Knowledge, Attitude and Social Behaviour about the Use of Disposable Breath Analyzers for Preventing Road Accidents Due to Drink and Drive - A Cross-Sectional Study in Delhi-NCR

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Abstract: **India has earned the dubious distinction of having the highest number of fatalities due to road accidents in the world. Road safety is, therefore, emerging as a major social concern around the world especially in India. Drinking and driving is already a serious public health problem, which is likely to emerge as one of the most significant problems in the near future. The methodologies applied to prevent road accidents are, therefore, of major concern. The present study explored the awareness, knowledge and behaviour about the practice of road safety related to drinking and driving with the use of breath analyzers. To our knowledge this is the first study on creating awareness along with the disposable breath analyzer among a large population in Delhi-NCR. Overall 603 respondents participated in this study having different socio-demographic profiles. In all, 83% of respondents were aware about the use of breath analyzers and that they are useful tools for preventing road accidents. Almost half the respondents (52.1%) stated that the digital breath analyzers available in India, for multiple-use, could be a source of infection. Our results significantly point towards the need of single-use, disposable breath analyzers for preventing road accidents due to drink and drive, which has multiple benefits in terms of low cost, safety and being portable.**

Key words: Disposable Breathe Analyzer, Road Safety, Hygiene, Inexpensive, Portable

INTRODUCTION

Road safety has been one of the major social concerns of the last decade especially in India. Drinking and Driving is likely to emerge as one of the most significant public health problems in near future. WHO predicts that road traffic injuries will rise to become the fifth leading cause of death by 2030 [1]. India suffers from the highest number of deaths - around 1,32,000 people killed in 2010 (An average of 336 per day) [2]. A study conducted by Alcohol & Drug Information Centre (ADIC), India revealed that around 40% of the road accidents have occurred under the influence of alcohol. After drinking, the judgment power of the driver gets impaired which is a threat to road safety [3].

Road related accidents cost India millions every year, but there is no sign of any possible intervention. In an alarming revelation, the Global Status report on alcohol and health 2014, released by the World Health Organization (WHO) states that the amount of alcohol consumption has raised in India between the periods of 2008 to 2012 [4]. In India, Kerala accounts for the country's highest consumption of alcohol followed by Maharashtra and Punjab. Jammu and Kashmir records the 'lowest' alcohol consumption [5].

In a report for WHO, a multi-centre collaborative study – 'Injury and Alcohol' was conducted by the National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore, which revealed that the proportion of injuries 'linked' to alcohol use was 58.9% of all injuries with 24% due to self drinking and 35% due to drinking by others. It was found that on the types of injuries amongst alcohol users, 46% was due to road accidents [6].

A study from Kerala State conducted by the Alcohol & Drug Information Centre revealed that around 40% of road accidents have occurred because the driver was under the Influence of alcohol. In the case of accidents on National Highways, more than 72% were related drink and drive. In a survey done at Delhi by the Directorate of Prohibition, it was found that 45% of vehicles are driven by drivers who had consumed alcoholic drinks. Car owners who attend dinners /parties tend to get drunk, indulge in rash driving and are unable to control the vehicle and meet with accidents. About 60% and 65% of accidents are being caused by drunken drivers of cars and two wheelers respectively during the night and early hours of the morning [7].

In UK, around 40% of patients admitted to Accident and Emergency departments (A&E) are diagnosed with alcohol-related injuries or illnesses. During the year 2001, over 16,000 motor vehicle fatalities and 310,000 injuries in the United States involved alcohol and a high

proportion of these events involved adolescents and young adults.

The need of the hour is to strengthen the National Information Centre with appropriate knowledge, skill techniques and resources to include information on driving under the influence of alcohol as an important element in road safety information systems with police and health sectors. In this regard, proper laws need to be devised and implemented effectively.

The first law banning drinking and driving was introduced in Norway in 1936 that set a legal limit of 50mg/100ml for safe driving. Many countries have since followed suit and introduced similar legislation. However, many are only considered to be moderately successful. India has introduced the law of Indian Motor Vehicles Act in 1914 and replaced it with a Motor Vehicle Act of 1934. The Motor Vehicle Bill having passed by both the Houses of Parliament, received the assent of the President on 14th October, 1988.

