

Incidence of cilioretinal arteries in Chinese Han population

Lei Liu, Li-Min Liu, Lei Chen

Foundation item: Supported by Liaoning S & T Project, China (No.2009225005)

Department of Ophthalmology, the First Affiliated Hospital, China Medical University. Shenyang 110001, Liaoning Province, China

Correspondence to: Lei Chen. Department of Ophthalmology, the First Affiliated Hospital, China Medical University. Shenyang 110001, Liaoning Province, China. leichen51@hotmail.com

Received: 2011-01-11 Accepted: 2011-04-10

Abstract

• **AIM:** To estimate the incidence of cilioretinal arteries among Han population of north China.

• **METHODS:** A cross-sectional sample of subjects aged from 20 years old to 80 years old were selected using a cluster sampling technique from Shenyang of Liaoning Province for Diabetic Eye Disease Study. Eligible subjects were recruited in the Community Health Center which took the stereo fundus photography using 45° Non-Mydriatic Fundus Camera. Data were analyzed by SPSS 14.0.

• **RESULTS:** The incidence of cilioretinal arteries in 5000 eyes of 2500 subjects was determined. One, two or more cilioretinal arteries were present in 876 of all subjects and in 923 of all the eyes. Difference of presence, number and distribution of cilioretinal arteries was observed. During the subjects, the arteries occurred bilaterally in 6.9% and contributed to some portion of the temporal circulation in 78.3% , nasal circulation 14.8% , respectively. Statistical analysis indicated that there was no significant difference in incidence between men and women, left and right eyes ($P > 0.05$).

• **CONCLUSION:** 35.0% persons have the cilioretinal arteries in Han population of north China. Men and women have an equal distribution of cilioretinal arteries.

• **KEYWORDS:** cilioretinal artery; incidence; population

DOI:10.3980/j.issn.2222-3959.2011.03.24

Liu L, Liu LM, Chen L. Incidence of cilioretinal arteries in Chinese Han population. *Int J Ophthalmol* 2011;4(3):323-325

INTRODUCTION

There is a close relationship between many eye diseases and the distribution pattern of retinal blood vessels.

Studies have shown that blockage of some vessels supplied for retinal blood could lead to eye diseases and cilioretinal artery was proved to be one of this kind of vessels^[1-3]. However, the prevalence of this artery varies for individual, in other word, not everyone has the cilioretinal artery. So understanding the incidence of cilioretinal artery may indirectly provide information for the prevalence of cilioretinal artery diseases. The prevalence of one or more cilioretinal arteries has previously been reported to be 49.5% of individuals and 32.1% of eyes, based on a review of stereo fundus photographs and fluorescein angiograms from 1000 subjects^[4]. Another study found the incidence of cilioretinal arteries was 6.9% in Indians^[5]. But to date, the incidence of this anatomical variations has never been invested among Chinese Han population. In this study, we used Non-Mydriatic Fundus Camera to analyze the incidence of cilioretinal artery in Han population of north China.

MATERIALS AND METHODS

Subjects Between 2007 to 2010, 2870 Chinese Han individuals were recruited for the Diabetic Eye Disease Study, including 1353 male and 1517 female with a mean age of 43±8.7 (range 20 to 80) years. Data used in this research were derived from this study. Stereo fundus photography (45° non-mydriatic fundus camera (Conon CR-DGi, Tokyo, Japan)) was used for taking photos. The presence of cataract was an exclusion criterion Only those with a clear view of optic nerves were included in this research. In total, there were 2500 subjects (1230 men, 1270 women) and 5000 eyes brought into this study.

Methods The presence, number, and location of cilioretinal artery were evaluated by two well-trained senior ophthalmologists according to the digital color fundus photographs independently. A cilioretinal artery was defined as a retinal arterial branch noncontiguous with the retina central artery, coursing through a near-180° hook or loop as it emerges from underneath the retinal pigment epithelium at the rim of the optic disc. The location of the cilioretinal artery was identified as temporal or nasal with respect to the center of the optic disc.

