



ORIGINAL ARTICLE

Visual function among commercial vehicle drivers in the central region of Ghana



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Road traffic accident;
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Abstract

Aim: To determine the relationship between some visual functions: colour vision defects, abnormal stereopsis, visual acuity and the occurrence of road traffic accident (RTAs) among commercial vehicle drivers in the central region of Ghana, and to assess their knowledge of these anomalies.

Method: A descriptive cross-sectional study employing a multi-stage random sampling approach was conducted in the major commercial towns within the central region of Ghana. Participants were taken through a comprehensive eye examination after the administration of a structured questionnaire.

Results: 520 male commercial vehicle drivers were enrolled for this study with a mean age of 39.23 years \pm 10.96 years and mean visual acuity of 0.02 \pm 0.08 logMAR. Protans were more likely to be involved in RTAs ($\chi^2 = 6.194$, $p = 0.034$). However, there was no statistically significant association between abnormal stereopsis (OR = 0.89 95% CI: 0.44–1.80, $p = 0.56$), poor vision due to refractive error ($\chi^2 = 3.090$, $p = 0.388$) and the occurrence of RTAs. While 86.9% were aware of abnormal stereopsis, only 45% were aware of colour vision defects. There was a statistically significant association between stereopsis anomaly and colour vision defect ($r = 0.371$, $p < 0.005$).

Conclusion: The study found an association between protanopia and RTAs but none between stereopsis anomalies, refractive errors and the occurrence of RTAs. Drivers were less knowledgeable on colour vision defects as compared to stereopsis anomalies.

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PALABRAS CLAVE

Defectos visuales;
Función visual;
Accidente de tráfico;
Conductores
comerciales

Estudio de la función visual de los conductores de vehículos comerciales en la región central de Ghana**Resumen**

Objetivo: Determinación de la relación entre algunas funciones visuales -alteraciones de la visión cromática, alteraciones de la estereopsis y agudeza visual- y la ocurrencia de accidentes de tráfico entre los conductores de vehículos comerciales en la región central de Ghana, así como evaluación de su conocimiento sobre estas anomalías.

Método: Se realizó un estudio descriptivo cruzado, utilizando una muestra aleatoria de múltiples fases, en las principales ciudades comerciales de la región central de Ghana. A los participantes se les realizó un amplio examen visual tras la entrega de un cuestionario estructurado.

Resultados: Se incluyó en este estudio a 520 varones conductores de vehículos comerciales, con una edad media de 39,23 años \pm 10,96 años, y una agudeza visual de $0,02 \pm 0,08$ logMAR. Los sujetos con protanopia tuvieron más probabilidad de sufrir un accidente de tráfico ($\chi^2 = 6,194$, $p = 0,034$). Sin embargo, no se produjo una asociación estadísticamente significativa entre las alteraciones de la estereopsis (OR = 0,89 95% IC: 0,44-1,80, $p = 0,56$), la baja visión debida a error refractivo ($\chi^2 = 3,090$, $p = 0,388$), y la ocurrencia de accidentes de tráfico. Aunque el 86,9% eran conscientes de las alteraciones de la estereopsis, sólo el 45% estaba al corriente de las alteraciones de la visión cromática. Se produjo una asociación estadísticamente significativa entre las alteraciones de la estereopsis y las alteraciones de la visión cromática ($r = 0,371$, $p < 0,005$).

Conclusión: El estudio halló una asociación entre la protanopia y los accidentes de tráfico, y ninguna asociación entre las alteraciones de la estereopsis, los errores refractivos y la ocurrencia de accidentes de tráfico. Los conductores eran menos conscientes de las alteraciones de la visión cromática que de las alteraciones de la estereopsis.

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Introduction

Good vision is a fundamental component of safe driving, being one of the most important sensory factors for this activity, accounting for about 95% of all sensory requirements.¹ For this reason, drivers with good vision have an advantage over those with poor vision as far as Road Traffic Accidents (RTAs) are concerned. RTAs are a major health problem worldwide,² and a leading cause of death from trauma,³⁻⁶ with an estimated annual death of 1.2 million and up to 50 million injuries worldwide.⁷

In Ghana, RTAs, with their associated fatalities have been on the increase over the years, and are reported to be higher than in most West African countries, being second after Nigeria.^{8,9} The rise in the number of RTA in Ghana is exemplified by the fact that there were 14,914 road accidents involving 21,817 vehicles which claimed 2249 lives and caused 14,181 injuries in 2012, compared to 13,572 accidents involving 19,530 vehicles in 2011.¹⁰ These data reveal the huge burden of RTAs to the Ghanaian economy, as it results in the loss of 1.6% of her Gross Domestic Product (GDP), with an average of 1800 deaths annually of whom 60% are in the productive ages of 18-55 years.¹¹

Commercial vehicles are the major source of motorized transport in many low-income countries.¹ In the absence of good public transport infrastructure such as railways,

most people rely on them for commuting, with the role of commercial driver being evident. Therefore, maintaining optimum visual function, such as visual acuity, colour vision, depth perception (stereopsis), contrast sensitivity and peripheral vision, is essential.^{12,13}

Colour vision plays an important role in driving, as a defect leads to difficulty in recognizing traffic signs and signals, as well as signals from other vehicles.¹⁴ Studies on the relationship between colour vision defects and road traffic accidents have been ambivalent, as some have indicated that colour vision deficiencies increase the risks of road accidents while others do not support this assertion. For instance, a study on accident rates¹⁵ found an increased risk for a small sample of colour deficient¹⁵ while Norman found no such effect.¹⁶ Another study reported that protans are precluded from holding a commercial driver's license in Australia because they have a substantially reduced ability to see red lights and had more road accidents involving signal lights.¹⁷

Stereopsis, the ability to appreciate depth (i.e. the ability to distinguish the relative distance of objects with an apparent physical displacement between the objects)¹⁸ is equally important for driving. According to Omolase et al.,¹⁹ it is needed to accurately judge distances, overtake other vehicles and change lane, especially in busy traffic. This presupposes that drivers with defective stereopsis may have difficulty judging distances in their quest to overtake other

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