

## RESEARCH ARTICLE

# Role of Tobacco Warning Labels in Informing Smokers about Risks of Smoking among Bus Drivers in Mangalore, India

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### Abstract

**Background:** Smoking tobacco is considered as a leading cause of preventable death, mostly in developing countries like India. One of the primary goals of international tobacco control is to educate smokers about the risks associated with tobacco consumption. Tobacco warning labels (TWLs) on cigarette packages are one of the most common statutory means to communicate health risks of smoking to smokers, with the hope that once educated, they will be more likely to quit the habit. **Materials and Methods:** The present survey was conducted to assess the effectiveness of TWLs in communicating health risks of tobacco usage among 263 adult smokers working as bus drivers in Karnataka State Road Transport Corporation (KSRTC), Mangalore, India. Information was collected on demographic details, exposure and response to health warnings on tobacco products, intention to quit and nicotine dependency. **Results:** The majority (79.5%) of the respondents revealed negative intentions towards quitting smoking. Nearly half of the participants had a 'low' nicotine dependency (47.5%) and 98.1% of the respondents had often noticed warning labels on tobacco packages. These health warnings made 71.5% of the respondents think about quitting smoking. Respondents who noticed advertisement or pictures about dangers of smoking had better knowledge, with respect to lung cancer and impotence as a consequence of tobacco. A higher exposure to warning labels was significantly associated with lower nicotine dependency levels of smokers among the present study population. A significantly higher number of respondents who noticed advertisement or pictures about the dangers of smoking thought about the risks of smoking and were more inclined to think about quitting smoking. As exposure increased, an increase in the knowledge and response of participants was also observed. **Conclusions:** Exposure to tobacco warning labels helps to educate smokers about health risks of tobacco smoking. It may be possible to promote oral health among bus drivers by developing strategies to educate them about these risk factors.

**Keywords:** Tobacco warning labels - bus drivers - smoking - nicotine dependence

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### Introduction

The World Health Organization has identified tobacco use as the leading global cause of preventable death, killing almost 6 million people every year and causing huge economic damage worldwide. Most of these deaths occur in the low- and middle-income countries and this disparity is expected to widen over the coming decades (WHO, 2011).

India bears a significant portion of this global tobacco burden with smoked and smoke-less (chewed and inhaled) forms of tobacco being highly prevalent among men (47%) and women (14%) (Bhan et al., 2012). More than 24 different tobacco related chronic and terminal diseases, including different forms of cancers, cardiovascular and respiratory diseases, destructive periodontitis and various other systemic ailments have been identified (CDC, 2004; Rao et al., 2013). Hence, development of effective

smoking cessation programs becomes necessary to protect people from contracting tobacco-related diseases and premature deaths (Jayakrishnan et al., 2013; Lin et al., 2013).

Smoking behaviour depends on the extent to which smokers understand the magnitude of these health risks (Kerr et al., 2006). Smokers perceiving greater risks are more likely quit smoking successfully (Sansone et al., 2012). Awareness of risks is the most commonly cited motivation to quit smoking, both by current and former smokers. It is also a better predictor for long-term abstinence before quitting (Hammond et al., 2004a; Hyland et al., 2004) and adopting healthy life styles has ever been associated with decreased development of chronic morbidities related to smoking (Tayyem et al., 2013; Luqman et al., 2014).

Communicating health effects of smoking remains a primary goal of tobacco control policy (CDC, 2007).

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Tobacco warning labels (TWLs) are one of the most common statutory means to communicate health risks of smoking; assuming that, once educated, smokers will be more likely to quit the habit. Article 11 of the WHO framework convention on tobacco control (FCTC) requires that health warning labels on tobacco packaging conform to specified characteristics, including that they cover at least 30% and preferably 50% of principal pack display areas; be large, clear and legible and be rotated by using multiple warnings concurrently or by introducing new warnings periodically (WHO, 2011). Graphic warning labels have been reported to increase cessation behaviour among smokers (Borland, 1997; Hammond et al., 2003; Hammond et al., 2004b). However, despite their prominence among tobacco control policies, very few studies have evaluated the impact of TWLs on consumer knowledge about tobacco risks, especially among lower socioeconomic groups.

