

The Use of Citicoline in Ophthalmology: An Educational Article

Aamir Al-Mosawi¹

¹ Advisor Doctor and Expert Trainer, The National Center of Training and Development, Iraqi Ministry of Health, Baghdad, Iraq

Correspondence: Aamir Al-Mosawi, Advisor Doctor and Expert Trainer, The National Center of Training and Development, Iraqi Ministry of Health, Baghdad, Iraq.

doi:10.56397/JIMR/2023.04.02

Abstract

Objective: Citicoline is a safe form of the choline has been increasingly grouped with the water soluble B vitamins. It has been increasingly used with noticeable benefits in the treatment of several pediatric and neuro-psychiatric disorders including, cerebral palsy, cognitive impairment, autism disorders, Rett syndrome, and kernicterus. The aim of this paper is to provide an overview of citicoline research progress relevant to the field of ophthalmology. **Conclusion:** Citicoline is a safe agent that has the potential to have promising therapeutic applications in a variety of ophthalmological disorders including amblyopia, glaucoma, non-arteritic ischemic optic neuropathy, and diabetic retinopathy.

Keywords: Citicoline, ophthalmology, educational article

1. Introduction

Citicoline is a safe form of the choline has been increasingly grouped with the water soluble B vitamins. It has been increasingly used with noticeable benefits in the treatment of several pediatric and neuro-psychiatric disorders including, cerebral palsy, cognitive impairment, autism disorders, Rett syndrome, and kernicterus (Al-Mosawi AJ., 2019). The aim of this paper is to provide an overview of citicoline research progress relevant to the field of ophthalmology.

Campos et al (1995) reported a placebo controlled study which was started in 1991 and included 50 patients with amblyopia treated with intramuscular citicoline 1000 mg per day for 15 days. The patients have not been treated before with occlusion or with other of anti-amblyopic treatment. Treatment was associated with marked improvement in visual acuity for the amblyopic and the non- amblyopic eye in 46 of the 50 patients (92%). The behavior was different for normal and amblyopic eyes. Treatment was not associated with side effects (Campos EC, Schiavi C, Benedetti P, Bolzani R, & Porciatti V., 1995).

Parisi et al (1999) from Italy reported a placebo study which included 40 patients with open-angle glaucoma. 25 patients were treated with intramuscular citicoline 1000 mg daily for 2 months days. The 15 placebo patients received physiologic solution. The study showed that citicoline can improve retinal and visual pathway function in patients with glaucoma (Parisi V, Manni G, Colacino G, & Bucci MG., 1999).

Parisi (2005) reported a placebo controlled study which included 30 patients with glaucoma. 15 patients were treated with intramuscular citicoline 1 g daily for 2 months, and 15 patients served as placebo group. The study showed that citicoline treatment was associated with marked improvement of retinal and cortical bioelectrical responses (Parisi V., 2005).

Parisi (2008) reported a placebo controlled study which included 26 patients non-arteritic ischaemic optic neuropathy. 14 patients were treated with oral citicoline 1600 mg daily for two months, and twelve patients served as the placebo group. Oral citicoline treatment was associated with improved pattern-electroretinogram,

visual evoked potentials and visual acuity (Parisi V, Coppola G, Ziccardi L, Gallinaro G, & Falsini B., 2008).

Ottobelli (2013) from Italy reported the use of oral citicoline solution for 24 months in 41 patients with progressive glaucoma. Treatment was associated with substantial retardation of the disease progression (Ottobelli L, Manni GL, Centofanti M, Iester M, Alleva F, & Rossetti L., 2013).

Pawar et al (2014) from India reported a controlled study which showed that the use of citicoline in addition to patching in the treatment of children with amblyopia aged 4-13 years was associated with a beneficial effect. In this study, the use of citicoline for more than five months up to one year was associated a considerable improvement in visual acuity (Pawar PV, Mumbare SS, Patil MS, & Ramakrishnan S., 2014).

Parisi et al (2015) from Italy reported the use of citicoline eye drops to improve retinal function and visual pathways neural conduction in patients with open angle glaucoma. The use of citicoline eye drops was associated with improvement in retinal bioelectrical responses and bioelectrical activity of the visual cortex (Parisi V, Centofanti M, Ziccardi L, Tanga L, Michelessi M, Roberti G, & Manni G., 2015).

