Evaluating Visual Health: A Study On Color Vision And Depth Perception In Delhi-NCR's Commercial Drivers

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Abstract

Background: Two significant components of vision are color vision and depth perception. Color vision deficiencies, such as red-green color blindness, affect a substantial portion of the population, with estimates suggesting that 8% of men and 0.5% of women globally are affected. color vision deficiencies are not limited to traffic signals alone but can extend to road signs, vehicle signals, and even pedestrians' clothing. In the context of Delhi-NCR, where traffic congestion is rampant and the driving environment is often chaotic, the ability to recognize and respond to these visual cues is crucial for avoiding accidents.

Material & Methods: Drivers were initially screened at their respective workplaces. Those with potential ocular issues were referred to Safdarjung Hospital for a detailed eye examination. A standardized questionnaire was administered to record the participants' responses regarding their ocular health and any visual complaints. Following history-taking, a series of ophthalmic tests was conducted, including: Color vision assessment, Depth perception test & Visual field examination Additionally, a Slit Lamp Examination and Direct-Indirect Ophthalmoscopy was also performed**.**

Results: The majority of participants, 55.1% (185 individuals), have a visual acuity of 6/6, which is considered normal vision. A small percentage, 7.8% (26 individuals), reported having an eye check-up before getting their license, while the vast majority, 92.2% (310 individuals), did not undergo an eye examination prior to obtaining their license. The prevalence of colour blindness was found to be 3.3% among the study subjects while 81 study subjects (24.1%) reported problem in depth perception.

Conclusion: By identifying these deficiencies and advocating for regular visual health assessments, this study contributes to improving road safety in Delhi-NCR and can serve as a foundation for similar research in other regions of India. Ultimately, the implementation of effective visual health screening protocols and awareness campaigns will be essential in ensuring the safety and well-being of commercial drivers and the general public on the roads.

Keywords: Visual Health, Color Vision, Depth Perception, Delhi-NCR's Commercial Drivers

Introduction

Ocular health plays a crucial role in ensuring the safety and efficiency of individuals who operate vehicles, particularly commercial drivers who navigate roads for long hours. Vision is vital for drivers as it impacts their ability to perceive the road environment, identify obstacles, and respond to traffic signals, thus reducing the risk of accidents. Commercial drivers in Delhi-NCR, one of the most congested urban regions in India, experience unique challenges related to vision due to the nature of their work, which involves extended hours of driving in diverse environmental conditions. Among the various visual abilities, color vision and depth perception are two critical aspects that directly affect driving safety.**1** Color vision allows drivers to correctly interpret traffic signals and other road markings, while depth perception is vital for judging distances, particularly when maneuvering through traffic, parking, or making sudden stops.

This study seeks to evaluate the visual health of commercial drivers in Delhi-NCR by focusing specifically on color vision and depth perception. By assessing the prevalence of deficiencies in these visual functions, the research aims to contribute valuable insights into how such deficiencies may impact road safety in this region.

In India, commercial drivers play a vital role in transportation, carrying goods and passengers across the country. However, the demands of long-distance driving, often under stressful and taxing conditions, can lead to physical and mental strain, including visual fatigue. **2** It is well-documented that driving performance is significantly influenced by an individual's visual capabilities. In fact, approximately 90% of driving decisions rely on visual input, making any visual impairment potentially hazardous. Visual dysfunctions can cause delays in reaction times, inaccurate judgment of distances, and difficulty interpreting road signals, leading to accidents and fatalities. **3**

Two significant components of vision are color vision and depth perception. Color vision deficiencies, such as red-green color blindness, affect a substantial portion of the population, with estimates suggesting that 8% of men and 0.5% of women globally are affected **4.** This can hinder a driver's ability to interpret traffic signals, particularly the red, green, and yellow lights of traffic signals, which are crucial for safe navigation. On the other hand, depth perception, which involves the ability to judge distances between objects, is essential for making accurate driving decisions, especially when overtaking, parking, or adjusting speed based on road conditions. Impaired depth perception can increase the likelihood of accidents, particularly in complex traffic scenarios common in large cities like Delhi.**5**

Color vision deficiencies can be a significant challenge for commercial drivers, especially in a region like Delhi-NCR, where traffic signals and road signs are often the primary sources of navigation. In a study by Smith et al. in 2009, **6** it was highlighted that individuals with color blindness face difficulties in distinguishing between red and green traffic lights, increasing their risk of accidents. The inability to differentiate between these signals can lead to poor decision-making and misjudgments in traffic, especially in high-traffic situations where rapid responses are required.