Bus drivers form an important group belonging to the lower socioeconomic strata, which need to balance the competing demands of safety, service and regulations. Bus drivers are also one of the professions with high stress (Bathija et al., 2014) and studies show that prevalence of tobacco smoking is higher among bus drivers (Goon and Bipasha 2014; Udayar et al., 2014). To our knowledge, there has been no previous study conducted to assess the awareness of tobacco related risks among bus drivers exposed to warning labels.

Hence the present study was conceptualized to evaluate the role of tobacco warning labels in informing bus drivers in Mangalore about the risks of smoking.

## Materials and Methods

A cross sectional survey was conducted among 263 bus drivers of Karnataka State Road Transport Corporation (KSRTC), Mangalore Division, Karnataka, India. Ethical approval was obtained from the Institutional Ethics Committee, Manipal College of Dental Sciences, Manipal University (Ref no: MCODES/198/2013) and written informed consent was obtained from the participants. Data was obtained over a duration of three months (July to September 2013) and included bus drivers who smoked at least 100 cigarettes/bidis in their life and smoked at least 1 cigarette/bidi in the past 30 days.

The instrument was a self-administered, close ended, pre-validated questionnaire adapted from the International Tobacco Control-4 country survey (Hammond et al.,

2006). Demographic details such as age, gender, education level, work experience and tobacco history was obtained from the respondents. Information about their exposure and response to different warning labels on tobacco packages, their knowledge about various systemic effects caused by smoking, intention to quit smoking and level of nicotine dependence was also obtained. Respondents were asked three questions about exposure to health warnings and three questions to measure their response to product warnings. To identify their knowledge of health effects, respondents were asked whether they believed smoking might cause heart disease, stroke, impotence, lung cancer in smokers, and lung cancer in non-smokers. They were also asked whether they knew if chemicals like cyanide, arsenic, and carbon monoxide were included in cigarette smoke. Intention to quit was assessed with a single question: "Are you planning to quit in the next month, 6 months, beyond 6 months, or not at all?" The level of tobacco dependence was assessed using the Fagerstrom Test for Nicotine Dependence (FTND) (Heatherton et al., 1991).

Translation and adaptation of the questionnaire to the local language (Kannada) was done using forward-translations and back-translations as recommended by WHO (WHO, 2013). Reliability of the questionnaire was tested by a pilot study on 10 respondents who were representative of the study subjects but not included in the study ( $k=0.85$ ).

The SPSS version 11.5 (SPSS Inc., Chicago, IL, USA) was used for all statistical analyses. Pearson's correlation analyses and Chi-square test were used to determine the association between the exposure to tobacco warning labels, health knowledge and response variables. Statistical significance was established at  $p<0.05$ .

## Results

Of a total population of 658 bus drivers, 270 fulfilled inclusion criteria, whereas 263 respondents consented to participate (response rate of 97.4%). Majority of the participants were aged less than 35 years (54%), had an education of secondary schooling or less (62.7%) and a duration of smoking habit of 11-20 years (41.8%).

98.1% of the respondents had 'often' noticed warning labels on tobacco packages and 88.6% had read or looked closely at them, only 68.4% had noticed advertisement or pictures about dangers of smoking on tobacco packages. Analysis of participant's response to tobacco warning

**Table 1. Exposure and Response to Tobacco Warning Labels, Intention to Quit and Nicotine Dependence**

Exposure	Subjects who had often noticed warning labels on tobacco packages in the past month	258 (98.1)
	Subjects who had often read/ looked closely at the warning labels in the past month	233 (88.6)
Response	Subjects who had noticed advertisement or information about the dangers of smoking	183 (68.4)
	Did the health warning on tobacco product anytime stop you from smoking/ having cigarette?	171 (65)
	Did the health warning make you think about the health risks of smoking?	186 (70.7)
Intention to quit	Did the health warning anytime lead you to think about quitting smoking?	188 (71.5)
	No	54 (20.5)
	Yes	209 (79.5)
Nicotine dependence (FTND)	No dependence	40 (15.2)
	Low dependence	125 (47.5)
	Moderate dependence	84 (31.9)
	High dependence	14 (5.3)

