Original Research Paper

Volume - 15 | Issue - 06 | June - 2025 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Ophthalomology

A CROSS-SECTIONAL STUDY TO ASSESS STEREOPSIS AMONG UNDERGRADUATE STUDENTS IN A MEDICAL COLLEGE.

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ABSTRACT **Background:** Stereopsis, the perception of depth using binocular vision, is critical for spatial orientation and precision, especially in surgical disciplines. **Objectives:** To assess the range of stereopsis among undergraduate medical students and evaluate its implications for postgraduate career guidance. **Methods:** A cross-sectional observational study was conducted on 502 undergraduate medical students at SSIMS and RC, Davangere. Stereoacuity was evaluated using the Titmus Fly Test. Based on test results, participants were categorized into normal (<40 arc sec), borderline (40–120 arc sec), and reduced (>120 arc sec) stereopsis groups. **Results:** Out of 502 students, 463 (92.2%) demonstrated normal stereopsis, 36 (7.2%) had borderline stereopsis, and 3 (0.6%) exhibited reduced stereopsis. **Interpretation & Conclusions:** Most students had normal stereoacuity. A minority showed impaired stereopsis, which could impact their suitability for visually demanding specialties. Early detection may support more informed career decisions in medical education.

KEYWORDS : Stereopsis; Depth Perception; Binocular Vision; Titmus Fly Test; Medical Students

1. INTRODUCTION

Stereopsis is a form of depth perception arising from binocular disparity—the slight difference in images received by each eye due to their horizontal separation. It is a key component of visual processing that enables precise spatial judgment and coordination. In clinical practice, particularly in fields requiring microsurgical precision such as ophthalmology, neurosurgery, and otolaryngology, stereopsis is indispensable for accurate manipulation of surgical tools in three-dimensional space.

Despite its importance, routine assessment of stereopsis is rarely emphasized during medical training. Detecting deficits early can help guide students toward specialties that align with their visual strengths. This study aimed to evaluate the distribution of stereopsis ability among undergraduate medical students and consider its implications for specialty choice.

2. Objective

1. To assess the range of stereopsis in medical students
2. Guide the screened undergraduate students in choosing appropriate postgraduate specialties according to their level of stereopsis.

3. MATERIALS AND METHODS

3.1 Study Design and Setting

A cross-sectional observational study was conducted at SSIMS and RC, Davangere, India.

3.2 Participants

A total of 502 undergraduate medical students were enrolled using convenience sampling.

3.3 Procedure

Each participant underwent the Titmus Fly Test, a standard test for assessing stereoacuity. The test was administered in a well-lit environment, and students were asked to wear polarized glasses while viewing the test book. The test is divided into three sections. The first section features a large housefly, designed to test for gross stereopsis using large disparities. The second section includes a series of circle patterns, each consisting of four circles, where one circle in each set has a graded disparity. The third section displays rows of shapes—specifically, three rows, with one shape in each row exhibiting a graded disparity to assess finer levels of depth perception.[1]

3.4 Classification Criteria

Stereoacuity was classified into three categories based on arc seconds:

- Normal: <40 arc seconds
- Borderline: 40–120 arc seconds
- Reduced: >120 arc seconds

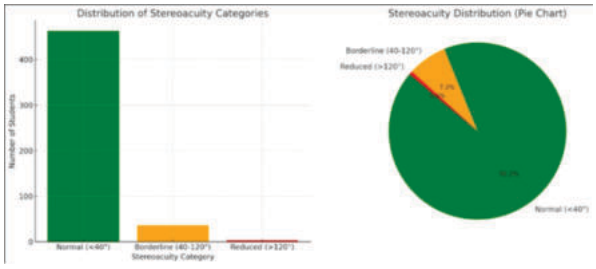
3.5 Data Analysis

Data were tabulated and analyzed using descriptive statistics. The percentage distribution of stereoacuity levels was calculated.

4. RESULTS

Out of 502 students assessed:-

a) Normal stereopsis (<40 arc sec): 463 students (92.2%)
b) Borderline stereopsis (40–120 arc sec): 36 students (7.2%)
c) Reduced stereopsis (>120 arc sec): 3 students (0.6%)



These findings indicate a high prevalence of normal stereopsis among medical students. However, the presence of borderline and reduced stereopsis in a minority highlights the need for early identification.

5. DISCUSSION

This study aimed to assess stereoacuity among medical undergraduates and highlight its relevance in guiding specialty choices. With 92.2% of students exhibiting normal stereopsis and 7.8% showing borderline or reduced performance, the findings underscore both the prevalence of effective depth perception and the need for early detection of deficits.

Stereopsis and Clinical Performance

Depth perception is crucial in performing complex tasks that require spatial judgment, particularly in minimally invasive and microsurgical techniques. In specialties such as ophthalmology, neurosurgery, and ENT, surgeons must operate in confined spaces with minimal visual cues apart from stereopsis. Poor stereoacuity has been associated with increased error rates and prolonged task completion times in simulation-based surgical training[2]. Furthermore, in a study by Nguyen et al. (2014), surgeons with impaired stereopsis performed significantly worse in laparoscopic surgery simulations than those with normal stereopsis[3].

Comparison with Other Studies

The findings of our study are consistent with previous research. For example, Sharma et al. (2017) conducted a similar cross-sectional study among 300 medical students in northern India and found that 91% had normal stereopsis, 7% had borderline values, and 2% had reduced stereopsis[4]. A UK-based study by Cufflin et al. (2019) on medical students showed a comparable trend, with 93% demonstrating stereoacuity under 40 arc seconds[5].

However, our lower rate of reduced stereopsis (0.6%) compared to Sharma et al.'s 2% may reflect differences in screening conditions, student demographics, or exposure to digital screens—a known contributor to visual fatigue and stereopsis degradation[6].

Stereopsis as a Criterion for Specialty Selection

Several professional training programs now consider stereopsis in selection and training. For instance, the Royal College of Ophthalmologists in the UK has emphasized stereoacuity assessment in ophthalmology trainees[7]. Ziv et al. (2003) suggested that poor stereopsis could delay learning curves in surgery and should be identified before admission to high-precision specialties[8].

Importance of Early Screening and Visual Training

Stereopsis deficits, especially if identified early, can be managed through visual therapy or ergonomic adaptations. Ciuffreda and Wang (2004) demonstrated that targeted vision therapy improved stereoacuity in individuals with non-pathological deficits[9]. Implementing routine stereoacuity screening at the undergraduate level could therefore play a role in optimizing clinical training and patient safety.

Additionally, vision training programs have shown promise in enhancing surgical skills. A study by Belyea et al. (2015) found that vision therapy in surgical trainees led to improved performance in laparoscopic simulators, particularly in those with borderline stereopsis[10].

Implications for Curriculum and Career Counseling

Given the implications of stereopsis in clinical performance, particularly in surgery, we propose integrating stereoacuity testing into medical school entry or early training. Career counseling based on visual aptitude may not only improve job satisfaction but also reduce the likelihood of medical errors in visually demanding procedures.

6. CONCLUSION

Stereopsis is crucial for medical students, particularly those considering visually intensive specialties. This study emphasizes the importance of screening and guiding students accordingly. Incorporating stereoacuity assessment into medical education may enhance both clinical performance and career satisfaction.

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