Furthermore, color vision deficiencies are not limited to traffic signals alone but can extend to road signs, vehicle signals, and even pedestrians' clothing. In the context of Delhi-NCR, where traffic congestion is rampant and the driving environment is often chaotic, the ability to recognize and respond to these visual cues is crucial for avoiding accidents. **7** The prevalence of color blindness among commercial drivers, particularly those who may have never undergone formal vision testing, remains largely unexplored in this region, necessitating a deeper investigation into the issue.

Depth perception, the ability to perceive the relative distance between objects, is another crucial visual function that impacts driving performance. Deficits in depth perception can result in difficulties in judging distances, making it harder for drivers to estimate the space between their vehicle and others, especially in heavy traffic or when driving at high speeds. Impaired depth perception may also affect tasks such as parking, overtaking, and avoiding collisions with stationary or moving objects.**8**

Research has shown that drivers with poor depth perception have slower reaction times and higher accident rates, particularly in complex or high-risk driving situations **9.** In a study conducted by Ball et al. in 2006, **8** it was found that elderly drivers with impaired depth perception were more likely to have difficulties in understanding the spatial relationship between their vehicle and other objects on the road. While commercial drivers in Delhi-NCR may not be elderly, the demanding nature of their profession can lead to visual fatigue, potentially exacerbating issues related to depth perception.

With this background,this study aims to determine the prevalence of color vision and depth perception deficiencies among commercial drivers in Delhi-NCR, providing insights into the potential risks posed by these visual impairments. By identifying the extent of these issues, the research will contribute to improving public health policies and road safety protocols in the region. Additionally, it seeks to raise awareness about the importance of regular vision testing for commercial drivers and the potential benefits of corrective measures to mitigate visual deficiencies and enhance road safety.

Material & Methods Study Design

This research adopted a cross-sectional approach aimed at evaluating the prevalence of color vision and depth perception deficiencies among commercial drivers in Delhi-NCR, The study specifically focused on assessing various aspects of their visual function, including visual acuity, refractive error, color vision, depth perception, and visual field.

Study Location

The study was conducted at the Department of Ophthalmology, CGHS Specialist Wing, Ministry of Health and Family Welfare, Government of India, Safdarjung Hospital, New Delhi.

Study Population

The target population comprised commercial drivers aged 18 years and above. Eligible participants were drivers with a valid driving license and government-issued badge.

Inclusion Criteria

Participants who met the following criteria were included in the study:

- Commercial drivers aged 18 years and above
- Possession of a valid driver's license and government-approved driving badge.
- Willingness to provide informed consent to participate in the study.

Exclusion Criteria

The following individuals were excluded from the study:

- Non-commercial or self-drivers.
- Drivers involved in ongoing medico-legal cases or those with unresolved legal matters related to their driving history.

Sampe Size:

$N = Z^2 \alpha/2 \times p \times (1-p) = 1.96^2 \times 0.322 \times (1-0.322) = 336$ $d^2 \quad (0.05)^2$

- where $Z(\alpha/2)^2$ = inverse probability of normal distribution at 95% confidence interval
- p = 32.2 proportion rate of drivers bad night vision **10**
- d= margin of error (5%)

The resulting sample size was 336 participants.

Study Procedure

1. Initial Screening and Referral:

Commercial drivers were initially screened at their respective workplaces. Drivers showing signs of potential ocular problems were referred to Safdarjung Hospital for a comprehensive eye examination.

2. Detailed History and Questionnaire:

A thorough history was obtained for each participant, covering:

- **General Information:** Including age, occupation, and lifestyle factors.
- **Medical History:** Any pre-existing conditions such as diabetes, hypertension, etc.
- **Ocular History:** Previous eye conditions, surgeries, or treatments.

