
Association Between Mobile Phone Usage in Road Traffic Environment with The Speed Managing Behaviour Among Young and Aged Population - A Survey

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Abstract: Travel speed is one of the most critical parameters for road safety; the evidence suggests that increased vehicle speed is associated with higher crash risk and injury severity. Both naturalistic and simulator studies have reported that drivers distracted by a mobile phone select a lower driving speed. Mobile phone use while driving is a major cause of driver distraction, affecting driving performance and increasing accident risk. The aim of the study is to analyse the impact of mobile phone usage in road traffic environment on the speed managing behaviour among young and aged population by survey. A questionnaire was created with a set of 12 questions related to mobile phone usage in a road traffic environment. 100 random participants of adults and aged males and females by random sampling method. The participants were asked to fill the questionnaire in an online forum. The results were collected and formatted in Pie charts, Chi-square test was used and statistically analysed using SPSS. 90% of them are aware of road safety while driving. Most of the population wear helmets regularly which is about 59%, 15% of the population wear helmets occasionally and 26% do not wear helmets regularly. 84% of them responded that they use bluetooth or headphones while driving and 16% of them responded that they won't use bluetooth or headphones while driving. 70% of them responded that they get distracted using phones while driving. Mobile phone use while driving is a common driving behavior and poses a serious threat to public health. From the current study it shows that mobile phone usage while driving causes greater distraction. Thus we conclude further measures to be taken in control of usage of mobile phone while driving.

Keywords: Drivers; road safety; mobile phones; speed; traffic rules.

INTRODUCTION

Travel speed is one of the most critical parameters for road safety; the evidence suggests that increased vehicle speed is associated with higher crash risk and injury severity. Both naturalistic and simulator studies have reported that drivers distracted by a mobile phone select a lower driving speed (Aarts and van Schagen, 2006). Speed decrements have been argued to be a risk compensatory behaviour of distracted drivers. Nonetheless, the extent and circumstances of the speed change among distracted drivers are still not known very well (Bella, 2008). Mobile phone use while driving is a major cause of driver distraction, affecting driving performance and increasing accident risk. Governments have responded to this with the implementation of legislation prohibiting the use of mobile phones, under specific conditions (Charlton, 2009). In particular, in Europe in most countries mobile phone use is permitted under the hands-free mode; that is, no handling of the device is allowed and the driver should not touch the mobile phone at any time. Hence, the allowed mobile phone use modes may include speaker mode, use of wired earphones, or Bluetooth (Edwards, 1999; Wood, 2002). Still, the adoption of the hands-free legislation in most countries indicates that relevant bodies consider the resulting physical distraction attributed to handling the mobile phone rather risky, while at the same time they do not seem to consider the cognitive distraction as important. Yet, driving is a complex perceptual and cognitive task and as such the effect of mobile phone use is significant even when physical contact is not involved (Aljanahi, Rhodes and Metcalfe, 1999; Winne, De Winne and De Winne, 2009). The premise that human factors are the root cause of most road safety safe-critical events and therefore should be the target of safety and prevention efforts is widely recognised.

Mobile phone interactions while driving involve a multitude of cognitive and physical resources, with such behaviour consistently linked with inferior driving performance and reduced safety margins. Driving tasks

mainly include controlling the stability of vehicles and monitoring the driving environment, which are directly related to driver's manual operation and visual attention (Garrison and Williams, 2013). Some previous studies tend to take visual distraction behavior as the main factor of accidents. In addition, most operations of using mobile phones are manual-visual distractions, such as texting and dialing. The effect of manual-visual distractions on driving performance is negative and of greater impact than just visual distraction (Haque and Washington, 2015). Driver's attention typically splits between performing control operations and processing driving environment information. When the distraction demand caused by mobile phone use is high, a part of attention is required to be allocated to deal with the distracted operation, thus causing interference to the driver's control behavior and environmental monitoring ability. Mobile phone distracted driving can impair a driver's car-following performance (Brusque, 2017). For example, mobile phone distraction driving reduces driving speed, increases following distance, and increases time headway. However, research shows that these performance impairments may not be completely harmful; in some cases, drivers may take conscious or unconscious compensation behavior to compensate for the increased workload associated with mobile phone use (White *et al.*, 2010; Bruyas, 2017). To maintain driving safety, drivers compensate for the increased accident risk caused by using mobile phones by exercising only one type of compensation behavior (reducing speed, increasing following distance, or increasing time headway).

