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Original Research

Assessment of thickness of choroidal thickness in normal eyes with swept-source optical coherence tomography

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***ABSTRACT*:**
Background: Choroid is the posterior most part of the uveal tissue and has the maximum vascular supply per unit mass in the eye. The present study was conducted to assess thickness of choroidal thickness in normal eyes with swept-source optical coherence tomography. **Materials & Methods:** The present study was conducted on 68 healthy subjects of both genders. Ophthalmic examination include best-corrected visual acuity, slit lamp examination, intraocular pressure measurement using noncontact tonometry, and dilated fundus examination. Axial length measurement was performed using ocular biometry. Refractive error was measured using automated refractometer. The choroidal thickness was measured using SS-OCT according to the standard ETDRS grid divided into different zones based on circles at 1 mm, 3 mm, and 6 mm from the centre of macula, between the Bruch's membrane, and choroido-scleral junction. **Results:** Out of 68 patients, males were 38 and females were 30. The mean thickness (μ) of central subfoveal was 298.1, nasal inner macula was 264.5, nasal outer macula was 245.3, temporal inner macula was 294.5, temporal outer macula was 282.7, superior inner macula was 306.2, superior outer macula was 302.8, inferior inner macula was 299.5 and inferior outer macula was 287.9. **Conclusion:** Authors found that swept-source optical coherence tomography is useful method of measuring subfoveal choroidal thickness.
Key words: Subfoveal choroidal, Swept-source optical coherence tomography, Macule

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INTRODUCTION

Choroid is the posterior most part of the uveal tissue and has the maximum vascular supply per unit mass in the eye. Structurally, it is made up of five layers, of which blood vessels form the major part.[1] Choroid serves important functions such as providing nourishment and oxygen supply to the outer retina, especially photoreceptor cell layer and retinal thermoregulation. It also absorbs excess light and prevents internal reflection of light on account of the presence of melanocytes and also regulates intraocular pressure by modulating the ocular blood flow.[2]

The choroid, with metabolic support of retinal pigment epithelium (RPE), provides nourishment and blood supply to the outer retina, and pre-laminar portion of the optic nerve.[3] Abnormalities of choroid have been a major concern in the pathophysiology of chorio-retinal diseases such as central serous chorioretinopathy (CSC), Vogt-Koyanagi-Harada (VKH) disease, polypoidal choroidal vasculopathy (PCV), age-related macular degeneration (AMD), high myopia, and diabetes mellitus (DM). An advanced, non-invasive and quick method used in structural analysis of choroid is Optical coherence tomography (OCT) which works on the principle of low coherence interferometry.[4] The introduction of enhanced depth imaging optical coherence tomography (EDI-OCT) by Spaide et al choroidal visualization was possible. Swept-source OCT (SS-OCT; DRI-OCT, Topcon Japan) is the latest milestone in retinal and choroidal imaging.[5]

The present study was conducted to assess thickness of choroidal thickness in normal Indian eyes with swept-source optical coherence tomography.

MATERIALS & METHODS

The present study was conducted in the department of Ophthalmology. It comprised of 68 healthy subjects of both genders. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

General data such as name, age, gender etc. was recorded. Patients were examined clinically. Ophthalmic examination include best-corrected visual acuity, slit lamp examination, intraocular pressure measurement using noncontact tonometry, and dilated fundus examination. Axial length measurement was performed using ocular biometry. Refractive error was measured using automated refractometer. The choroidal thickness was measured using SS-OCT according to the standard ETDRS grid divided into different zones based on circles at 1 mm, 3 mm, and 6 mm from the centre of macula, between the Bruch's membrane, and choroido-scleral junction. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 68		
Gender	**Males**	**Females**
Number	38	30

Table I, graph I shows that out of 68 patients, males were 38 and females were 30.