According to the Motor Vehicle Act of 1988, the Law Commission of India says that "Driving by a drunken person or by a person under the influence of drugs, whoever while driving, or attempting to drive, a motor vehicle, (a) has, in his blood, alcohol exceeding 30 mg per 100 ml of blood detected in a test by a breath analyzer, or (b) is under this influence of drug to such an extent as to be incapable of exercising proper control over the vehicle, shall be punishable for the first offence with imprisonment for a term which may extend to six months, or with fine which may extend to two thousand rupees, or with both; and for a second or subsequent offence, if committed within three years of the commission of the previous similar offence, with imprisonment for a term which may extend to two years, or with fine which may extend to three thousand rupees, or with both."

The situation is alarming and calls for quick actions to be taken in India for awareness about don't drink and drive and it calls for transport department of India to take strict actions and measures to control the situation. Around 70% of road accidents due to drink and drive in India are done by drivers of transporters and public transport systems.

The only way to put a ceiling on these road accidents in India is to make Indian Traffic Police & Ministry of Road Transport & Highways more efficient in implementing laws related to drinking & driving. However, even though we have enough traffic police officials but we don't have so many devices to check and catch people when they drink and drive.

In the light of the above, World Healthal Trust (WHT) took an initiative of carrying out a research survey in Delhi-NCR to investigate the Knowledge, Attitude & Behaviour of the general public for the use of disposable breath analyzers to prevent road accidents. The

present study also served as an advocacy initiative for enhancing awareness of the people at large on the use of disposable breath analyzer as a road safety device.

METHODOLOGY

A questionnaire based cross-sectional research survey was done at Delhi-NCR region to investigate the Prevalence, Knowledge and Attitude of the general public towards the use of a disposable breath analyzer, having registered trade name, Sensi drive, d*isposable breath analyzer*, as a road safety device. This multicentric study was carried out in Greater Noida, Noida, Delhi and Ghaziabad covering Colleges, Universities, Petrol Pumps, Metro Stations, Shopping Malls and Residential Colonies. Overall 603 respondents were included in this survey having different socio-demographic profiles. The majority of respondents were Students followed by Businessmen, Teaching faculties, IT Professionals, Medical professionals, Drivers and Homemakers.

Research Tool: A self-administered questionnaire was designed and used to investigate the Prevalence, Knowledge and Attitude of the people towards the use of disposable breath analyzer as a road safety device. All the data were entered and cross checked thrice to avoid any error during the data entry and analyzed using the SPSS 21 research software.

RESULTS AND DISSCUSSION

Out of 603 respondents, maximum (59.5 %) respondents were from Greater Noida and minimum (1.3%) were from Ghaziabad. As the results shown in Figure 1a and 1b, it was observed that maximum 72% respondents were from student category and maximum respondents were from the age group from 18-25 years.