Mao and colleagues (2016) reported an experimental study which showed that citicoline can help in retarding myopia progression in guinea pigs (Mao J, Liu S & Fu C., 2016).

Cinar et al (2019) reported a controlled study which showed that the use of citicoline eye drops three times daily for one month after LASIK was associated with a beneficial effect on the recovery of corneal sensitivity suggesting that citicoline has an important role in speeding up corneal re-innervation (Cinar E, Yuce B, Aslan F, & Erbakan G., 2019).

Parravano et al (2020) from Italy reported that the use of citicoline plus vitamin B₁₂ eye drops for three years in patients with type 1 diabetes who had mild diabetic retinopathy was associated with reduction or stabilization of rate of neuroretinal degeneration, functional impairment, and microvascular damage (Parravano M, Scarinci F, Parisi V, Giorno P, Giannini D, Oddone F, & Varano M., 2020).

Rossetti et al (2020) from Italy reported a placebo-controlled, multicenter 3-year trial to study the effect of adding citicoline eye drops to intraocular pressure-lowering treatment on the progression of mild to moderate open-angle glaucoma. The study showed that citicoline eye drops had a beneficial effect on the progression of glaucoma (Rossetti L, Iester M, Tranchina L, Ottobelli L, Coco G, Calcatelli E, Ancona C, Cirafici P, & Manni G., 2020).

Fogagnolo et al (2020) from Italy reported a placebo controlled study which included 30 patients with diabetic neuropathy. Twenty patients were treated with citicoline plus vitamin B₁₂ eye drops 3 times a day for one and half year, while ten patients served as the placebo group. Treatment was associated with improved morphology and corneal nerves function suggesting that citicoline has a regenerative effect on the corneal nerves (Fogagnolo P, Melardi E, Tranchina L, & Rossetti L., 2020).

Parisi et al (2021) from Italy reported a placebo controlled study which showed that the use of citicoline plus vitamin B₁₂ eye drops in diabetic patients (Type-1) who had mild non-proliferative diabetic retinopathy for three years was associated with improvement in macular bioelectrical responses on mfERG recordings (Parisi V, Ziccardi L, Barbano L, Giorno P, Varano M, & Parravano M., 2021).

2. Conclusion

Citicoline is a safe agent that has the potential to have promising therapeutic applications in a variety of ophthalmological disorders including amblyopia, glaucoma, non-arteritic ischemic optic neuropathy, and diabetic retinopathy.

Conflict of Interest

None.

References

- Al-Mosawi AJ., (2019). *Citicoline research progress*, 1st ed., Saarbrücken; LAP Lambert Academic Publishing, ISBN: 978-620-0-11372-6.
- Al-Mosawi AJ., (2019). The Use of Citicoline in Pediatric Neurology and Pediatric Psychiatry. *Austin Pediatrics*, 6(1), 1071-1072.
- Al-Mosawi AJ., (2019, August 6). The novel use of cerebrolysin and citicoline in the treatment of kernicterus. *Online Journal of Neurology and Brain Disorders*, 3(1), 208-212. Doi: 10.32474/OJNBD.2019.03.000151. ISSN: 2637-6628.
- Al-Mosawi AJ., (2019, January). The use of cerebrolysin and citicoline in autism and Asperger syndrome. *Journal of Bio Innovation*, 8(1), 99-108, e-ISSN 2277-8330.