Graph I Distribution of patients

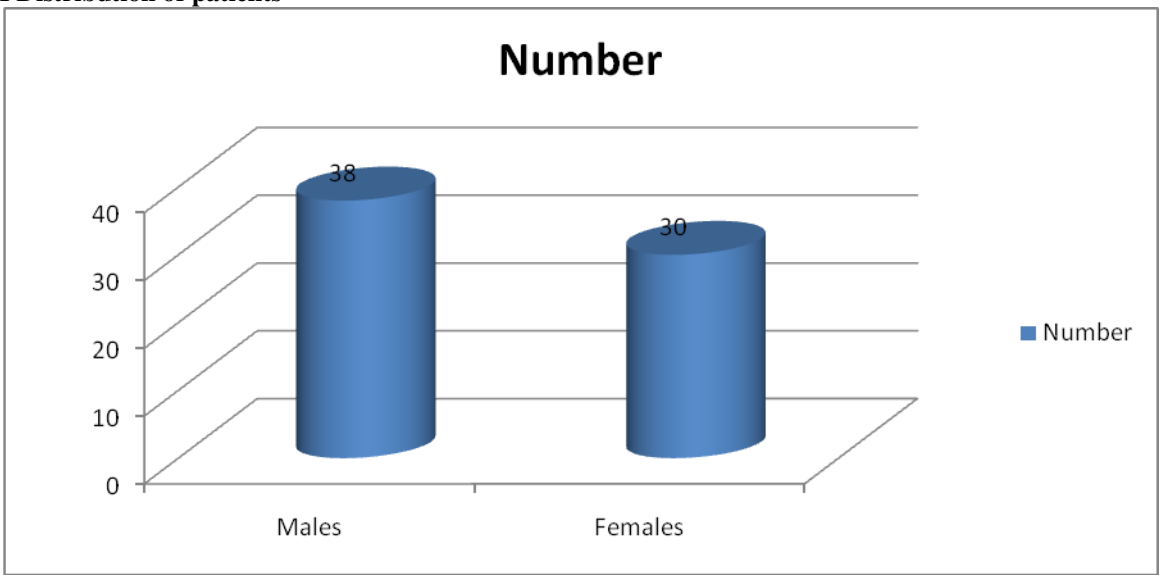
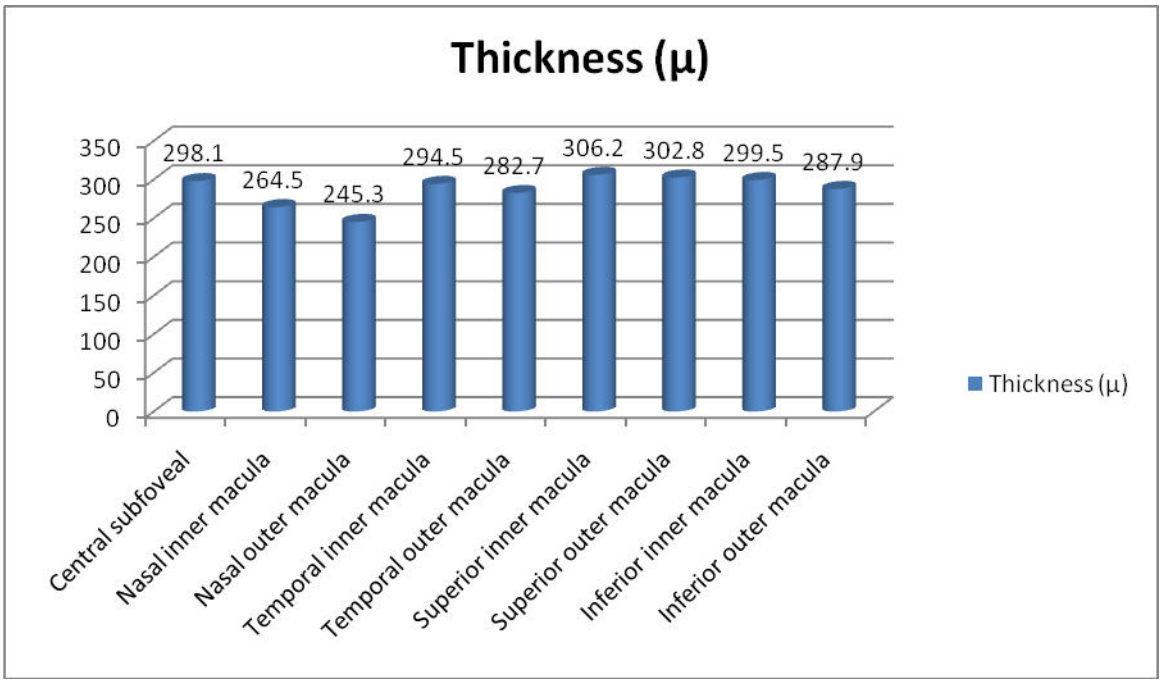