Some researchers have studied the impact of mobile phone distraction on the time headway, but very few scholars have studied whether time headway compensation strategies can completely offset the increased accidents (Reed, Robbins and TRL Limited, 2008; Čubranić-Dobrodolac *et al.*, 2013). Most adults carry out transport related activities daily. The driving itself often becomes routine, even in unknown traffic environments, which can present a significant cause for traffic accidents. In 2016, road injuries were the eighth top cause of deaths, killing 1.35 million people worldwide. The occurrence of traffic accidents is influenced by many factors, which are generally divided into factors on the side of the driver, vehicle, and the environment. Because the driver is the most changing factor out of these, as it reflects the characteristics of each individual (Liu and Ou, 2011).

Previously we have done so many bioinformatics studies, morphological and Morphometric studies (Sekar *et al.*, 2019; Johnson *et al.*, 2020) (Seppan *et al.*, 2018), online survey analysis (Krishna, Nivesh Krishna and Yuvaraj Babu, 2016), (Nandhini *et al.*, 2018), Morphometric studies (Subashri and Thenmozhi, 2016) (Samuel and Thenmozhi, 2015; Menon and Thenmozhi, 2016; Pratha, Ashwatha Pratha and Thenmozhi, 2016), in vivo animal experimental studies (Hafeez and Thenmozhi, 2016) and genetic studies (Choudhari and Thenmozhi, 2016) in various fields of research which led us to conduct study on Impact of mobile phone usage in road traffic environment on the speed managing behaviour among young and aged population. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020)

The aim of the study is to analyse the impact of mobile phone usage in road traffic environment on the speed managing behaviour among young and aged population by survey.

MATERIALS AND METHODS

A total of 100 participants were involved in this online survey study. This study was carried out in an online setting with advantage of flexible data retrieved and disadvantage of statistical error while recording. The questionnaire consisted of 12 questions, and was distributed in the online forum. The questionnaire was based on mobile phone usage in a road traffic environment on the speed managing behaviour. All the data was analysed by multiple logistic and tabulated in MS excel sheet and variables were added and imported to SPSS. Using SPSS Version 20.0, descriptive statistics were carried out and figures were plotted to arrive at final inference.

RESULTS AND DISCUSSION

The total 100 participants of the survey were categorised according to their age in which the 15-20 years age category was 8%, 21-35 years category was 46%, 36-50 years age category was 43% and 50 years above age category was 3% (Figure 1). In which 33% were females and 67% were males (Figure 2), out of which 90% of them are aware of road safety while driving (Figure 3), Most of the population wear helmets regularly which is about 59%, 15% of the population wear helmet occasionally and 26% do not wear helmet regularly (Figure 4). Most of the population participated were drivers who were about 53% (Figure 5), 56% of the population responded that they use mobile phone while driving and 33% responded that they won't use mobile phone while

driving and 11% responded that they use mobile phone occasionally (Figure 6) and 84% of them responded that they use bluetooth or headphones while driving and 16% of them responded that they won't use bluetooth or headphones while driving (Figure 7). 70% of them responded that they get distracted using phones while driving (Figure 8).

Most of the population responded that they don't rash drive which is about 52% , 26% of them rash drive occasionally and yet 22% of them rash drive due to emergency situations (Figure 9). Most of the population responded that they drive at a speed above normal which is about 51% and 42% of them drive at normal speed (Figure 10). Most of the population are aware that using mobile phones while driving causes a high rate in accidents which is about 98% (Figure 11). By comparing age and Are you aware of road safety while driving. Most of the population in almost all the age groups answered yes . This indicates that all the participants are aware of road safety which shows its statistically significant. Chi square test showing P value =0.00 which is found to be statistically significant (Figure 12).