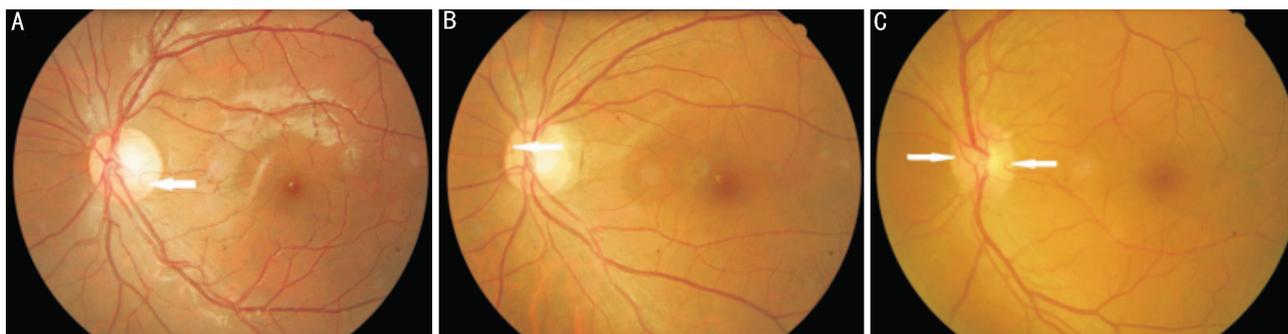


Figure 1 Cilioretinal artery A: Temporal; B: Nasal; C: Bilaterally

RESULTS

The presence of (one, two or more)cilioretinal arteries were 35.0% (95% CI: 23.7%-40.8%) in 876 of all subjects and 18.5% (95% CI: 13.5%-25.6%) in 923 of all the eyes. Of the total number of cilioretinal arteries, 78.3% (95% CI: 70.4%-83.5%) were located temporally (Figure 1A), 14.8% (95% CI: 10.3%-18.6%) were located nasally (Figure 1B) and 6.9% (95% CI: 3.4%-9.8%) were located bilaterally (Figure 1C). The number of individuals with cilioretinol arteries were 421 (34.2%, 95% CI: 29.6%-38.2%) and 455 (35.8% , 95% CI: 31.1% -38.3%)in men and women, respectively. 435 (17.4% , 95% CI: 13.2% -20.9%) cilioretinol arteries were in right eyes and 488 (19.5%, 95% CI: 15.8%-22.8%) in left eyes. No significant difference in incidence between men and women, left and right eye ($P > 0.05$), was observed (Table 1).

DISCUSSION

The cilioretinal artery, which originates from the short posterior ciliary artery and goes through the optic nerve or its neighbor and enters in ocular to participate in the retina circulation, is different from the retina central artery [6]. Many people do not have such a vessel, if it exists, the inner retina is supplied by two vascular systems, cilioretinal artery system and retina central artery system. Both of the arteries are different in size, distribution and issue of position. Given these different characteristics, it could be easily distinguished by the fundus. Non-Mydriatic Fundus Camera is a very useful tool through which extremely sophisticated digital fundus image could be accessed. To date, it is widely used for screening or monitoring of diabetic retinopathy, glaucoma and other serious illnesses [7,8]. In this study, the incidence of cilioretinal artery was 35.0% in all subjects and 18.5% in all the eyes. These data are higher than prior studies based on the direct visualization of the fundus 7%-29.6%. But it is a little lower than the study which is about the prevalence of cilioretinal arteries based on a review of stereo fundus photographs and fluorescein angiograms. This difference may be due to the methods for assessing cilioretinal arteries. Non-Mydriatic Fundus Camera could

