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Tadalafil 5 Mg/Daily in the Treatment of Vision Impairment, A Single Case Study: Optic Nerve and Hsp70 Up-Regulation as a New Medical Hypothesis for Vision Improvement

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Research Article

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Abstract

Introduction: The use of tadalafil (daily 5 mg) has proved efficient in treating depression in patients with erectile dysfunction based on its ability to upregulate the expression of HSP70. We previously showed its efficacy in treating prediabetes, and cerebral palsy.

Study objectives: The main objective of the present study is to introduce the efficacy of using tadalafil (5 mg daily) in treating vision impairment as a new medical hypothesis.

Methods: A man 56 years with type 2 diabetes and hypertension has suffered from vision impairment since years. He was seeking for non-conventional therapeutic options to restore or reverse vision impairment. The patient was advised to use tadalafil (5 mg/day) for 1 month.

Results: Following one month of treatment, the patient reported that his vision impairment was reversed to a high level.

Conclusion: The use of tadalafil (5 mg/day) is a novel therapeutic approach for the treatment of vision impairment through possible up-regulation of HSP70.

Keywords: Vision; Impairment; Tadalafil; HSP70; Up-Regulation

Introduction

Vision impairment is classified into two groups, distance and near vision impairment. Distant vision impairment varies in its severity from mild to blindness, while near vision impairment displays near visual acuity as worse than N6 or M.08 with current correction [1].

From a medical point of view, vision impairment is very important because of its high prevalence as it has been reported that about one billion people suffer of vision impairment globally. For those people, vision impairment can be preventable or to be treated. Vision impairment affects people due to different reasons including: an untreated refractive error (123.7 million), cataracts (65.2 million), glaucoma (6.9 million), corneal opacity (4.2 million), diabetic retinopathy (3 million), trachoma (2 million), as well as near vision impairment caused by untreated presbyopia (826 million) [2].

Vision impairment is considered a great health problem for people who in the middle-aged and elderly adults around

the world and is associated with a reduced quality of life and an increased risk of falls and deaths [3,4]. It is estimated that 36 million people were blind and 217 million people had moderate to severe vision impairment globally in 2015 [2].

It has been reported that in China, the prevalence of vision impairment is high among patients with diabetes type 2, and the most prevalent cause is attributed to retinopathy. However, the most known causes of vision impairment are uncorrected refractive alterations (43%), cataracts (33%) and glaucoma (2%) [5].

Therapeutic options for vision impairment are mainly conservative including the correction vision refractive conditions, eye-glasses, eye drops, and in some cases surgical options [6]. According to Wooltorton, [7] phosphodiesterase type 5 (PDE5) inhibitors is a family of compounds such as sildenafil (Viagra), tadalafil (Cialis) and vardenafil (Levitra). These compounds are used in treating erectile dysfunction and may be associated with minor vision impairment in less than 10% of patients [8]. Some reports showed that some users of sildenafil developed sudden, severe visual loss, a condition known as nonarteritic ischemic optic neuropathy [7].

Study Objective

The main objective of the present study was to introduce the efficacy of using tadalafil (5 mg daily) in treating vision impairment as a new medical hypothesis based on possible up-regulation of HSP70 as a protective mode.

Case Study

A male (56 years) with diabetes type 2 and hypertension, the onset of hypertension appeared firstly, then followed by diabetes 7 years later. Hypertension level was approximately 135/85 mm Hg. The following medications were prescribed: valsartan 160 mg with hydrochlorothiazide 12.5 mg, atorvastatin 20 mg, 1 per day, and aspirin 100 mg, 1 per day. For diabetes, the following treatments were prescribed: metformin 850 mg, 3 times daily and glimeryl 4 mg, 1 per day. Fasting blood sugar was 230 mg/dl, and the level of Hba1c level was 8.6%

He developed vision impairment that impacted the quality of his life. He cannot read well, particularly small letters, or numbers. His driving ability was also impacted. Due to the consideration that the nature of his work depends mainly on visual issues using computer and smart phone, he searched for other therapeutic options, rather than conventional treating methods such as eye-glasses, eye drops, or surgery. He was advised to use tadalafil 5mg/day for 30 days.

Results

The patient was surprised that there was a great improvement in his vision. Various aspects of his vision impairment were largely improved including:

- Good reading ability of small lines and fonts without being tired. This feature was very difficult to overcome before initiating tadalafil treatment.
- No need to use eye-glasses.
- Sitting and working for long time using his computer without the sensation of eye-burning as experienced before.
- No more eye itching.

Discussion

We have previously shown that the diabetes is associated with two distinguished features in an animal model in which brain of diabetic rats significantly ($p<0.001$) down-regulated the expression of heat shock protein70 (HSP70) in the white matter of diabetic brain compared with control group. The second feature was the significant up-regulation of inducible nitric oxide synthase (iNOS) in white matter of the brain of diabetic rats compared with that of the control group ($p<0.001$) [9]. These features were shown in the whole brain sections including optic nerve. We have recently reported that prediabetes can be reversed using tadalafil (5 mg daily) [10]. According to these considerations, it is plausible to explain the benefits of using tadalafil 5 mg/day in treating vision impairment.

Previous reports have shown that vision impairment is associated with the use of sildenafil [7]. These results can be explained by taking into consideration that either high concentration was used in treating erectile dysfunction which increased the circulation resulting in vision impairment. Also, the increased up-regulation of iNOS worsens the outcome of diabetes [9]. Furthermore, the use of tadalafil has been reported to have antioxidant activities in blood and tissues [11-14]. Other benefits of using tadalafil 5 mg daily include increasing some regional cerebral blood flow (CBF) and improving of the cognitive function among patients who have erectile dysfunction (ED) [15]. In another study, Barroso, et al. [16] reported that there was an influence of using a chronic tadalafil treatment in cognitive function of Alzheimer Disease (AD). These studies indicated that chronic treatment of tadalafil 5 mg/day is beneficial [17,18].

Conclusion

The use of tadalafil 5 mg/day for vision impairment merits further studies.

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