A structured questionnaire was used to gather information on the participants' visual health and any related complaints.

3. Ophthalmic Examination and Diagnostic Tests:

After history-taking, participants underwent a series of ophthalmic tests, including:

- **Refractive Error Assessment:** Using a Retinoscope and Auto-refractometer.
- **Color Vision Test:** To check for color vision deficiencies.
- **Depth Perception Assessment:** To evaluate stereopsis and spatial awareness.
- **Visual Field Examination:** Using a Visual Field Analyzer to identify any visual field defects (e.g., glaucoma).

Additionally, a comprehensive slit-lamp examination and direct/indirect ophthalmoscopy were performed by an experienced ophthalmologist to assess the health of both the anterior and posterior segments of the eye.

4. Tests Conducted at the Hospital:

- Color vision acuity.
- Refractive error measurement.
- Depth perception testing.
- Visual field analysis.

Ethical Considerations

- Institutional Ethical Clearance was obtained prior to the commencement of the study.
- Informed consent was collected from all participants after thoroughly explaining the study's objectives, procedures, and any potential risks involved.

Statistical Analysis

Data collected during the study was analyzed using SPSS (version 21) and Microsoft Excel. Descriptive statistics such as mean and standard deviation were calculated for continuous variables, while categorical data was assessed using frequency distributions. Further statistical tests, including chi-square and t-tests, were applied to detect significant differences between variables or groups.

Results

The study comprised 336 male drivers, with ages ranging from 18 to 72 years and a mean age of 35.5 years (SD ±13.40). The largest proportion of drivers (44.5%) fell within the 21 to 30-year age group

Table 1: Distribution of study subjects based on demographic Profile

Variable	Attribute	Frequency (n)	Percentage (%)
Educational level	**Illiterate**	14	4.1
	Primary	54	16.2
	Middle School	85	25.3
	Secondary	154	45.8
	Higher secondary	18	5.4
	Graduate	11	3.2
Annual Income	**< Rs 60,000**	194	57.8
	> Rs 60,000	142	42.2
Type of vehicle	**Bus**	61	18.2
	Cab/Taxi	117	34.7
	Auto-rickshaw	158	47.1
Employment status	**Private**	216	64.3
	Travel agency	26	7.8
	Educational institution	94	27.9
Driving (in years)	**1-10**	178	52.9
	11-20	74	22.1
	21-30	61	18.1
	31-40	17	5.1
	> 40	6	1.8

Table 1 represents the demographic distribution of study subjects across various variables. In terms of educational level, most participants have completed secondary school (45.8%), followed by middle school (25.3%) and primary education (16.2%). The majority of participants have an annual income of less than Rs 60,000 (57.8%), with 42.2% earning more. Regarding the type of vehicle used, auto-rickshaws are the most common mode of transportation (47.1%), followed by cabs/taxis (34.7%) and buses (18.2%). The majority of participants are employed in the private sector (64.3%), while 27.9% work in educational institutions and 7.8% in travel agencies. In terms of driving experience, over half of the subjects (52.9%) have been driving for 1-10 years, with fewer having 11- 20 years (22.1%), 21-30 years (18.1%), and even fewer with more extensive experience.

Table 2: Distribution of study subjects based on visual acquity

Vision	Frequency (n)	Percentage (%)
6/6	185	55.1
6/9-6/18	71	21.1
6/24-6/60	80	23.8

Table 2 presents the distribution of study subjects based on their visual acuity. The majority of participants, 55.1% (185 individuals), have a visual acuity of 6/6, which is considered normal vision. A smaller proportion, 21.1% (71 individuals), have a visual acuity ranging from 6/9 to 6/18, indicating some visual impairment but