By comparing gender and with the response on the question 'do you use mobile phone while driving', 33% of females have responded yes and 33% males responded no, yet 23% of males have responded yes and 11% of males use mobile phone occasionally while driving . This indicates that females use mobile phones while driving compared to males but it's statistically significant. Chi-square test showing P value =0.00 which is found to be statistically significant (Figure 13). By comparing gender and Do you know using mobile phones while driving causes a high rate in accidents 65% of male population responded yes and 33% of the female population responded yes. This indicates that both populations are aware of the high rate of accidents while driving due to mobile phones but statistically not significant. Chi-square test showing P value= 0.316 which found to be statistically not significant (Figure 14).

According to Oscar Oviedo-Trespalacios et al(Oviedo-Trespalacios *et al.*, 2017) ., Most of the drivers were distracted while driving due to mobile phones, it is evident that most of the drivers can't manage their speed while driving if they use mobile phones which eventually leads to road accidents. According to Ioanna Spyropoulou et al(Spyropoulou and Linardou, 2019).,76% of the participants use their mobile phone while driving, while only 20% acquire a Bluetooth, with the remainder 56% using it in an illegal manner. This indicates that drivers use their mobile phone less in rural networks. In addition, Bluetooth mode is the least used regardless of the road network type, while handheld mode and speaker mode are used most in urban and rural areas, respectively. According to T.Huge WOO et al(Woo, Hugh WOO and Jawkuan, 2001).

When it comes to gender who tended to be more distracted by mobile phone use, the results showed that females consistently increased more reaction time than males did for all traffic situations. Nevertheless, only the situation of an obstacle falling evidenced marginal significance with females showing more distraction.drivers who carried a mobile phone and were involved in an accident, nearly 20 percent were using their mobile phones when the accidents occurred. Almost 80 percent of these drivers leave their mobile phone turned on while driving, and 73 percent report having talked on the phones while driving. According to Lanfang Zhang et al(Zhang *et al.*, 2019)., distracted drivers often exhibit self-regulatory behaviors, such as reducing driving speed, increasing the distance to the lead vehicle, and making less lane changes, which are considered to reduce the driving demand and accident risk. Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

CONCLUSION

Mobile phone use while driving is a common driving behavior and poses a serious threat to public health. At the same time, driving behaviour was found to be affected less with the increase of familiarity and experience of mobile phone use while driving. This is partly due to not only legislation ignorance but also law disobedience. From the current study it shows that mobile phone usage while driving causes greater distraction. Thus we conclude further measures to be taken in control of usage of mobile phone while driving.

AUTHOR CONTRIBUTION

Swetaa. A, contributed in the conception, acquisition of data, analysis, interpretation of data and also in drafting the article and revising it critically for important intellectual content.

Dr. Karthik Ganesh contributed in study design, made formatting and other alignment corrections and supervision.

ACKNOWLEDGEMENT

None declared.

CONFLICT OF INTEREST

None declared

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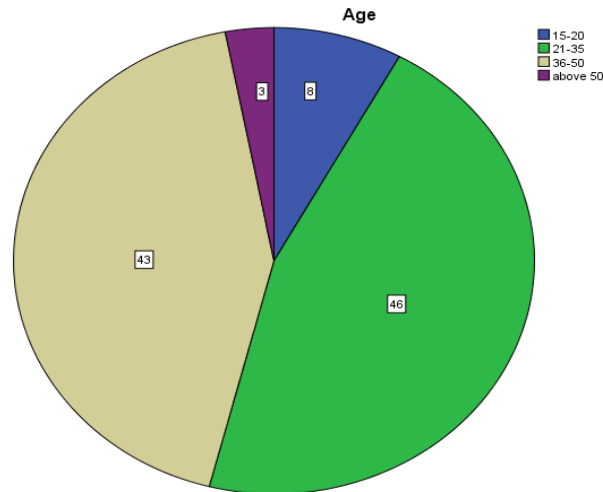


Fig.1: Pie chart depicting the frequency of the responses to the question, "Age". Majority of the participants (46%) responded were in the age category 21-35 years (green) followed by (43%) were in the age category 36-50 years (brown), (8%) were in the age category 15-20 years (blue) and (3%) were in the age category which is above 50 years (purple).