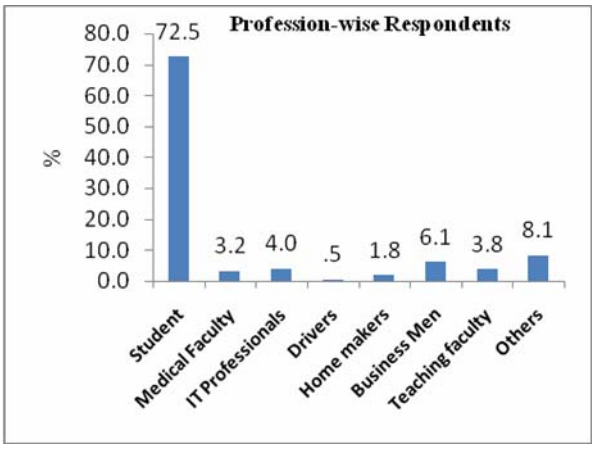


Figure 1a-Total number of Profession-wise Respondents

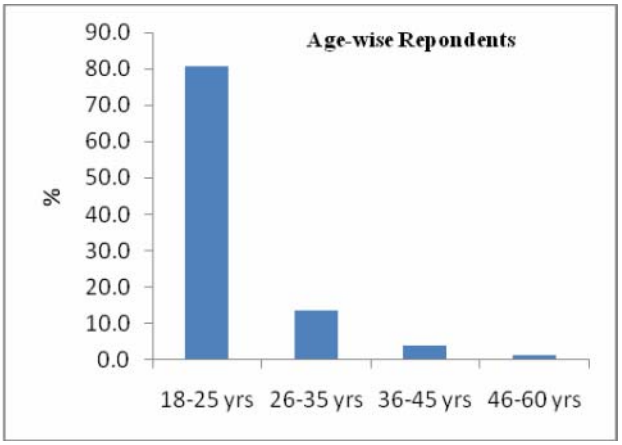


Figure 1b-Total number of age-wise Respondent

Prevalence, Awareness and Behaviour of public on Drink and Drive:

According to the data collected, significant prevalence for drink and drive was observed in the age group of 18-25, indicating that self-breath analyzer test is necessary for road safety

for everyone. As per Table 1, significant 26% prevalence for drink and drive was observed under the age of 18-25, indicated that self-breath analyzer test is necessary for everyone's safety. The majority of people (84%) responded that *disposable breath analyzer* will help to save one's life. More than 70% of respondents said that a safe breath analyzer will reduce the number of accidents. Based on location and profession, a majority of respondents agreed that they are not safe while driving after drinking alcohol. More than 60% of respondents said that there is a need to have a breath analyzer in their vehicle while driving.

Table: 1 Age-wise public behavior on road safety (Total n=603)

S.NO	ATTENDED QUESTIONS	FREQUENCY (YES)	PERCENTAGE (%)
1.	Driving safely after drunk(personal)	153	26.2
	AGEWISE(Years)		
	18-25	131	27.0
	26-35	20	24.0
	36-45	6	24.0
	46-60	1	11.0
2.	Necessity to carry self-test breath analyzer	380	63.0
	AGEWISE(Years)		
	18-25	301	62.0
	26-35	58	70.0
	36-45	15	60.0
	46-60	6	67.0
3.	Can disposable breath analyzer control road accident and save everyone's life	501	83.1
	AGEWISE(Years)		
	18-25	406	84.0
	26-35	66	80.0
	36-45	21	84.0
	46-60	8	89.0
4.	Meet any accidents in the past after drunk	95	15.8
	AGE-WISE(Years)		
	18-25	77	16.0
	26-35	12	14.0
	36-45	05	20.0
	46-60	01	11.0

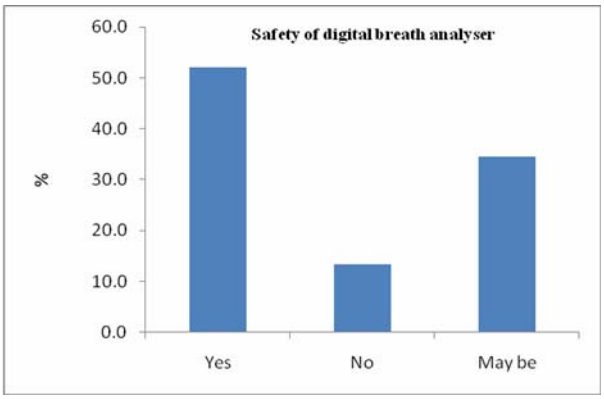
The table-2 shows the knowledge and awareness about the breath analyzer and the data collected shows that 61.7% of the respondents were aware of the breath analyzer and 52.1%

reported that digital breath analyzer can cause infections. Nearly 40% respondents were not having the knowledge of any breath analyzer.

