Non-Strabismic Binocular Vision Anomalies Among Tibetan College Students of Bengaluru.

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Abstract:

Purpose: The effect of race has been reported to influence the vergence and accommodation system. Evidences proven that binocular and accommodative disorders are common than refractive error. Current study aims to evaluate the prevalence of NSBVA among Tibetan college students of Bangalore.Methods: This is a cross-sectional study in which 281 (103 males and 178 females) Tibetan students were included. Written consent was taken from the participants those who are willing to participate based on the inclusion and exclusion criteria of this study. Initial examination was done which includes visual acuity, refraction, torchlight examination and sensory tests. The minimum test battery was used for binocular vision assessment which includes NPC with penlight and red filter, phoria test for distance and near and monocular accommodative facility. The subjects were diagnosed based on the details given by Scheiman and Wick. The COVD-QOL questionnaire was filled by the subjects and was calculated for symptom score. Results: Out of 281 Tibetan college students included in the study 103 (36.6%) were males and 178 (63.4%) were females. A total of 284 students were evaluated, 3 were excluded since they are found to have suppression after performing Worth 4 dot test. There is a moderate prevalence of NSBVA found among Tibetan students which was found to be 38.07% and the most prevalent condition was accommodation excess (15%), following that was convergence insufficiency (11%). Prevalence of other anomalies like convergence excess and combination of accommodation excess with convergence insufficiency was 4% and 2.49% respectively. Based on the symptomatic score A total of 61 students (21.7%) students were symptomatic and 220 students were asymptomatic (78.29%). Conclusion: The study shows a significant prevalence of NSBVA among Tibetan college students. Early detection of NSBVA is crucial since these anomalies hampers activities that requires eye co-ordination. CTRI Registration: CTRI/2022/03/040824; keywords: NSBVA; Tibetan; Prevalence; COVD-QOL; Symptomatic score.

Introduction

Scientist used to classify people racially with skin color, hair texture, facial features, and to some extent bodily structure. It must be understood in terms of evolutionary processes and the long-range adaptation of human groups to differing environments. Other features may simply reflect accidental mutations or functionally neutral changes in the genetic code.[1] It is well known that the frequencies of alleles vary over geographical space in humans. In traditional taxonomic studies, the boundaries were defined by morphological differences, but now these boundaries are typically defined in terms of genetic differences that can be scored in an objective fashion in all species. Genetic physical features characterize an ethnic group and are classified based on various characteristics such as facial characteristics, including the appearance and form of the exterior eye.[2]

There are several factors that influence corneal parameters, including ethnicity (social groups who have the same race), age, sex, race, axial length, and refractive status of the eye, in addition to certain anthropometric factors. Genetic physical features characterize an ethnic group and are classified based on various characteristics such as facial characteristics, including the appearance and form of the exterior eye.

People are widely classified into three major ethnic groups: Caucasoid, Negroid, and Mongoloid. The Caucasoids are the major inhabitants of Europe and North America.

In general, they have large double eyelids, exposed tear troughs, and light eyes. Negroids are the principal inhabitants of Africa. Their facial features involve large eyes and dark irises with exposed tear troughs. Finally, Mongoloids mainly live in Asia. Their principal facial features include narrow eyes, usually with dark irises and epicanthic folds.3

Facial feature of a typical Tibetan compared with another race. There are few variations including changes in interpupillary distance, palpebral fissure height and also the canthal folds. It is also known that living at altitudes above 3000 m has biological effects on humans. The unique plateau environment comprises low air pressure, reduced oxygen, dryness, cold weather, sunshine and exposure time, intense solar infrared light, intense ultra-violet radiation, and long winters, which all have effects on the human body, in general, and on the eyes in particular.4

The fundamental part of a child's education involves learning through reading. Reading involves both accommodative and vergence mechanism and an imbalance between the sensory-motor integrative functions results in nonstrabismic accommodative and/or binocular vision anomalies. The state of simultaneous vision which was accomplished by the coordinated use of two eyes with the goal that separate and slightly different images emerging in each eye were appreciated as a single image by the process of fusion was expressed as binocular single vision. 5 Normal binocular vision requires accurate alignment of the eye and binocular mechanism for accommodation, vergence, sensory and motor function. 6