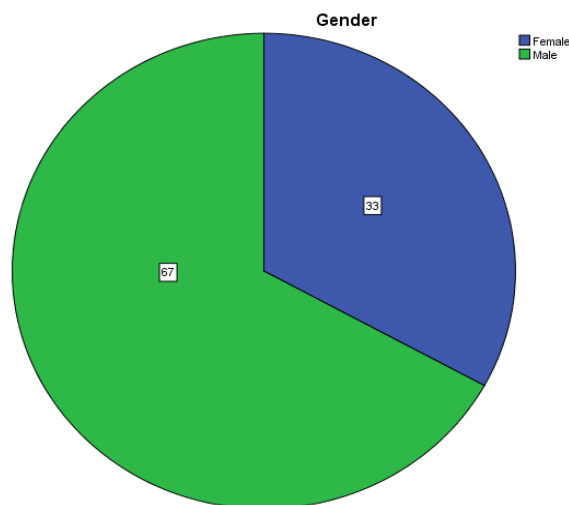


Fig.2: Pie chart depicting the frequency of the responses to the question, "Gender". Majority of the participants (57%) responded were males (green) followed by (33%) were females (blue).

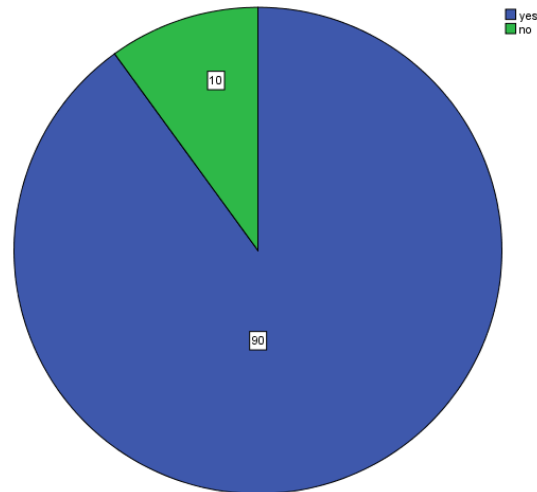


Fig.3: Pie chart depicting the frequency of the responses to the question, "Are you aware of road safety while driving?". 90% of the participants were aware of road safety while driving (blue).

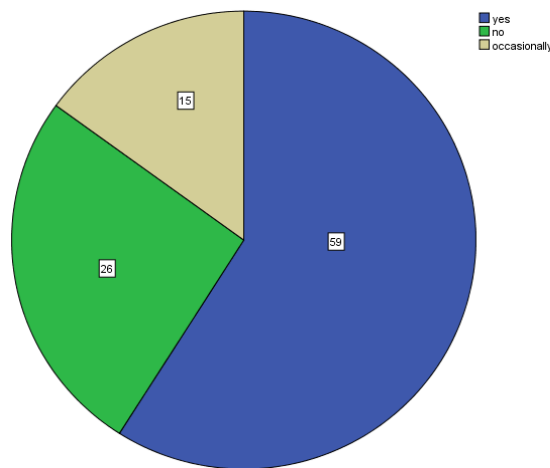


Fig.4: Pie chart depicting the frequency of the responses to the question, "Do you wear a helmet while driving?". 59% of the participants wear helmet driving (blue), 26% of the participants do not wear helmets (green).

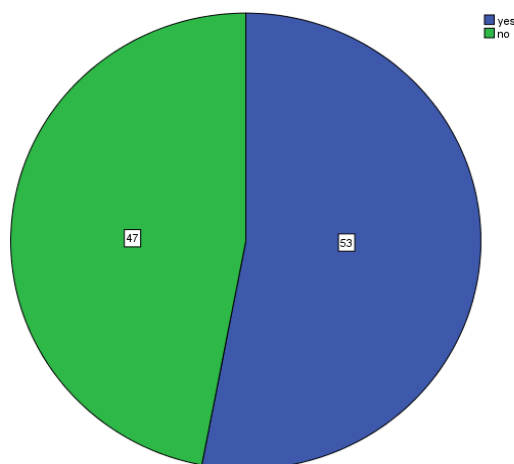


Fig.5: Pie chart depicting the frequency of the responses to the question, "Is your occupation related to driving?". 53% of the participants' occupation were related to driving (blue), 47% of the participants' occupation were not related to driving (green).