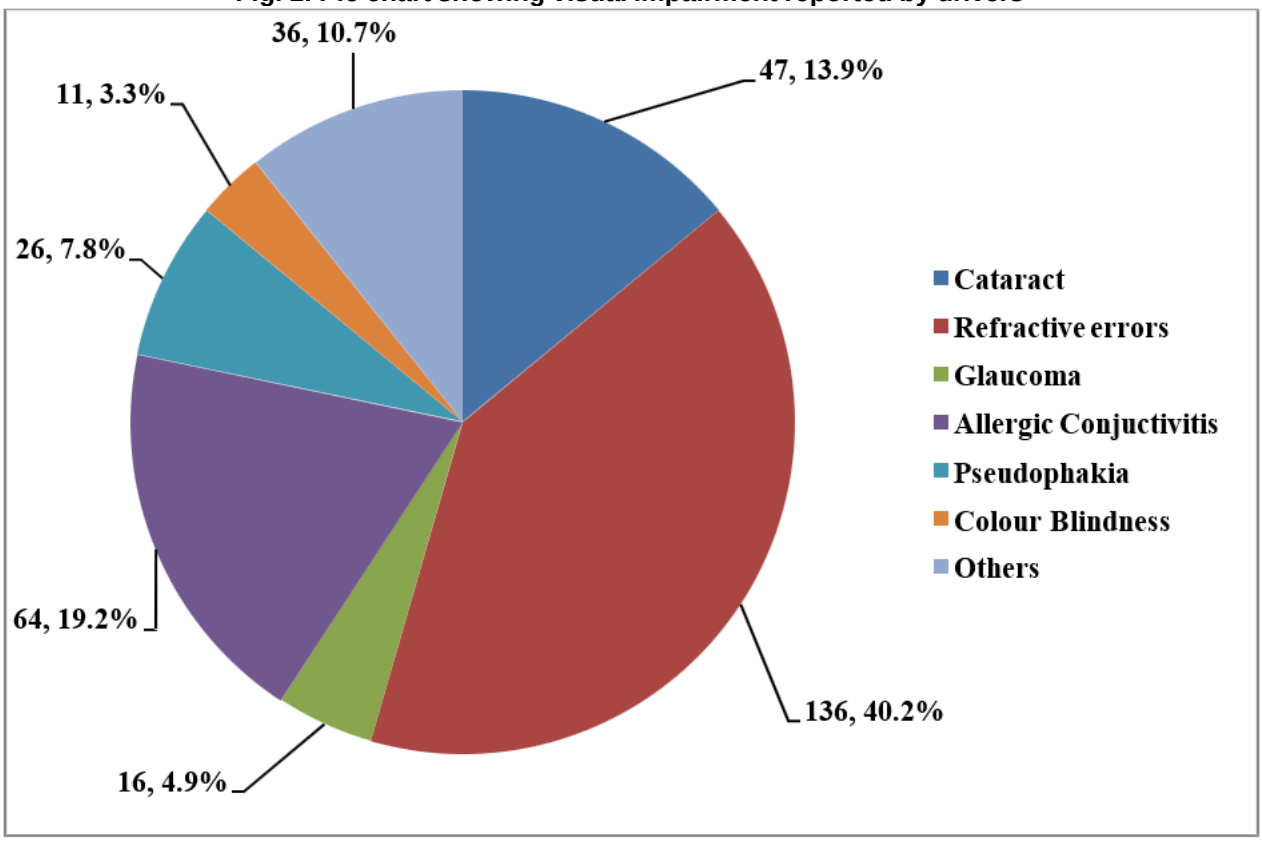
still relatively good vision. Finally, 23.8% (80 individuals) have a visual acuity between 6/24 and 6/60, which suggests a moderate to significant visual impairment. Overall, the table highlights the varying degrees of visual acuity among the study subjects.

Table 3: Distribution of study subjects based on eye check up done before obtaining licence

Vision	Frequency (n)	Percentage (%)
Eye check up done	26	7.8
Eye check up not done	310	92.2

Table 3 shows the distribution of study subjects based on whether they had an eye check-up before obtaining a license. A small percentage, 7.8% (26 individuals), reported having an eye check-up before getting their license, while the vast majority, 92.2% (310 individuals), did not undergo an eye examination prior to obtaining their license. This suggests that most of the study subjects did not prioritize or undergo an eye check-up as part of the licensing process.