\*values in () indicate percentage

labels revealed that, 65% of the respondents reported that the health warnings on the package stopped them from smoking cigarette at some time or the other. About 71% of them reported that, warning labels made them think about the health risks of smoking and also about quitting smoking, although majority (79.5%) of the respondents revealed negative intentions towards quitting smoking. Nearly half of them had 'low' dependency (47.5%), 31.9% exhibited 'moderate' dependency and a minor proportion of the participants (5.3%) belonged to the 'high' dependency group. About 15% belonged to the 'no' nicotine dependence group (Table 1).

Analysis of knowledge regarding health risks and tobacco constituents indicated that majority of the participants knew that smoking was a risk factor for lung cancer (74.5%), heart disease (69.6%) stroke and lung cancer in non-smokers (63% each). However, only less than half the participants (46.4%) knew that smoking could lead to impotence. The knowledge of the participants regarding the constituents of tobacco smoke was also very low with not more than 25% of the population identifying

**Table 2. Association of Demographics with Tobacco Related Knowledge, Response, Nicotine Dependence and Plan to Quit**

	Knowledge	Response	Nicotine dependence	Plan to quit
Age	21.9 (0.01)*	7.28 (0.29)	2.26 (0.89)	1.64 (0.43)
Education	2.76 (0.73)	5.39 (0.14)	13.0 (0.00)*	0.01 (0.96)
Duration of habit	22.8 (0.01)*	6.87 (0.33)	2.83 (0.82)	5.73 (0.05)
Driving experience	17.9 (0.07)	10.1 (0.11)	2.81 (0.83)	1.90 (0.38)

\*Indicates significant at 5% level of significance (p<0.05); \*\*Chi square values (p values)

**Table 3. Association between Exposure to Tobacco Warning Labels and Knowledge, Quitting Behaviour and Nicotine Dependence Level**

Characteristic	Noticed TWL	Read/looked closely at TWLs	Noticed advertisement/pictures	
Knowledge	Heart disease	150 (58.1%)	163 (70%)	128 (71.1%)
	Stroke	125 (48.4%)	147 (63.1%)	120 (66.7%)
	Impotence	71 (27.5%)	105 (45.1%)	91 (50.6%)*
	Lung cancer in smokers	172 (66.7%)*	179 (76.8%)*	143 (79.4%)*
	Lung cancer in non smokers	123 (47.7%)	153 (65.7%)	123 (68.3%)*
	Cyanide	68 (26.4%)	87 (37.3%)	69 (38.3%)
	Arsenic	34 (13.2%)	54 (23.2%)	44 (24.4%)
	Carbon monoxide	41 (15.9%)	57 (24.5%)	44 (24.4%)
Response	Stop from smoking cigarette	171 (66.3%)*	160 (68.7%)*	139 (77.2%)*
	Think of risks of Smoking	186 (72.1%)*	174 (74.7%)*	147 (81.7%)*
	Think of quitting	188 (72.9%)*	175 (75.1%)*	150 (83.3%)*
Nicotine dependence	Planning to quit	207 (80.2%)	188 (80.7%)	145 (80.6%)
	No dependence	37 (14.3%)	36 (15.5%)	27 (15%)
	Low dependence	123 (47.7%)*	110 (47.2%)	91 (50.6%)
	Moderate dependence	84 (32.6%)	73 (31.3%)	53 (29.4%)
High dependence	14 (5.4%)	14 (6%)	9 (5%)	

\*Indicates significant at 5% level of significance (p<0.05); TWL= Tobacco Warning Label