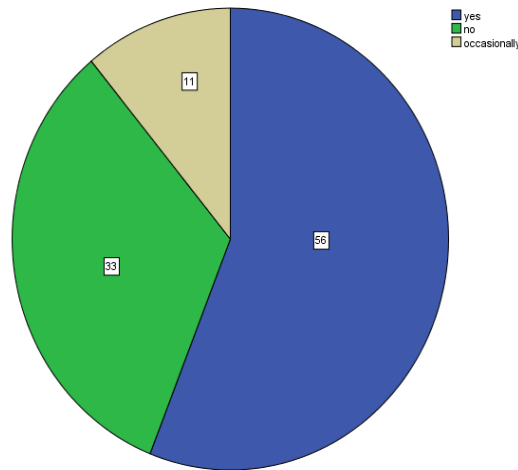


Fig.6: Pie chart depicting the frequency of the responses to the question, "Do you use a mobile phone while driving ?". 55% of the participants use mobile phones while driving (blue), 33% of the participants responded that they won't use mobile phones while driving (green) and 11% of the participants responded that they use mobile phones occasionally while driving (brown).

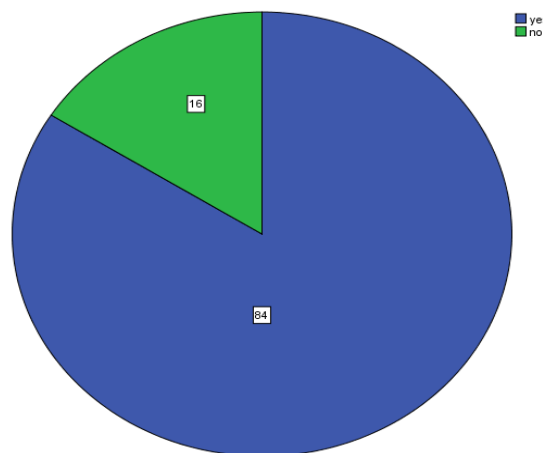


Fig.7: Pie chart depicting the frequency of the responses to the question, "Do you use bluetooth or headphone while driving ?". 84% of the participants use bluetooth or headphones while driving (blue), 16% of the participants responded that they won't use bluetooth or headphones while driving (green)..

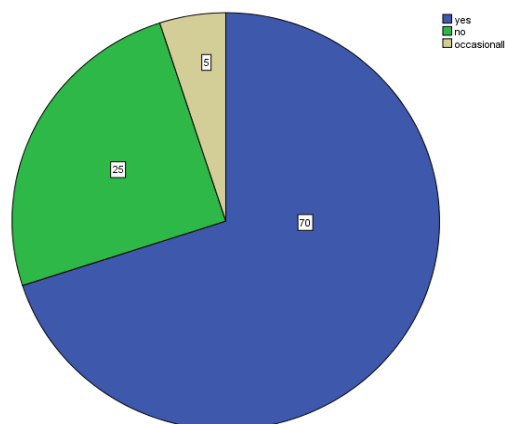


Fig.8: Pie chart depicting the frequency of the responses to the question, "Do you get distracted while driving while talking on the phone ?". 70% of the participants get distracted while talking on the phone (blue), 25% of the participants responded that they won't get distracted while talking on the phone (green) and 5% of the participants responded that they get distracted occasionally while driving (brown).

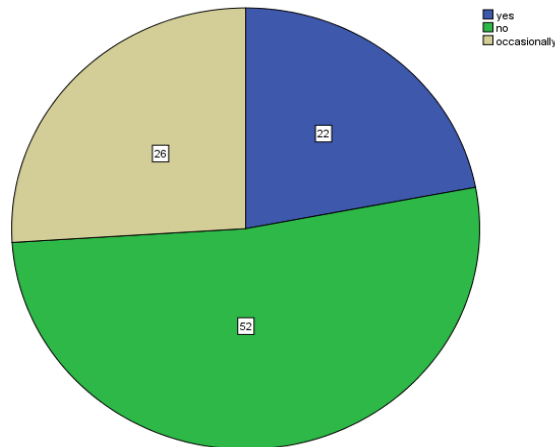


Fig.9: Pie chart depicting the frequency of the responses to the question, "Do you rash drive?". 52% of the participants responded that they don't rash drive (green), 28% of the participants responded that they rash drive occasionally (brown) and 22% of the participants responded that they don't rash drive (blue).