Table:2 Age-wise knowledge and awareness on road safety

S.No	Attended question	FREQUENCY (YES)	PERCENTAGE (%)
1.	Have you heard of breath analyzer	372	61.7
	AGEWISE(Years)		
	18-25	303	62.0
	26-35	50	60.0
	36-45	14	56.0
	46-60	05	56.0
2.	Can digital breath analyzer used by police can cause infections as one device used for several people?	314	52.1
	AGEWISE(Years)		
	18-25	252	50.0
	26-35	51	61.0
	36-45	14	56.0
	46-60	07	78.0

As per figure 2a and 2b, only 50% of people said that the digital analyzer is safe to reduce number of accidents and more than 70% respondents knew that the police can test with breath analyzer at anytime. As per Figure 2c, around 70% of the respondents mentioned *Disposable breath analyzer* under the category of: "GOOD" and more than 20% reported *Disposable breath analyzer* as an excellent product.



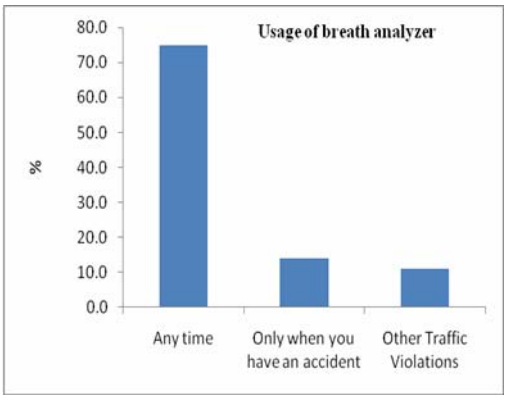


Figure 2a: Overall safety view of digital breath analyzer

Figure 2b: Overall view of usage of breath analyzer

It is noted that a majority of people in the age group of 45-60 have rated the product to be "excellent" (Figure 2d). Fig 2e shows that a majority of all categories rated the disposable breath analyzer "good", as indicated by all professionals.

