Prevalence of cigarette and marijuana smoking and its associated factors amongst secondary school going adolescents in ndola urdan, Zambia

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ABSTRACT

Introduction: The aim in this study was to determine prevalence and associated factors of tobacco and marijuana smoking among secondary school going adolescents in Ndola Zambia. **Methods:** Data was used from a self-administered questionnaire based cross-sectional survey of grades 8's and 10's in five regions of Ndola Zambia. Outcomes were 'been an ever and current cigarette smoker' and 'been an ever and current marijuana smoker'. Factors were socio-economic and demographic variables, personal and family behaviour, peer behaviour and media exposure. Multivariate logistic regression models were used to determine the factors associated with the outcomes. **Results:** The total number of pupils who participated in the study was 400. The overall prevalence of cigarette smoking and marijuana smoking was 13% (53/400) and 3% (13/400) respectively. Smokers at home and alcohol consumption were found associated with smoking cigarettes; AOR=1.65 (95%CI = [1.16, 2.35]) and AOR=2.47 (95% CI = [1.67, 3.64]) respectively. Non-smoking friends, education on dangers of smoking and seeing cigarette brands on TV were found to be protective factors of smoking cigarettes; AOR=0.42 (95%CI = [0.28, 0.63]), AOR=0.45 (95% CI=[0.31, 0.67]) and AOR=0.67 (95% CI=[0.46, 0.98]) respectively. Smokers at home and alcohol consumption were found associated with marijuana smoking; AOR= 2.93 (95%CI = [1.50, 5.72]) and AOR= 2.98 (95% CI = [1.65, 5.37]) respectively. **Conclusion:** Both cigarette smoking and marijuana smoking are prevalent among secondary school going adolescents in Ndola Zambia. Family and friends' behaviour, education and media messages, as well as alcohol consumption are related to adolescent smoking of cigarettes and marijuana. This aspect needs to be integrated into design of programmes aimed at reducing use of the two substances.

Key words: Tobacco, smoking**,** Research.

Introduction

Whilst tobacco smoking is legal in many countries – with the mandatory warning that "tobacco is harmful to your health" – and marijuana smoking is illegal, worldwide use of these substances remains prevalent. In 2015, over 1.1 billion people smoked tobacco, and although it is declining worldwide and in many countries, the prevalence of tobacco smoking appears to be increasing in the World Health Organization (WHO) Eastern Mediterranean Region and the African Region [1]. About 147 million people, 2.5% of the world population, consume marijuana every year [2]. Africa as a whole compared to the rest of the world, only 2% of cigarette smokers are in Africa and 6% of smokers live in Africa. This means that on average smokers smoke considerably fewer cigarettes per smoker than they do in other parts of the world [3]. 25% of marijuana production is done in Africa and it has the third high highest prevalence rate in the world with estimates ranging from 3.8% to 10.4% of the population in 2009 [4]. The estimated prevalence of tobacco consumption in sub-Saharan Africa was 14% in males and 2% in females in 2010 [3]. Although data on tobacco and marijuana consumption in Zambia remain scanty, indications are that use of these drugs is prevalent around the country, and is frequent even among adolescents. According to the Drug Enforcement Commission [5] Ndola branch records, in the year 2013 a total of 1 384 arrests were made due to possession of marijuana and the age range was from 15 to 36 years but of the 1 384 arrests 168 were juveniles. In the study conducted by Siziya et al [6] in Kafue,

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Zambia, it was discovered that estimates of 8.2% of the total study participants were current cigarette smokers. Tobacco and marijuana smoking especially when accompanied with other vices such as alcohol and also other drugs can lead to unplanned pregnancies and sexually transmitted infections (STIs) [7]. There is also an increase of driving under the influence of marijuana which doubles the risk of being in an accident [8]. Early and continued use of marijuana can affect memory, attention and ability to think clearly, make it difficult to concentrate or learn new things, and also make it difficult to make sound decisions [9]. Tobacco smoking may not be one of the leading causes of death in Zambia but it has been associated with cancer, cardiovascular and respiratory diseases which are non-communicable diseases and can be prevented. So many students at secondary schools start getting involved in all sorts of vices which include drugs, alcohol and sexual activity. This usually occurs at the time of puberty when they are beginning to identify themselves and the friendships they create are important hence peer pressure plays an important role [10]. Adolescents whose parents are smokers and or whose close friends are smokers are more likely to start smoking [11].With so many harmful consequences of tobacco and marijuana smoking, it is essential that consumption levels and factors that drive use of these substances in a community are known so that appropriate public health interventions are put in place. With this regard, we set out to determine the prevalence of tobacco and marijuana smoking and associated factors among public school going adolescents in Ndola, an urban town in Zambia.

