specks” etc. Vitreous degeneration was diagnosed with B-mode ultrasonography (special attention was paid to the posterior hyaloid, which in some cases was attached to the retina, and in some cases it was either partially or fully detached from the retina), and confirmed with slit lamp biomicroscopy.

In the available literature (6) we identified a grading system for vitreous degeneration, which was based on self-assessed severity of vitreous opacities. However, we found that this self-assessment of the impact of vitreous opacification on quality of life did not correlate well with objective data from biomicroscopy and B-mode ultrasonography. We noted that patients with minimal changes in the vitreous, as determined by the clinical examination, often reported very high symptom severity, whereas many patients with intensive opacities diagnosed with B-mode ultrasonography and biomicroscopy graded the impact of floaters on their vision as minor.

Taking into account these observations, we have chosen a different method to evaluate the effectiveness of treatment, a drug effect questionnaire with an analogue scale. We asked the participants to answer a question “How did the condition of each of your eyes change 3 months after commencement of

treatment?" There were 6 possible answers that participants had to choose from: better/better (b/b), better/no change (b/no ch.), better/worse (b/w), no change/no change (no ch.), worse/no change (w/no ch.); worse/worse (w/w).

The results were analysed with a combination of parametric and nonparametric methods and descriptive statistics using Statistica 10.0 and Biostat 4.03 software. Chi-squared test ($\chi 2$) was selected for the comparison of the treatment effect between the two groups. P-value was estimated from the $\chi 2$ table. Degrees of freedom required to obtain the coefficient of concordance was calculated using the following formula:

$$n^I = (s-1)\cdot(r-1),$$

where s is a number of columns and r is a number of lines in the table.

If the distribution results obtained did not fulfil the criteria for use of the coefficient of concordance, we used Fisher's exact test. The significance level was set at $p<0.05$, which gives a confidence level of 95.5%.

Results and discussion

One of the main results of the therapy with VitroCap® was that the visual acuity among patients in the treatment group did not decrease and remained the same throughout the study. 3 months after administration of VitroCap®, subjective change in the vitreous transparency was described as "better/better" by 15 patients, in 30 eyes (51.7 %) in the treatment group and by 2 patients, 4 eyes (6.1 %) in the control group. Change in vitreous transparency was described as "better/no change" by 4 patients, in 4/4 eyes (13.8 %) in the treatment group and by 2 patients, 2/2 eyes (6.1%) in the control group. 5 patients, 10 eyes (17.2%) in the treatment group and 14 patients, 28 eyes (42.4%) in the control group did not notice any change in the impact of floaters on their quality of vision. One patient in the treatment group reported that his vision improved in one eye and worsened in the fellow eye, 3.5%. There were 5 patients in the control group who also reported that their vision improved in one eye and worsened in the fellow eye (10 eyes, 15.1%). 3 patients (6 eyes – 10.3%) in the treatment group and 7 patients (14 eyes – 21.2%) in the control group stated that their vision worsened in one eye without changes in the fellow eye. In the treatment group, only one patient reported symptoms of increasing vitreous degeneration in both eyes (3.5%)

despite administration of VitroCap®, versus 3 patients (6 eyes – 9.1%) in the control group (see Table 1).

Table 1. Subjective, patient-reported change in the quality of vision in the treatment group following administration of VitroCap®, and in the control group, N - number of patients, n - number of eyes/%

Change in the quality of vision	Main group		Control group	
	N of patients	n of eyes/%	N of patients	n of eyes/%
better/better	15	30/51.7*	2	4/6.1%
better/no change	4	8/13.8*	2	4/6.1%
better/worse	1	2/3.5%*	5	10/15.1%
no ch./no ch.	5	10/17.2*	14	28/42.4%
worse/no change	3	6/10.3*	7	14/21.2%
worse/worse	1	2/3.5	3	6/9.1%
Total	29	58/100	33	66/100%

* – significant difference between the groups, $p < 0.05$

Table 2. Subjective, patient-reported change in the quality of vision in the treatment group following administration of VitroCap®, and in the control group (stratified by the number of eyes)