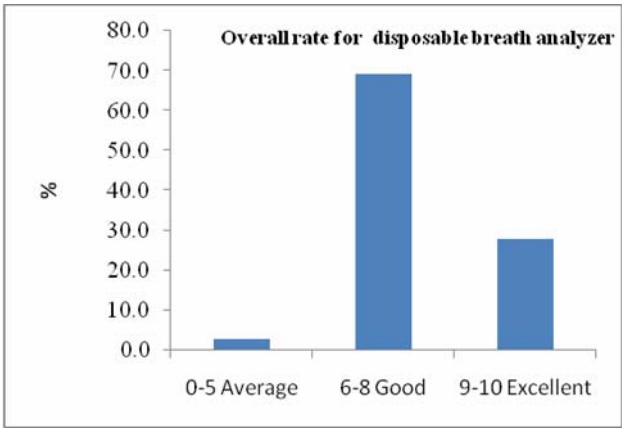


Figure 2c: Overall results for *Disposable breath analyzer* rating

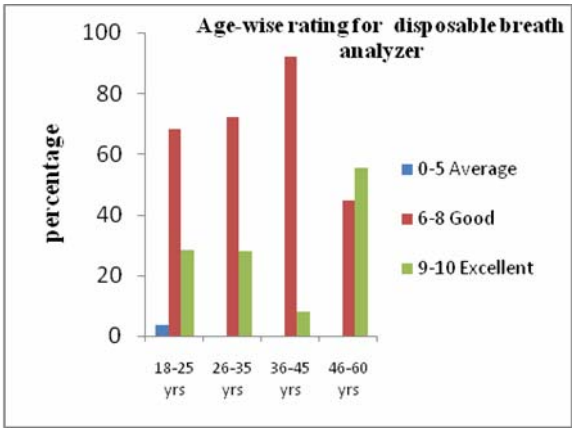


Figure 2d: Age-wise rating for *Disposable breath analyzer*

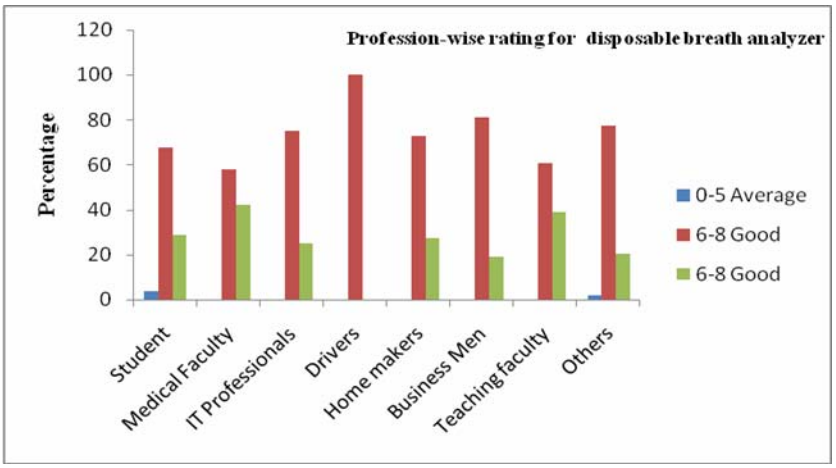


Figure 2e: profession-wise rating for *Disposable breath analyzer*

Results based on Prevalence, Awareness and behavior of public on drink and drive:

It came to light that 63% of respondents considered it to be necessary to carry disposable breath analyzer with them while driving. A significant number (83%) of respondents had awareness that *Disposable breath analyzer* will prevent road accidents. Only 26% of respondents mentioned that they could drive safely after drinking alcohol.

Results based on Behavior:

Several respondents (61%) reported that they were aware about breath analyzers and 52% had the knowledge that digital breath analyzer used by police can ca9use infections.

Results based on practice:

A large number of respondents (65%) reported that they were ready to buy the disposable breath analyzer in order to prevent accidents. More than 70% people were also ready give the disposable breath analyzer as a gift to others.

DISCUSSION

The main aim of this study was to examine social behaviour, attitude and knowledge of road safety and acceptance of disposable breath analyzer as a potent tool by the general public to reduce road accidents associated with drinking and driving. Analysis of the data involved dividing respondents into groups based on their age, location and professions.

The survey questionnaire took less than five minutes to complete, which was half the time in comparison to the survey conducted by Accident Research Centre, Monash University on "An Exploratory Investigation of Aspects of Drink-Driving and Enforcement in Rural Area of Victoria".

The device used for roadside testing is called an alcohmeter. Failure to pass the roadside test cannot by itself lead to conviction for drunk driving. The police has the right to check the alcohol content of a person through digital breath analyzer. The results of this survey show that the use of disposable breath analyzer, carried by people in their vehicle while driving, could significantly reduce road accidents.

Availability of single-use/disposable breath testing devices has been widespread throughout Europe for over 20 years, and Sécurité Routière (the French Government's National road safety body) has continually promoted their use within numerous road safety campaigns during this time. The new legislation is an emphatic indication that the use of such devices directly leads to a reduction in the incidence of road accidents caused by drinking and driving, and resultantly, it will deliver a significant social and economic benefit to the community [8].

All the countries in the world are affected by youth road traffic accidents. The resolution is simple but the act requires readiness and actual intervention through the involvement of many private sectors and their respective governments. It is found that 54% respondents will not drive if they were drunk but as per the study of National Survey of Drinking and Driving (NSDD) Attitudes and Behaviors in U.S, it is quoted that one out of five are drunk-drivers. It is also stated that about 21% of the driving age public has driven a motor vehicle within two hours of consuming alcoholic beverages. NSDD reports two in ten (17%) persons of driving age were involved in a motor vehicle crash as a driver and also a majority (63%) of persons of driving age believes that they, themselves, should not drive after consuming more than two

alcoholic beverages. The present disposable breath analyzer report shows that 53% persons of driving age believe that they themselves should not drive after consuming alcohol.

Recently study was done in Iran to determine the role of human factors in traffic crashes and results shows that the most prevalent risk factors leading to death within cities were "Disregarding traffic rules and regulations" (45%), "driver rush" (31%) and "alcohol consumption" (12.3%). Using the proportional odds regression model, alcohol consumption was the most significant human risk factor in traffic crashes within cities (OR: 6.5, 95% CI: 4.88-8.65) and out of cities (OR: 1.73, 95% CI: 1.22-3.29) [9].