- Al-Mosawi AJ., (2019, March 27). New therapies for the treatment of spastic cerebral palsy. *Medical Journal of Clinical Trials & Case Studies*, 3(2), 1-9. Doi: 10.23880/mjccs-16000209, ISSN: 2578-4838.
- Al-Mosawi AJ., (2019, May). New therapies for Rett syndrome. *Journal of Bio Innovation*, 8(3), 301-307, e-ISSN 2277-8330.
- Campos EC, Schiavi C, Benedetti P, Bolzani R, Porciatti V., (1995, May). Effect of citicoline on visual acuity in amblyopia: preliminary results. *Graefes Arch Clin Exp Ophthalmol*, 233(5), 307-12. Doi: 10.1007/BF00177654.
- Cinar E, Yuce B, Aslan F, Erbakan G., (2019, December). Neuroprotective effect of citicoline eye drops on corneal sensitivity after LASIK. *J Refract Surg*, 35(12), 764-770. Doi: 10.3928/1081597X-20191021-01.
- Fogagnolo P, Melardi E, Tranchina L, Rossetti L., (2020, August 1). Topical citicoline and vitamin B12 versus placebo in the treatment of diabetes-related corneal nerve damage: a randomized double-blind controlled trial. *BMC Ophthalmol*, 20(1), 315. Doi: 10.1186/s12886-020-01584-w.
- Mao J, Liu S, Fu C., (2016, June). Citicoline retards myopia progression following form deprivation in guinea pigs. *Exp Biol Med (Maywood)*, 241(11), 1258-63. Doi: 10.1177/1535370216638773.
- Ottobelli L, Manni GL, Centofanti M, Iester M, Alleva F, Rossetti L., (2013). Citicoline oral solution in glaucoma: is there a role in slowing disease progression? *Ophthalmologica*, 229(4), 219-26. Doi: 10.1159/000350496.
- Parisi V, Centofanti M, Ziccardi L, Tanga L, Michelessi M, Roberti G, Manni G., (2015, August). Treatment with citicoline eye drops enhances retinal function and neural conduction along the visual pathways in open angle glaucoma. *Graefes Arch Clin Exp Ophthalmol*, 253(8), 1327-40. Doi: 10.1007/s00417-015-3044-9.
- Parisi V, Coppola G, Ziccardi L, Gallinaro G, Falsini B., (2008, May). Cytidine-5'-diphosphocholine (Citicoline): a pilot study in patients with non-arteritic ischaemic optic neuropathy. *Eur J Neurol*, 15(5), 465-74. Doi: 10.1111/j.1468-1331.2008.02099.x.
- Parisi V, Manni G, Colacino G, Bucci MG., (1999, June). Cytidine-5'-diphosphocholine (citicoline) improves retinal and cortical responses in patients with glaucoma. *Ophthalmology*, 106(6), 1126-34. Doi: 10.1016/S0161-6420(99)90269-5.
- Parisi V, Ziccardi L, Barbano L, Giorno P, Varano M, Parravano M., (2021, July). Citicoline and Vitamin B₁₂ Eye Drops in Type 1 Diabetes: Results of a 36-Month Pilot Study Evaluating Macular Electrophysiological Changes. *Adv Ther*, 38(7), 3924-3936. Doi:10.1007/s12325-021-01771-1.
- Parisi V., (2005, January). Electrophysiological assessment of glaucomatous visual dysfunction during treatment with cytidine-5'-diphosphocholine (citicoline): a study of 8 years of follow-up. *Doc Ophthalmol*, 110(1), 91-102. Doi: 10.1007/s10633-005-7348-7.
- Parravano M, Scarinci F, Parisi V, Giorno P, Giannini D, Oddone F, Varano M., (2020, April). Citicoline and Vitamin B₁₂ Eye Drops in Type 1 Diabetes: Results of a 3-year Pilot Study Evaluating Morpho-Functional Retinal Changes. *Adv Ther*, 37(4), 1646-1663. Doi: 10.1007/s12325-020-01284-3.
- Pawar PV, Mumbare SS, Patil MS, Ramakrishnan S., (2014, February). Effectiveness of the addition of citicoline to patching in the treatment of amblyopia around visual maturity: a randomized controlled trial. *Indian J Ophthalmol*, 62(2), 124-9. Doi:10.4103/0301-4738.128586.
- Rossetti L, Iester M, Tranchina L, Ottobelli L, Coco G, Calcatelli E, Ancona C, Cirafici P, Manni G., (2020, July). Can treatment with citicoline eye drops reduce progression in glaucoma? The results of a randomized placebo-controlled clinical trial. *J Glaucoma*, 29(7), 513-520. Doi:10.1097/IJG.0000000000001565.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).