Change in the quality of vision	Main group		Control group	
	Number of eyes	%	Number of eyes	%
Better	35	60.4*	11	16.7
No change	17	29.3*	37	56.1
Worse	6	10.3*	18	27.3
Total	58	100	66	100

* – $p < 0.05$, values reached statistical significance

In summary, after 3 months of supplementation with VitroCap®, improvement in both eyes was observed in 15 patients (51.7%), and in one eye by an additional 5 patients (17.2%); in the control group improvement in both eyes

was observed in 2 (6.1%) patients ($p<0.05$) and improvement in one eye was observed in 7 (21.2%) patients ($p<0.05$).

Three patients (10.3%) in the treatment group reported worsening of vitreous degeneration in one eye without changes in the fellow eye, compared to 21.2% of patients in control group ($p<0.05$). Only one patient (3.5%) in the treatment group reported progression of vitreous degeneration in both eyes, compared to 3 participants (9.1%) in the control group.

There was a statistically significant difference in the number of patients who reported improvement in the quality vision between the treatment and the control groups (see Table 2).

Changes in the results of slit-lamp examination and B-mode vitreous ultrasonography among patients in both groups were comparable.

A similar study was conducted by T. Kaercher et al, who evaluated the effect of 3-month supplementation with VitroCap in 24 patients with vitreous degeneration [6]. However, Kaercher et al. used different inclusion criteria and outcome measures, which makes it difficult to compare our results. In the abovementioned study, the authors divided the severity of subjective symptoms into 5 levels. The average level of symptom severity at baseline was 3.63. Following supplementation, it dropped to 1.33. As a result, only 12.5% of patients have not experienced any improvement, while 87.5% of patients reported improvement in their symptoms following VitroCap® treatment.

In our study, patients reported improvement or stabilisation of the process in 82.7% of the eyes, and only in 5 eyes (17.3%) no positive result was achieved. Improvement was observed in 65.5% of eyes (of treated patients) compared to 12.2% in the control group ($p<0.05$).

Degeneration of the vitreous that occurs with ageing may have an impact on visual function. This degeneration, however, is a part of the normal ageing process. Changes in vitreous structure observed in our patients were associated with the liquefaction of its gel-like structure (synchisis). Such changes were more pronounced in the vitreous core. It is known that there is a significant increase in the liquid volume of human vitreous with age, and this is associated with conformational changes in collagen due to formation of new covalent cross-links between the peptides. In our patients we observed bundles of collagen fibrils which looked like confluent opacities in the vitreous detectable with slit lamp

biomicroscopy. These structures can cause clinically significant optical disturbances. It is postulated that vitreous degeneration is associated with liquefaction of gel-like hyaluronic acid, which further promotes aggregation of the collagen fibrils that are no longer separated by a network of gel hyaluronan [7]. These changes normally do not involve the surrounding tissues, including the retina.

It is, however, important to remember that posterior vitreous detachment (PVD) is one of the vitreous pathologies which may result in vitreomacular traction, especially around the fovea, and if there is an attachment of vitreous and the internal limiting membrane. Also shrinkage of the posterior hyaloid membrane may lead to various forms of retinopathy, including macular oedema. This is often seen in eyes with diabetic retinopathy.

Moreover, perifoveal vitreous detachment detected on OCT or B-mode ultrasonography is often considered the primary pathogenic event in idiopathic macular hole formation [8].

Therefore, the potential benefit from using VitroCap® should not be underestimated, as it extends from improving signs of vitreous degeneration to potentially preventing retinal pathology.

Conclusion

1. Administration of VitroCap®, 1 capsule daily for 3 months, leads to significant improvement or stabilisation of subjective self-reported quality of vision in patients with vitreous degeneration.
2. VitroCap® does not have any negative effects on the function of the visual system.
3. To expand this research, it is necessary to conduct a prospective long-term clinical trial of VitroCap® in different groups of patients such as those with isolated vitreous pathology, those with high risk of macular hole and epiretinal membranes in both eyes or patients at risk of nonproliferative diabetic retinopathy progressing to the proliferative form, etc.

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