In the survey of New South Wales (NSW), 87% shows that RBT helps in reducing the drunk-driving. Research on Knowledge, Attitudes and Reported Behavior on Drink-Driving in New South Wales (NSW) survey results shows a high-acceptance (98%) of drunk-driving counter measures and strong public opposition to drunk-driving in the context of their current laws. The replica of the result is seen in the present survey where 81% of the public strongly accepted the new disposable breath analyzer. In the present survey, 83% respondents believed that disposable breath analyzer helps to reduce road accidents and drunk-driving. The survey also revealed that 40% of drunk drivers were caught red-handed by the police.

The above discussion shows that people are in need of a disposable breath analyzer which is low cost, portable and poses no risk of infection. However, disposable breath analyzer can reach the people at large only if the government makes necessary rules and regulations, supporting the use of this tool to avoid road accidents and drunk-driving.

SAFETY FEATURES OF DISPOSABLE BREATHANALYZERS

Disposable breath analyzer, the breath analyzer introduced in the survey, is low cost and 100% safe as it is disposable. In digital breath analyzers there are chances of infection because of its mouthpiece. If the mouthpiece is changed on every test, there remains some vapor on the sensor from the previous person's breath, which increases the chance of spreading communicable diseases like T.B., Flu, etc.

Traditionally, passive breathalyzers are cone or torch-shaped and have to be held very close to the subject's mouth to get a breath sample. The subject's breath is channeled down the cone-shaped tunnel and is often reflected back into the subject's face. This is referred to as the blowback effect. The result is that bacteria or germs are trapped inside the "cone" and this increases the risk of transmitting infectious diseases.

BENEFITS OF DISPOSABLE BREATHANALYZERS

1. ACCURACY OF RESULTS

The Alcohol Breathalyzer test uses an internationally accepted breath testing principle to indicate the ingestion of alcohol. The disposable tube contains yellow crystals, which turn green in the presence of alcohol. When a measured volume of breath is passed through the tube, the length of the green color change indicates above or below the legal driving limit. Any green color change indicates the presence of alcohol in a person's breath.

2. BENEFIT OF USING A QUICK BREATHALYZER ALCOHOL TEST

The use of alcohol when driving or operating heavy machinery is not just dangerous for the person involved but also for those around them. This is where disposable alcohol breathalyzer test comes in handy to do a quick test.

3. SELF ASSESSMENT BY DRIVER

Anyone can self assess the over limit of alcohol consumption.

4. SAVES FROM PENAL PROCEDURES AND ACCIDENTS

If someone knows that his/her blood alcohol concentration is over the limit and avoids driving then this breath analyzer could save such persons from penal provisions and accidents.

5. HYGIENIC

Disposable breath analyzer is assured of good hygiene and is inexpensive, making it accessible to both the public and traffic regulating authorities.

7. CERTIFIED

Disposable breath analyzer is quality approved and certified for accuracy by the FDA, USA, Standards Australia, French NF and German TUV.

Table: 3 A COMPARISION CHART DIGITAL versus DISPOSABLE BREATH ANALYZERS

S. No.	Digital Breath Analyzer	Disposable Breath Analyzer
1	Heavy and costlier	Safe and Disposable
2	Calibration required	No calibration required
3	Not much environment friendly	Eco-friendly
4	Mouthpieces required	No Mouthpieces required
5	Sensor is required and shall require maintenance	No sensor required
6	Battery needs to be changed	No need to change batteries
7	Cannot used by mass of people	It is easy to carry and can be kept

		anywhere and can be used by masses

CONCLUSION

Our study points to important areas related to awareness, knowledge, behaviour and practice of road safety related to drinking and driving, with focus on the usage of breath analyzers. So far such study has not been reported in India. The findings warrant the need of disposable breath analyzer to prevent road accidents occurring due to drunk-driving. A majority of professionals from various fields were optimistic that this breath analyzer could save many lives from road accidents.