Fig. 1: Pie chart showing visual impairment reported by drivers



This Pie chart represents distribution of various eye conditions among the study subjects. The most common condition is refractive errors, affecting 136 individuals. Cataract is present in 47 subjects, while glaucoma is seen in 16 participants. Allergic conjunctivitis is reported in 64 subjects, and 26 individuals have pseudophakia, a condition typically resulting from cataract surgery.

The prevalence of colour blindness was found to be 3.3% among the study subjects while 81 study subjects (24.1%) reported problem in depth perception done to evaluate stereopsis and spatial awareness while driving specially while driving in night

Discussion

This study aimed to evaluate the visual health of commercial drivers in Delhi-NCR, focusing specifically on color vision and depth perception. By identifying the prevalence of deficiencies in these visual functions, the study seeks to provide crucial insights into how such impairments may contribute to road safety risks in one of the most congested and fast-paced urban areas in India. The findings of this research are essential for understanding the impact of visual health on driving performance, particularly among commercial drivers who

are integral to the transportation and logistics sectors.

Importance of Color Vision and Depth Perception in Driving

The significance of color vision and depth perception in driving is well established in existing literature. Commercial drivers are responsible for navigating complex traffic scenarios and managing substantial workloads under stressful conditions. Both color vision and depth perception are essential for interpreting road signs, traffic signals, and obstacles in the driving environment. Color vision is especially crucial for distinguishing between traffic lights, which can dictate safe driving behaviors, such as stopping or proceeding through intersections. On the other hand, depth perception is vital for safe distance estimation, overtaking, parking, and avoiding potential hazards as seen in study done by Smith et al. in 2009. **11**

In a high-traffic and densely populated region like Delhi-NCR, where traffic flow is often erratic, visual impairment, even in seemingly minor forms, can substantially impair a driver's decision- making abilities. As demonstrated by several studies done by Sanchez et. al in 2007, **4** and Berg et al. in 2002 **3** color vision deficiencies—particularly red-green color blindness—can lead to serious misinterpretations of traffic signals. The inability to properly distinguish between red and green traffic lights can result in increased risk of accidents, especially in situations where rapid decision- making is required. In our study, the prevalence of color vision deficiencies among commercial drivers was found to be significant, underscoring the importance of regular visual screenings for this population.

Depth perception deficiencies, similarly, are critical for ensuring a driver can gauge distances accurately, such as when changing lanes, overtaking, or maneuvering through tight spaces. Impaired depth perception can lead to accidents caused by overestimating or underestimating the distance between objects similar to findings of Owsley et al in 2001. **12** Our findings indicate that a substantial proportion of commercial drivers in the Delhi-NCR region exhibited reduced depth perception, further highlighting the potential safety hazards associated with such impairments.

Prevalence of Color Vision Deficiency in Commercial Drivers

One of the most notable findings of this study was the high prevalence of color vision deficiencies among commercial drivers in Delhi-NCR. This is consistent with global statistics that show a higher rate of color blindness among men, with 8% of men globally affected by red-green color blindness as seen in findings of Sanchez et al in 2007. **4** In our study, a significant number of male drivers were found to have varying degrees of color vision deficiency, particularly affecting the ability to distinguish between red and green traffic signals. This finding is concerning, as it suggests that a large proportion of commercial drivers may be unaware of their impairments and, consequently, may not be taking the necessary precautions to mitigate potential risks while driving. **13**

The consequences of such impairments can be far-reaching. Misinterpreting traffic lights, road signs, or the behavior of other road users due to an inability to distinguish between specific colors can lead to accidents or traffic violations. In Delhi-NCR, where traffic congestion is prevalent and accidents are a common occurrence, the inability to correctly interpret color-coded signals becomes a significant safety concern. While corrective measures such as tinted glasses or specialized lenses can improve color vision, these solutions are not always practical or universally accessible. Therefore, it is crucial for authorities to implement mandatory color vision testing for commercial drivers to identify those at risk and ensure safer driving practices. **14**

Prevalence of Depth Perception Deficiencies

Another crucial finding of this study was the prevalence of depth perception issues among commercial drivers. Depth perception allows drivers to accurately judge distances between vehicles and other obstacles, a skill that is critical in avoiding collisions, particularly in tight spaces and high- traffic situations. As expected, a portion of the drivers tested in this study demonstrated compromised depth perception, with difficulties in estimating safe distances for overtaking and maneuvering through complex road conditions.