	Variation of cilioretinal artery		n(%)
	Yes	No	n
Man	421(34.2)	809(65.8)	1230
Woman	455(35.8)	815(64.2)	1270
Right eye	435(17.4)	2065(82.6)	2500
Left eye	488(19.5)	2012(80.5)	2500

make the assessment more convenient and accurate because it was greater magnifying and much clearer than direct checking fundus, which was difficult to distinguish the retinal artery from the cilioretinal artery when they were staggered. So the lower incidence of the prior studies could be explained by the different assessing means. Due to the same reason with the prior studies, the incidence of temporal cilioretinal arteries was more than that of nasal ones. Temporal retinas vessels are larger than nasal retinas, which require more blood supplying. It may be the reason that previous study also observed that some cases of a cilioretinal artery supplying the entire retina[9]. Cilioretinal arteries are derived directly from the circle of Zinn, which is formed by some small branches from the short posterior ciliary arteries supplying the choroids. It is of clinical relevance that a temporal cilioretinal artery supplying the fovea may spare the fovea in case of central retinal artery occlusion. Therefore, the cilioretinal arteries are important for protecting macular in some retinal blood vessel or any other disease, for example, the high-tension open angle glaucoma which lead to central visual field damaged. Understanding the incidence of cilioretinal artery can predict the blood circulation of macula and inner retina, even though the central vision could be concluded after retinal vascular occlusion. Relatively, cilioretinal artery occlusion can also lead to macular or inner retinal diseases, but compared to this the previous meaning is more important.

Acknowledgements: This study was supported by Liaoning Diabetic Eye Center. Thanks to Yue-Dong Hu, Ning-Ning Liu, Chao Wan, Rui Hua, Yi-Zhou Sun, Jun Chen, Yun

Zhou, Li-Tao Gao, Yuan-Yuan Zhang, Hong Shi, Jin Geng,
and De-Peng Shi *et al.*

REFERENCES

- 1 Chang L, Mruthunjaya P, Rodriguez-Rosa RE. Postoperative cilioretinal artery occlusion in Sturge Weber-associated glaucoma. *Saapos* 2010;14(4):358-360
- 2 Theoulakis PE, Livieratou A, Petropoulos IK, Lepidas J, Brinkmann CK, Katsimpris JM. Cilioretinal artery occlusion combined with central retinal vein occlusion—a report of two cases and review of the literature. *Klin Monbl Augenheilkd* 2010;227(4):302-305
- 3 Gandhi JS, Ziahosseini K. Cilioretinal perfusion in concurrent cilioretinal and central retinal vein occlusions. *Can J Ophthalmol* 2008;43(1):121-122
- 4 Justice J Jr, Lehmann RP. Cilioretinal arteries. A study based on review of stereo fundus photographs and fluorescein angiographic findings. *Arch Ophthalmol* 1976;94(8):1355-1358
- 5 Jain IS, Singh K, Nagpal KC. Vessels at the disc margin (cilioretinal and other simulating cilioretinal vessels). *Indian J Ophthalmol* 1972;20(4):141-144
- 6 Nina C.B.B, Inger C, Kirsten O, Brigit S, Line K, Thorkild I. A, Jesper L, Michael L. Heritability of cilioretinal arteries: a twin study. *IOVS* 2005;46:3850-3853
- 7 Romero P, Sagarra R, Ferrer J, Fernández-Ballart J, Baget M. The incorporation of family physicians in the assessment of diabetic retinopathy by non-mydiatic fundus camera. *Diabetes Res Clin Practise* 2010;88(2):184-188
- 8 Detry-Morel M, Zeyen T, Kestelyn P, Colligon J, Gothal M, Belgian Glaucoma Society. Screening for glaucoma in a general population with the non-mydiatic fundus camera and the frequency doubling perimeter. *Eur J Ophthalmol* 2004;14(5):387-393
- 9 Hegde V, Deokule S, Matthews T. A case of a cilioretinal artery supplying the entire retina. *Clin Anat* 2006;19(7):645-647