**Table 4. Correlation of Exposure to TWLs and other Variables**

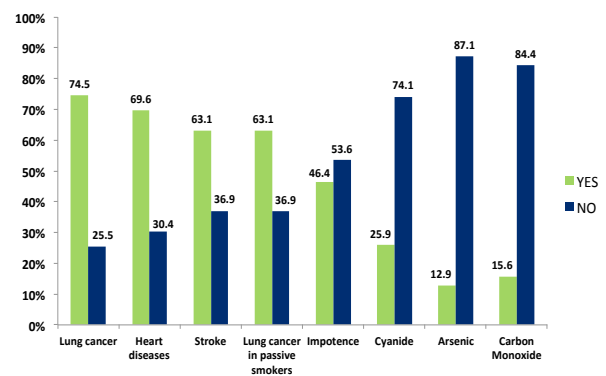
	Driving experience	Duration of habit	Exposure to TWLs	Response to TWLs	Knowledge of risks	Nicotine dependence
Driving experience	1	--	--	--	--	--
Duration of habit	r = 0.81**	1	--	--	--	--
Exposure to TWLs	r = -0.07	r = -0.13*	1	--	--	--
Response to TWLs	r = -0.11	r = -0.20**	r = 0.455**	1	--	--
Knowledge of risks	r = 0.05	r = 0.09	r = 0.22**	r = 0.20**	1	--
Nicotine dependence	r = -0.20	r = -0.04	r = -0.01	r = -0.17**	r = 0.06	1

\*Significant at 5% level of significance (p<0.05); \*\*Significant at 1% level of significance (p<0.01); TWL= Tobacco Warning Label

different toxic constituents of tobacco (Figure 1).

Analysis of demographic characteristics with tobacco related knowledge, response, nicotine dependency and plan to quit revealed that knowledge was significantly associated and increased (positively correlated) with age and with the duration of habit (p<0.05). Education was significantly associated with nicotine dependence, i.e., an increase in education resulted in lower nicotine dependence levels (p<0.05). However, driving experience did not show any relation with other tobacco variables (p>0.05) Table 2.

Table 3 demonstrates the association between 'exposure to TWLs' and knowledge of health risks, nicotine dependence level and quitting behaviour. Noticing advertisement or pictures about dangers of smoking led to better knowledge, with respect to lung cancer and impotence as a consequence of tobacco, when



**Figure 1. Knowledge of Participants' Smoking Related Risks and Smoke Constituents**

compared to just 'reading the TWLs' or only noticing labels ( $p < 0.05$ ). A higher number of respondents who noticed advertisement or pictures about the dangers of smoking thought about the risks of smoking and were more inclined to think about quitting smoking ( $p < 0.05$ ).

On comparing the exposure to TWLs with the nicotine dependence of smokers, we found that higher exposure to warning labels was significantly associated with lower nicotine dependence levels among smokers ( $p < 0.05$ ) (Table 3).

Pearson's correlation analyses revealed a significant positive correlation between exposure to TWLs and knowledge and response ( $p < 0.01$ ). However, participants' response to TWLs correlated negatively with their duration of the habit as well as their nicotine dependence. Duration of the smoking habit went hand in hand with their work experience showing significant positive correlation ( $p < 0.01$ ) (Table 4).

## Discussion

The present study attempted to shed light on the influence of TWLs in informing smokers about the health risks of smoking. The association between nicotine dependency and knowledge of health effects due to smoking was also explored in this study.

Majority of the smokers belonged to younger age group, similar to the general population (Jha et al., 2008), had an education of secondary schooling or less; a positive correlation was found between their education levels and their knowledge about tobacco. Studies have traditionally reported better knowledge of risks with higher levels of education (Roychowdhury et al., 2005; Panda et al., 2012; Binnal et al., 2013). However the present study was in contrast to the study by Crawford et al., (2012) who reported no relation between awareness among smokers and their level of education.

In the present study, about 98% had noticed warning labels on tobacco packages and these warning labels even convinced about 70% to think about quitting smoking which is similar to the findings by Raute et al., (2009) and Hammond et al., (2003) where nearly 90% of respondents reported noticing health warnings.