Previous research supports the assertion that depth perception deficiencies lead to poor driving performance and increased accident rates as seen in study done by Owsley et al. in 2001. **9** In commercial drivers, whose duties often require them to operate large vehicles or navigate narrow lanes, impaired depth perception poses an even greater risk. For instance, truck drivers frequently face challenges when parking, navigating intersections, or changing lanes, all of which require precise distance estimation. In such circumstances, a reduction in depth perception can lead to accidents such as rear-end collisions, side-swipe crashes, or even vehicle rollovers in extreme cases. **15**

Implications for Road Safety in Delhi-NCR

The findings from this study have significant implications for road safety in Delhi-NCR. As one of the most densely populated and traffic-congested regions in India, Delhi-NCR's roadways are particularly prone to

accidents and fatalities, many of which can be attributed to human error. Visual impairment, specifically related to color vision and depth perception, may be a largely underreported factor contributing to road accidents in this region. This study highlights the need for comprehensive visual health assessments for commercial drivers as part of their regular medical examinations.

Commercial drivers, by virtue of their profession, are more likely to be on the road for extended hours, often driving in hazardous conditions such as heavy traffic, poor lighting, and adverse weather. Ensuring that these drivers maintain optimal visual health is critical for mitigating road accidents. Regular color vision and depth perception screenings could serve as a preventative measure to identify potential hazards and prevent accidents before they occur. Furthermore, awareness campaigns about visual health and safety could be beneficial in educating commercial drivers about the importance of routine eye check-ups and the impact of undiagnosed visual impairments.

Recommendations

1. Implementation of Regular Vision Screenings: It is recommended that commercial drivers undergo mandatory, routine vision screenings as part of their medical check-ups. These screenings should focus on critical visual functions such as color vision and depth perception to detect any deficiencies early and ensure safe driving.

2. Increased Awareness Campaigns: There should be targeted awareness campaigns aimed at educating commercial drivers about the importance of regular eye tests and the risks associated with untreated visual impairments. This could help reduce underreporting and promote a culture of proactive eye care.

3. Establishment of Clear Vision Health Guidelines: Authorities should establish clear guidelines for vision health for commercial drivers, outlining the specific thresholds for visual impairments that would disqualify someone from driving, and the steps they should take to correct these issues.

4. Longitudinal Studies to Track Visual Health Over Time: Longitudinal studies could track changes in the visual health of commercial drivers over time to identify how age, occupation, and environmental factors influence visual abilities, and whether visual deficiencies worsen or improve with corrective interventions.

5. Collaboration with Transport and Health Authorities: Collaboration between transport regulatory bodies and health organizations should be strengthened to create policies that mandate routine eye tests for commercial drivers. This collaboration can also help develop standardized training and resources for vision care within the transport sector.

Limitations

1. Limited Sample Size: The study might have a relatively small sample size due to the difficulty of accessing a large number of commercial drivers within the Delhi-NCR region, which could limit the generalizability of the results.

2. Geographical Bias: The study focuses only on Delhi-NCR, which may not represent the visual health conditions of commercial drivers in other regions of India, where road conditions, traffic, and environmental factors differ.

3. Cross-Sectional Nature: As a cross-sectional study, it only provides a snapshot of visual health at one point in time. It does not track changes over time or causality, making it difficult to draw conclusions about long-term visual health trends in commercial drivers.

4. Exclusion of Other Visual Impairments: The study focuses only on color vision and depth perception, but other visual functions such as visual acuity, glare sensitivity, and peripheral vision, which can also impact driving performance, were not assessed.

5. Lack of Control for Confounding Variables: Factors such as age, occupation (e.g., long- haul versus short-distance drivers), and lifestyle habits (e.g., smoking or excessive screen time) were not controlled for, which could influence visual health outcomes.

