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## LETTER TO THE EDITOR

# Are optic discs with large physiological cups really healthy?



Dear Editor,

Glaucoma is a chronic progressive neurological optic nerve disorder that causes progressive loss of vision. There are two main factors that lead us to suspect glaucoma during an eye examination. These are high intraocular pressure and large optic disc cupping. With a lack of disease-specific changes on the optic nerve heads with glaucomatous cupping, even experienced clinicians make mistakes in discriminating normal cases from large physiologic cupping (LPC) cases. LPC was described in Lopes et al.'s [1] report as a vertical cup-to-disc ratio  $\geq 0.6$ , normal visual field testing in both eyes, and at least 30 months of follow-up with no evidence of progressive optic neuropathy (assessed using serial color stereophotographs performed at least twice a year, with a maximum interval of 6 months) prior to spectral domain optical coherence tomography (OCT) imaging. Because of these mistakes, 20% of cases are misdiagnosed glaucoma as illustrated in studies and this is not a low rate given the other pathologies leading to cupping [2]. However, if the eye is not healthy, an early diagnosis opportunity of an existing disease can be missed. The most challenging cases for clinicians are individuals with LPC, normal intraocular pressure, and visual field, and there are no existing guidelines that explain what sort of management is to be used for these cases [1].

The retinal nerve fiber layer (RNFL) thickness is crucially important with regard to glaucoma diagnosis and follow-up [3]. Based on glaucomatous destruction, thinning is observed in RNFL. In our study, it was found that the RNFL thickness of the cases with LPC was significantly lower than healthy individuals ( $p = 0.005$ ). Although the cases evaluated in our study were not early glaucoma, this result can

demonstrate that suspected glaucoma patients may have earlier damage (see Table 1).

It is known that the cause of optic disc cupping in glaucoma is a result of ganglion cell loss. It was revealed that the ganglion cell complex thickness measured with OCT in early glaucoma diagnosis was superior in comparison to RNFL [4]. Starting from this point of view, we examined the OCT and ganglion cell complex thickness of the cases with LPC in our study and compared them with healthy individuals. A significant difference was found between the two groups with regards to both values ( $p = 0.003$ ) and it was observed that it was thicker in healthy individuals.

The disc size is a major determinant of other disc parameters such as neuroretinal rim area or cup area or volume and it was reported that the disc area showed significant positive correlation with the rim area, cup area, horizontal cup disc ratio, vertical cup disc ratio, cup disc area ratio, mean cup depth, and maximum cup depth [5]. Conformably, our data showed similar results as the average disc size were statistically larger in the LPC group ( $p = 0.00$ ). The present result demonstrating that cup size had a positive correlation with disc area ( $r = 0.609$ ) and a negative correlation with rim area ( $r = -0.283$ ) has likely been reported in previous studies.

The cup-to-disc ratio seems to be greater than 0.7 in 2% of society [5]. Each of these individuals is faced with either the threat of misdiagnosis or missing the chance of early diagnosis. Although the existing OCT findings have some structural differences, it is not possible to make the sufficient discrimination based on those findings. There is a need for more comprehensive studies to reveal the relationship between the cases with LPC and the normal individuals and early glaucoma cases.

Conflicts of interest: All authors declare no conflicts of interest.

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**Table 1** Comparison between optical coherence tomography parameters in eyes with large physiologic cupping (LPC) and healthy individuals.

	LPC (n = 42)	Control (n = 42)	p
Age (y)	45.1 (± 13.9)	41.6 (± 6.8)	0.152
C/D	0.67 (± 0.06)	0.28 (± 0.04)	0.00
Disc area (mm <sup>2</sup> )	2.39 (± 0.41)	1.89 (± 0.43)	0.00
Rim area (mm <sup>2</sup> )	1.29 (± 0.16)	1.4 (± 0.3)	0.72
Cup volume (mm <sup>3</sup> )	0.435 (± 0.19)	0.121 (± 0.14)	0.00
IOP (mmHg)	13.45 (± 1.7)	13.1 (± 1.5)	0.32
CCT (μm)	533.2	536.4	0.421
Aver. GCC thickness (μm)	82.57 (± 5.7)	85.74 (± 4.2)	0.005
Aver. RNFL thickness (μm)	94.43 (± 8.8)	99.3 (± 7.2)	0.003
Superior RNFL (μm)	117.24 (± 14.5)	124.92 (± 12.9)	0.009
Inferior RNFL (μm)	122.38 (± 15.09)	128.52 (± 13.96)	0.046
Nasal RNFL (μm)	71.5 (± 9.3)	74.66 (± 10.9)	0.144
Temporal RNFL (μm)	66.36 (± 11.9)	66.78 (± 6.9)	0.833

CCT = central corneal thickness; C/D = cup-to-disc ratio; GCC = ganglion cell complex; IOP = intraocular pressure; RNFL = retinal nerve fiber layer.

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