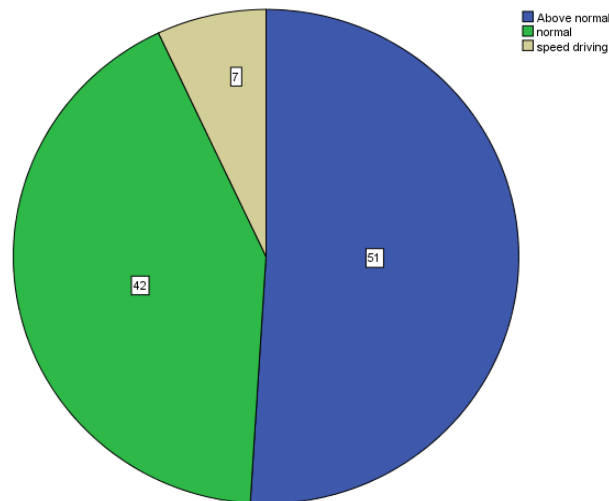


Fig.10: Pie chart depicting the frequency of the responses to the question, "How is your speed while driving?". 51% of the participants responded above normal speed (blue), 42% of the participants responded that they drive at normal speed (green) and 7% of the participants responded that they usually drive very fast (brown).

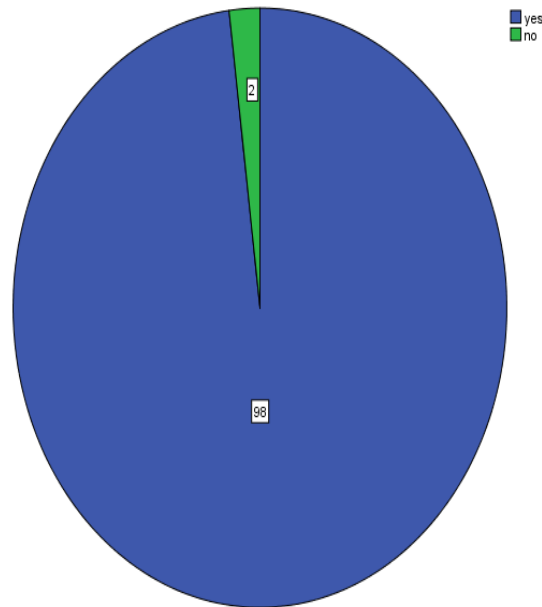


Fig.11: Pie chart depicting the frequency of the responses to the question, "Do you use a mobile phone while driving results in a high rate of accidents?". 98% of the participants are aware that there are high rates of accidents due to mobile phone usage while driving (blue), 2% of the participants responded that they are not aware of a high rate of accidents due to mobile phone usage while driving (green) .

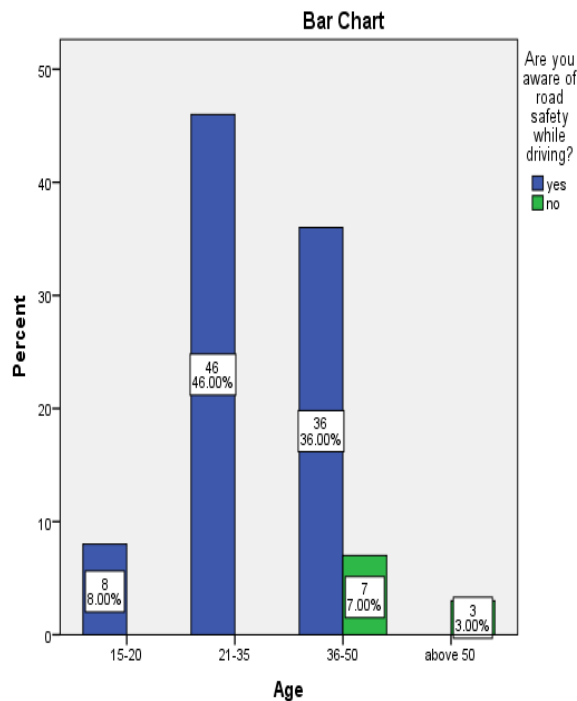


Fig.12: Bar chart showing association between age and awareness on road safety while driving. The X-axis represents age and the Y-axis represents the percentage of responses of participants. . All the age categories are equally aware about road safety while driving. Chi square test showing $p=0.00$ ($p>0.05$ indicating statistically significant).