Uses of visual devices increased dramatically among college students. With additional factors like, poor lighting, glare, screen brightness, uncorrected refractive error and improper workstation setup extended use of visual devices results in different accommodative, vergence dysfunction in a large percentage of college student's population. This group of disorders is known as NSBVA.6 NSBVA were considered as vision anomalies which affect clarity, binocularity, impair the comfort and effectiveness of visual performance when near work (Reading, Writing and Computer-based work) is performed. NSBVA is mainly categorized in two groups, which are accommodative anomalies and vergence anomalies. NSBVA is categorized into two group, which are accommodation anomalies and vergence anomalies. 7Increase in the use of computer and cell phones, the near and intermediate visual tasks have increased dramatically.8 Evidences proven that binocular and accommodative disorders are common than refractive error (Scheiman M,et al 1996).The effect of race has been reported to influence the vergence and accommodation system. Hence, in current study, investigation of the status of binocular vision status among Tibetan students has been done which has not been reported previously.

Materials and Methods:

This is a cross-sectional study in which the data was collected from different institutes with Tibetan student population. Those are Dalai Lama Institute for Higher Education Bangalore, Men-Tsee-Khang (Sowa Rigpa) College Bangalore and Tibetan youth hostel Bangalore from the year 2020-2022. The procedures were compiled considering the ethical guidelines of institutional ethics committee. The updated 2013 Declaration of Helsinki was also followed while conducting the study. Before commencing the permission was taken from the ethics committee of the Sankara Eye Hospital, Bengaluru. Also, study was registered in CTRI : CTRI/2022/03/040824.Permission was taken from the college authorities as well the concerned authorities of respective

community from where we collected the data. As per the sample size calculation, we screened 281 participants throughout the study.

Every participant was informed about the purpose and procedure of the study and written consent was taken from each student prior to enrolling them into the subject. The consent form was given to the individual participant and a brief history was taken for both systemic and ocular health. The study setting was maintained to the clinical requirement for binocular vision work up.

The order of examination for all subjects were started initially with visual acuity for distance and near after which objective and subjective refraction was done. Subjects with their best corrected visual acuity were evaluated for their binocular vision. Sensory status of each subject was determined with the help of worth's 4 dot test for distance and near along with color vision using Ishihara chart and stereopsis using TNO.

Then, the subject was examined for their motor test which was evaluated through extraocular motility test, cover test. After these tests minimum test battery was performed which includes modified Thorrington test (horizontal and vertical), near point of convergence using penlight and filter and monocular accommodative facility

Statstical Analysis

The descriptive statistical analysis was done by using the statistical tool Microsoft excel.

Results

Out of 281 Tibetan college students included in the study 103 (36.6%) were males and 178 (63.4%) were females. A total of 284 participants were evaluated, 3 were excluded since they are found to have suppression after performing Worth 4 dot test.

There is a moderate prevalence of NSBVA found among Tibetan students which was found to be 38.07%% and the most prevalent condition was accommodation excess (15%), following that was convergence insufficiency (11%). Prevalence of other anomalies like convergence excess and combination of accommodation excess with convergence insufficiency was 4% and 2.49% respectively(figure1).

Figure 1: Diagnosis of the students with non-strabismic binocular vision anomalies
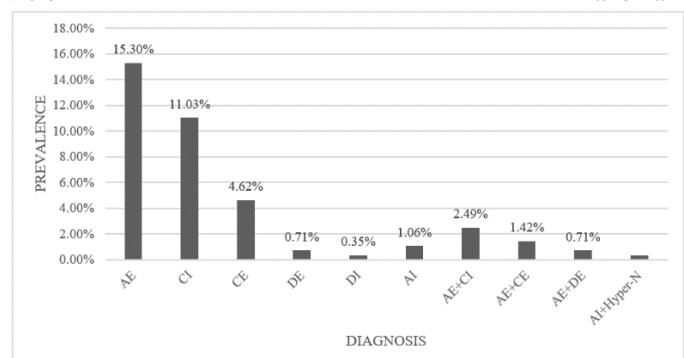
AE: Accommodative excess; CI: Convergence Insufficiency; CE: Convergence excess; DE: Divergence Excess; DI: Divergence Insufficiency; AI: Accommodative Insufficiency;
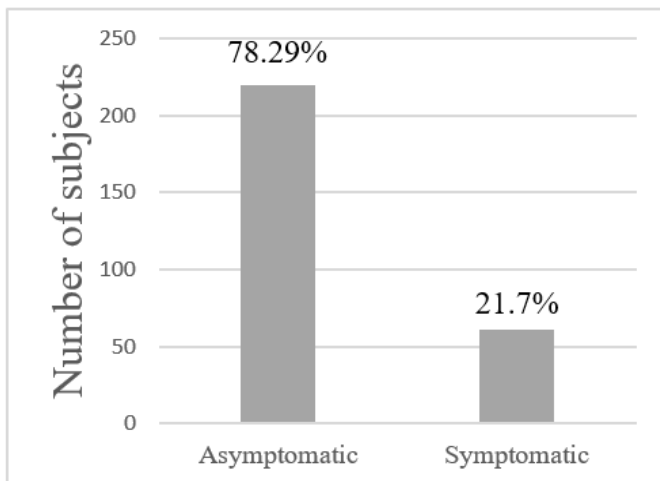
Among NSBVA participants, 73.64% were asymptomatic and 26.35% were symptomatic (Figure3).