Table II Assessment of choroidal thickness

Parameters	Thickness (µ)
Central subfoveal	298.1
Nasal inner macula	264.5
Nasal outer macula	245.3
Temporal inner macula	294.5
Temporal outer macula	282.7
Superior inner macula	306.2
Superior outer macula	302.8
Inferior inner macula	299.5
Inferior outer macula	287.9

Table II, graph II shows that mean thickness (μ) of central subfoveal was 298.1, nasal inner macula was 264.5, nasal outer macula was 245.3, temporal inner macula was 294.5, temporal outer macula was 282.7, superior inner macula was 306.2, superior outer macula was 302.8, inferior inner macula was 299.5 and inferior outer macula was 287.9.

Graph II Assessment of choroidal thickness



DISCUSSION

With the recent development of recent enhanced depth imaging (EDI), *in-vivo* assessment of choroid has become an area of interest. EDI helps better visualization of choroid, which allows accurate quantitative assessment of the choroid, which was not possible before. Information about the choroidal thickness (CT) could be useful in many clinical situations for decision making regarding the management and monitoring of disease progression.[6] Recent literature has shown the effect of age, sex, axial length (AXL), refractive error, and diurnal variation on the CT. Various studies have reported normal range of CT. However, none of these reports provides range of CT measurements in each decade, which could help to differentiate between diseased or normal choroid in a given patient. Retinal parameters have been reported to vary in various ethnic groups.[7] The present study was conducted to assess thickness of choroidal thickness in normal Indian eyes with swept‑source optical coherence tomography.

In this study, out of 68 patients, males were 38 and females were 30. We found that mean thickness (μ) of central subfoveal was 298.1, nasal inner macula was 264.5, nasal outer macula was 245.3, temporal inner macula was 294.5, temporal outer macula was 282.7, superior inner macula was 306.2, superior outer macula was 302.8, inferior inner macula was 299.5 and inferior outer macula was 287.9.

Adhi et al[8] conducted a study in which two hundred and thirty eight eyes of 119 healthy subjects were examined in terms of axial length, spherical equivalent, and choroidal thickness. Twelve radial line scans were obtained centered on the fovea that was used to calculate choroidal and retinal thickness in 9 early treatment diabetic retinopathy study (ETDRS) zones. The mean age of all the subjects was 28.70 ± 11.28 years; mean axial length was 23.63 ± 1.96 mm, and mean spherical equivalent was − 0.92 ± 3.08 D. The mean subfoveal choroidal thickness was 299.10 ± 131.2 μ and mean foveal thickness was 239.92 ± 48.16 μ. A negative correlation was found between subfoveal choroidal thickness and age and axial length. A statistically significant positive correlation was found between subfoveal choroidal thickness and refractive error.

Because it uses a light of a longer wavelength, it provides a better resolution of choroidal layers and its thickness. Due to several advantages offered by SS OCT over SD OCT (better resolution, simultaneous imaging of vitreous, retina and choroid, longer OCT scans, and penetration through hazy media), many retinal surgeons and centers are shifting to SS OCT. Matsuo et al[9] compared the subfoveal choroidal thickness on two different SDOCT platforms and SS OCT. The authors found that the choroidal thickness was greater when measured with SS OCT and attributed it to the better delineation of choroido sclera junction, especially in eyes with thicker choroid.

Ding et al[10] in their study evaluated the correlation between CT at various locations and age, AXL, spherical equivalent, and macular thickness. Mean age was 42.8 ± 13.6 years.

Mean AXL was 22.84 ± 0.78 mm. Median spherical equivalent was 0.16 ± 0.64 D. Mean central macular thickness was 216.4 ± 30.03 μm. Choroidal was thinnest nasally and thickest subfoveally. On multivariate regression, age was the most significant factor affecting subfoveal CT. Regression analysis showed an approximate decrease in CT of 1.18 μm every year.

CONCLUSION

Authors found that swept‑source optical coherence tomography is useful method of measuring subfoveal choroidal thickness.

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