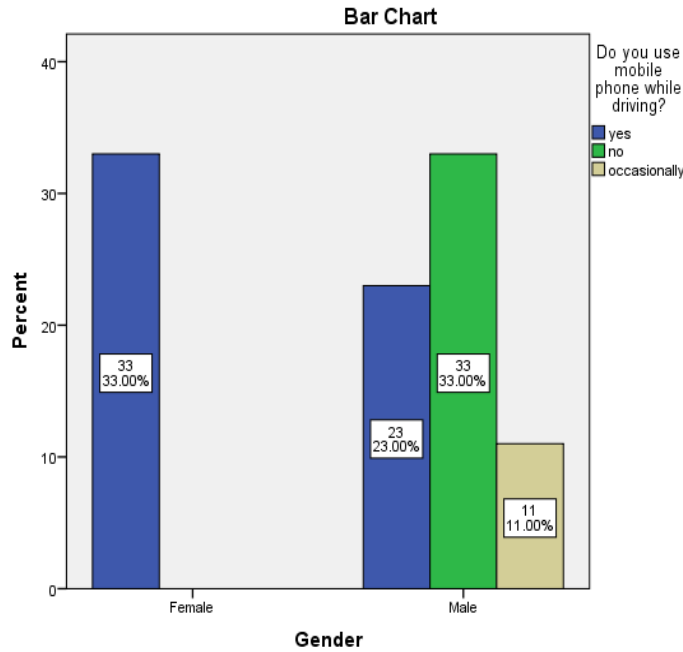


Fig.13: Bar chart showing association between gender and do they use mobile phones while driving . X-axis represents gender and Y-axis represents percentage of responses of participants. 23% males and 33 % females responded that they use mobile phones while driving (blue) and 33% responded that they don't use mobile phones while driving (green) and 11% responded that they use mobile phones occasionally while driving (brown) . Both male and female participants were equally aware about dementia. Chi square test showing $p=0.00$ ($p>0.05$ indicating statistically significant).

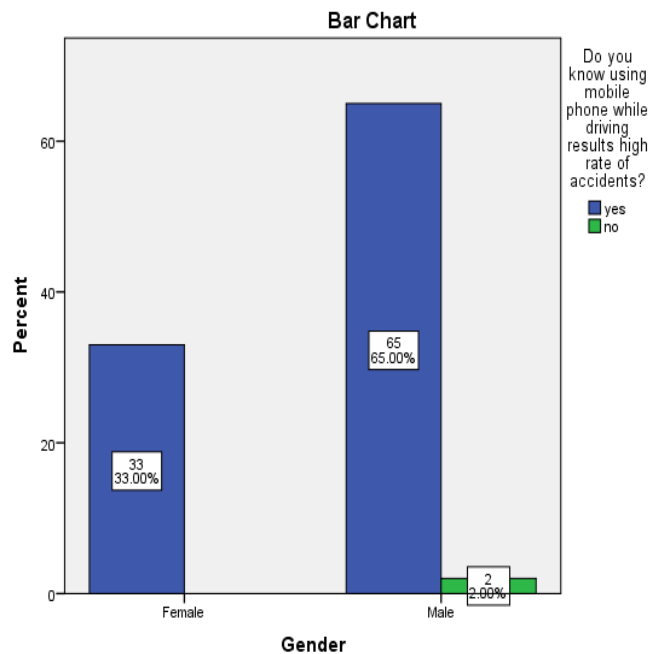


Fig.14: Bar chart showing association between gender and using mobile phone while driving results in a high rate of accidents . X-axis represents gender and Y-axis represents percentage of responses of participants. 65% males and 33 % females responded that they know using mobile phones while driving increases accidents (blue) and 2% of male population responded that they are not aware (green). Chi square test showing $p=0.31$ ($p>0.05$ indicating statistically not significant).