Figure 3: Symptomatic and asymptomatic based on the Questionnaire among NSBVA subjects

Among the different Age groups, in the age group of 18-21 years, total of 174 students participated. Among that 43.01% had NSBVA. In the age group of 22-25 years, total of 107 students participated. Among them 50.04% had NSBVA.

Based on the COVD-QOL symptomatic score questionnaire, among total 281 participants, 61 (21.7%) participants were symptomatic and 220 participants were asymptomatic (78.29%)(Figure2).

Figure 2: Symptomatic and asymptomatic based on the Questionnaire among the participants

Results

A total of 65 patients with tunneled catheters assigned to the chronic hemodialysis program were found with an average age of 65.6 years with a standard deviation of 7.37, with a predominance of males in 60% of cases with a mortality of 60 & . Of which, during the year 2021, seven met the definition of suspects, of which one of the cases was ruled out for presenting thrombophilia related to protein S deficiency and who previously took anticoagulants. When evaluating the electronic file, another patient was discarded for not having the radiological studies as they were still pending. Therefore, in the end, only 5 cases were considered in 64 patients with tunneled catheters (7.8%), as shown in Table 1.
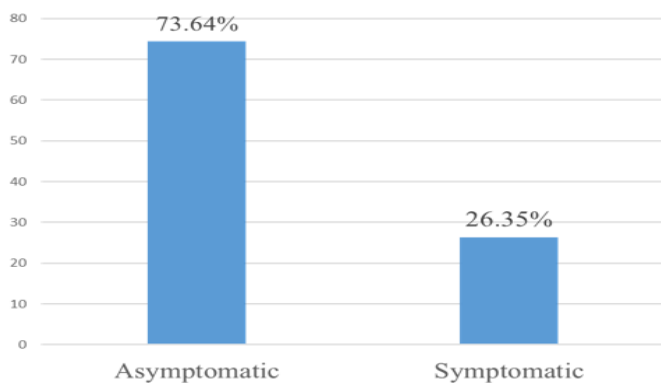
Discussion

In the current study, 281 Tibetan college students were included in which 103 students were males and 178 were females. The age group of 18 to 25 years with mean age group of 21.5 + 2.44 years.

The prevalence of non-strabismic binocular vision anomalies was 38.07%. Study done by Tiwari RP, et al study done in India in 2022 reported that prevalence of NSBVA was found 47% among medical students. 5

In the study of Esteban Porcar et.al they have reported Accommodative Excess was most prevalent and convergence insufficiency.6 The current study report also supports this statement with the accommodation excess being most prevalent 15.3 percent followed by convergence insufficiency 11.03 percent. This shows that accommodation and convergence anomalies are commonly observed NSBVA among such students with high near task demands. In the current study, 50.04% students of age group 22-25 years had NSBVA> 18–21-year age group. Magdalene D et al., in a similar study held in North-east India among patients with asthenopic symptoms, found prevalence of NSBVA as 69.35% in 10-20 years age group, 67.35% n 21-30 years age group and 50% in 31-40 years age group.7 Present study shows that, as age increases the NSBVA might increase as near task increases.

Among 281 students, 21.7% students were symptomatic.

The simplified version of COVD-QOL questionnaire(14-items) performs adequately as a vision screening tool for children in special education classes. Lower score in higher grade children was explained as a result of adaptation to visual symptom which leads to change in symptom perception by age in a group of children without learning disabilities.8

Conclusion

The NSBVA status among Tibetan college students was 38.07%. Based on the COVD-QOL 14 questionnaire, 78.29% of the subjects were asymptomatic and 21.7% were symptomatic. Early detection of NSBVA is crucial since these anomalies hampers activities that requires eye co-ordination. Hence timely detection and proper management of the NSBVA will allow the students to perform at their full capabilities.

Conflict Of Intrest:
There is no Conflict of Interest.

Source Of Support:
This study didn't receive any funding or support.

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