The most effective measures to reduce alcohol related road traffic accidents are routine blood alcohol screening performed by breath analyzers, lowering the legal level of blood alcohol concentration, supported by deterrence through unrestricted powers to breathe test. Lower legal levels of blood alcohol concentrations are effective for young and inexperienced drivers. License suspension and vehicle actions can be effective in reducing reoccurrence of alcohol related road traffic accidents, when combined with remedial programmes [10].Comprehensive community based programmes that combine media campaigns, educational campaigns and responsible serving practices, although expensive, can lead to further reductions in drunk-driving fatalities. In addition, road-side liquor shops and bars should be shifted, minimizing their use by drivers.

Enforcement of drunk–driving laws has been shown to be more effective when it includes random breath tests (RBT) for all drivers (not just those suspected of drinking), and when it is carried out at times and in locations when drunk–driving is more likely to occur. Such measures that increase drivers' perception of the likelihood of being apprehended are crucial to the success of this intervention [11]. RBT is a minimally intrusive, cost-effective, and publicly accepted impaired driving counter measure and that it would significantly improve the detection and deterrence of impaired drivers [12]. In addition, the introduction of disposable breath analyzer will reduce the number of accidents. In order to introduce the new breath analyzer, the Traffic Police and the Ministry of Road Transport & Highways need to support the process of validation and calibration of the new disposable breathe analyzer, field tested in the present survey, so that the road accident by drunk-drive could be minimized.

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REFERENCES:

[1] Global status report on road safety: time for action. Geneva, World Health Organization,2009.www.who.int/violence_injury_prevention/road_safety_status/2009

[2] T. Sivakumar and R. Krishnaraj. Road traffic accidents (rtas) due to drunken driving in India- challenges in prevention. IRACST- International Journal of Research in Management & Technology, 2012; (2): 401-406.

[3] Drinking and Driving: a road safety manual for decision-makers and practitioners. Geneva, Global Road Safety Partnership, 2007.

[4] Alcohol consumption in India on the rise: WHO report By A Correspondent Posted 15-May-2014.http://www.mid-day.com/articles/alcohol-consumption-in-india-on-the-rise-who-report/15299173#sthash.UFhI8EDt.dpuf.

[5] Manisha Ruikar. National statistics of road traffic accidents in India. Journal of Orthopaedics, Traumatology and Rehabilitation 2013; (6): 1-6

[6] Rajasekaran S. The Alarming facts of Road Accidents in India. Report on behalf of Indian Orthopedic Association.

Available from: http://ioaindia.org/ROADTRAFFICACCIDENTS.pdf

[7] Neelima Chakrabarty, Kamini Gupta and Ankit Bhatnagar. A survey on awareness of traffic safety among drivers in Delhi, India. The SIJ Transactions on Industrial, Financial & Business Management 2013; 106-110.

[8] A Eurocare Report to the European Union.

www.eurocare.org/content/download/2955/15514/.../drinkdriving.pdf

[9] Mahmood Bakhtiyari, Ali Delpisheh, Ayad Bahadori Monfared,Mohammad Hassan Kazemi-Galougahi, Mohammad Reza Mehmandar, Mohammad Riahi, Masoud Salehi, Mohammad Ali Mansourni. The road traffic crashes as a neglected public health concern; an observational study from iranian population. Traffic Injury Prevention 2014; (4) 24:1-6.

[10] Ashish Verma, S. Velmurugan, Neelima Chakrabarty & Sushma Srinivas. "Recommendations for Driver Licensing and Traffic Law Enforcement in India Aiming to Improve Road Safety", Current Science, 2011; (100): 9, 10.

[11] WHO, Global Status Report on Road Safety, Supporting a decade of action, 2013.

[12] R. Solomon, E. Chamberlain, M. Abdoullaeva, and B. Tinholt. Random Breath Testing: A Canadian Perspective. Traffic Injury Prevention, 2011; (12):111–119.

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