Majority of the respondents knew that smoking was a risk factor for lung cancer in smokers and heart disease (74.5% and 69.6% respectively), findings similar to that reported by previous studies (Brownson et al., 1992; Wardle et al., 2010; Yang et al., 2010). However a previous study (Reddy et al., 1996) reported a lower knowledge (58%) and other study (Gupta and Kumar, 2014) reported a higher knowledge (87.2%) regarding health effects associating smoking to lung cancer.

Many of our respondents knew that smoking caused stroke (63.1%) and lung cancer among non-smokers (63.1%), and about half of them knew that smoking led to impotence (46.4%); Yang (2010) reported similar findings regarding awareness about lung cancer in smokers, lung cancer in non-smokers, and heart disease (73%, 59% and 41% respectively) but contrary findings were reported with lower proportion of study subjects regarding knowledge about impotence (20%) and stroke (19%). However,

Hammond et al., (2006) reported a higher knowledge about lung cancer in smokers (94.3%), heart disease (88.7%), stroke and lung cancer in non-smokers (73% and 70% respectively). However, knowledge regarding impotence associated with smoking was low, similar to findings of the present study. There is also considerable evidence which shows that individuals involved in smoking do not necessarily have sufficient knowledge regarding ill effects of tobacco usage (Hu et al., 2006; Crawford et al., 2012).

In the present study, the knowledge of the participants, regarding the constituents of tobacco smoke was found to be very low, different from a previous study (Hammond et al., 2006). Exposure to warning labels also had no influence on the knowledge of constituents of the tobacco smoke ( $p > 0.05$ ). This could be explained by the fact that tobacco products in India do not carry information regarding the toxic constituents of tobacco unlike those seen in United States, Australia or Canada. Also there is possibility of usage of local tobacco products which do not carry warning labels compliant with the packaging and labelling rules specified by Cigarettes and Other Tobacco Products Act (Aruna et al., 2010).

Respondents exposed to TWLs had better knowledge about smoking and lung cancer when compared to other health effects. These findings were supported by other studies (Hammond et al., 2006; Yang et al., 2010) which reported warning labels instilled better knowledge about various health effects. A plausible explanation here could be the presence of majority of the warning labels in the form of diseased lung on the tobacco packages in India, resulting in increased tendency of the smokers to associate tobacco smoking with lung cancer.

Smokers exposed to TWLs reported that the warning labels made them stop having a cigarette or a tobacco product. Respondents also reported that warning labels made them not only think about the health risks of smoking but also made them think about quitting smoking, findings similar to previous studies (Hammond et al., 2003; Hammond et al., 2006; Raute et al., 2009). These findings are also in accordance with that of the Ukraine Global Adult Tobacco Survey (WHO, 2010). But a 3 country survey conducted in South East Asia (Kishore et al., 2013) reported contradictory findings where the majority of the smokers (44.3%) reported no interest in quitting smoking even though they had a higher knowledge of tobacco related illnesses.

Findings from this study necessitate the need to formulate policies and propose for different graphic warning labels on tobacco packages on a rotation basis that can educate smokers regarding various health risks of tobacco usage as well as different constituents of tobacco. Since tobacco is an addictive habit, studies with further insight into psychosocial factors governing this habit in a multi factorial approach can be conducted to develop methods regarding educating and encouraging smokers to quit.

As with any population based survey, the first limitation of the present study is that of social desirability associated with responding to a questionnaire. A qualitative open ended instrument would also have been



a fairly better measure for evaluating health knowledge in this population. Recommendations can also be made to further strengthen the evidence by inclusion of a non-smoker comparison group and a longer follow up to assess the impact of warning labels.

In conclusion, exposure to warning labels is an important factor in educating the smokers about health risks as a consequence to tobacco smoking. Within the limitations of the present study we can categorically conclude that tobacco warning labels remains one of the most effective ways to communicate the risks of smoking and lead them to think about quitting this habit.

There is an urgent need to display health warnings and pictures on tobacco products since most tobacco users start this habit early, when they are not aware about the adverse health consequences associated with this habit.

Healthy life style, active living with no smoking might reduce/prevent the risk of various disorders including different forms of cancer in Indian bus driver population.

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