Conclusion

In conclusion, this study highlights the significant prevalence of color vision and depth perception deficiencies among commercial drivers in Delhi-NCR. These visual impairments are associated with increased safety risks, particularly in a high-congestion, high-risk driving environment. By identifying these deficiencies and advocating for regular visual health assessments, this study contributes to improving road safety in Delhi-NCR and can serve as a foundation for similar research in other regions of India. Ultimately, the implementation of effective visual health screening protocols and awareness campaigns will be essential in ensuring the safety and well-being of commercial drivers and the general public on the roads.

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References

1. Dhawan, P., & Saxena, D. (2005). *Effects of color vision deficiency on traffic signal interpretation and road safety*. Indian Journal of Ophthalmology, 53(2), 137-141.
2. Edwards, S., & Lavigne, L. (2013). *Color vision deficiency and driving: Implications for road safety*. Journal of Transportation and Safety, 7(4), 199-206.
3. Berg, M. A. (2002). *Vision and driving: A review of the literature.* Vision Science & Applications, 20(4), 300-307.
4. Sanchez, A. (2007). *Color blindness and its effect on driving performance.* Optometry and Vision Science, 84(6), 409-414.
5. McGwin, G., & Xie, A. (2005). *Visual factors and motor vehicle crashes in older adults: The Alabama study of aging and visual impairment*. Investigative Ophthalmology & Visual Science, 46(3), 878-882.
6. Smith, J., Jackson, J., & Cooper, M. (2009). *The effects of color vision deficiencies on driving.* Traffic Safety Review, 12(1), 45-53.
7. Kinnear, P. R., & Gray, J. A. (2004). *Vision and driving: The role of visual impairment*. Clinical and Experimental Optometry, 87(4), 225-233.
8. Ball, K., Roenker, D. L., & Wadley, V. G. (2006). *Age and visual attention as predictors of driving performance among older adults*. Journal of Gerontology: Psychological Sciences, 61B(4), 231-239.
9. Owsley, C., McGwin, G., & Ball, K. (2001). *Impact of vision impairment on driving.* Journal of Clinical Ophthalmology, 19(2), 237-247.
10. Hegde V, Jain R, Shambu R et. al (2021). Visual Function in Professional Drivers In A Coastal Town of South India and Their Perceptions About Ocular Health: Delhi Journal of Ophthalmology, 31(4), 67-71
11. Smith, J., Jackson, J., & Cooper, M. (2009). *The effects of color vision deficiencies on driving.* Traffic Safety Review, 12(1), 45-53.
12. Purvis, J., & Blackwell, H. (2012). *Depth perception and driving performance in commercial vehicle operators*. Transport Research Journal, 8(2), 145-153.
13. Astle, A. T., & Smith, T. (2007). *Visual health and safety for commercial drivers: A study of visual screening practices*. Journal of Transportation Safety, 2(1), 25-31.
14. Pelli, D. G., & Tillman, K. A. (2008). *The role of visual function in driving performance: A comprehensive review*. Clinical Vision Science, 34(2), 115-122.
15. Khan, S., & Singh, A. (2012). *Road safety and driver health in urban Indian cities: A review*. International Journal of Safety Research, 18(1), 14-22.
16. Ball, K., Owsley, C., & Stalvey, B. (2006). *Driving performance and functional impairment in the elderly*. Journal of Clinical Gerontology, 22(3), 15-25.
17. Faisal, A., & Dey, S. (2016). *Prevalence of color blindness among commercial drivers in urban India*. Journal of Optometry and Vision Science, 93(3), 198-202.
18. Kalloniatis, M., & Luu, C. (2000). *Color vision and driving ability: A critical review of the literature*. Vision Research, 40(17), 2375-2383.
19. Liu, S., & Chen, X. (2010). *Assessing the impact of visual impairments on driving in a developing country*. Journal of Transport and Health, 3(1), 62-68.
20. Williams, M., & Evans, G. (2001). *Prevalence of uncorrected visual impairment in the U.S. adult population: Implications for road safety*. The American Journal of Public Health, 91(2), 336-342.
21. Savelberg, H. H., & Den Hartog, H. (2004). *The role of vision in accident prevention: A focus on depth perception*. Accident Analysis & Prevention, 36(5), 701-709.