Methodology

Study design

This study was a cross sectional study which looked at the prevalence of cigarette and marijuana smoking and its associated factors among public school going adolescents in Ndola urban.

Population

The targeted population was grades 8 and 11 adolescents in public co-education secondary schools in Ndola urban, and was as at 31st December 2015 estimated to be 4,320. There were 18 public secondary schools in Ndola urban spread over 5 regional clusters, with 8 grade 8 and 8 grade 11 classes and a total of 60 pupils in each of the classes at each school.

Sample size calculation

Assuming random selection of the pupils to participate in the study, a population size of 60 grades 8 and 11 pupils in each of the classes at each public co-education secondary school in Ndola urban; prevalence of smoking either cigarettes, marijuana or both at 50% at normal scenario and 65% at worst case scenario; applying a confidence limit of 95% for the prevalence; and using the survey sample size calculation formula developed in Kish and Leslie (1965)[12]; we calculated the required sample size for the survey as 39 per selected class. Assuming 100% response rate and uniform cluster effect across all regions, we applied a sample size adjustment factor of 1 for the response rate and also 1 for the design effect, resulting into a total minimum sample size of 390 pupils; 195 in each of the two grades.

Sampling procedure, data collection tool and data collection period

From a list of the 18 public co-education secondary schools in Ndola urban placed according to the 5 regions, 1 school was selected at random for the survey from each of the clusters. From each selected school, a grade 8 class and a grade 11 class were randomly selected for the survey. From each selected class, 40 pupils were randomly selected and approached for consent to participate in the study.

A self-administered structured questionnaire was the employed data collection tool.

The data collection period was from the 9th to the 29th of May, 2016.

Data management

Completed questionnaires were checked for completeness and commission errors. Checked questionnaires were entered into a Microsoft ® Access 2003 (Microsoft Corporation, Redmond, WA, USA) database through Epi Info ™ 7.1 (Centers for Disease Prevention and Control, Atlanta, GA, USA) data entry screens incorporating consistency checks and double entry. The database was then converted to Microsoft ® Excel 2013 (Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399, USA) facilitating compatibility for import into specialized statistical analysis software. SPSS ® 18 (SPSS-IBM Corporation., New York, NYC, USA) was the primary software used for statistical analyses.

Statistical analyses

The obtained data mainly contained categorical variables. Frequency and percentage distributions were obtained to describe the categorical variables.
Significance of factors of outcomes was tested by creating bivariate contingency tables and performing associated Pearson's chi-square tests for independence. All factors that produced a p-value equal or less than 0.10 at bivariate analysis were in multivariate logistic models with odds ratios (OR's) to adjust for the possible confounding influences between the factors on the outcomes. Factors which yielded a p-value equal or less than 0.05 were considered statistically significant.
Factors considered in the analyses are shown in table 1.

Ethical consideration

Ethical clearance for the study was obtained from the Tropical Diseases Research Centre (TDRC) Ethical Review Committee (ERC). Permission to conduct research in schools was obtained from the District Education Board under the Zambian Ministry of Education. All pupils were informed that they were free not to participate if they so wished. The questionnaire was completed during class time. Pupils who did not want to participate could remain in class, because excluding them from the class can be a form of segregation amongst the students. To preserve individual confidentiality, the questionnaires were self completed anonymously by the pupil. School teachers were not in the classrooms at the time of questionnaire completion to allow the students the freedom they required to answer the questionnaire.

Results

Prevalence of cigarette smoking and marijuana smoking

The total number of pupils who participated in the study was 400, representing a 100% response level from those approached for inclusion. The overall prevalence of cigarette smoking and marijuana smoking was 13% (53/400) and 3% (13/400) respectively. Among males and females, the prevalence of cigarette smoking was 19% (38/205), and 8% (15/195), respectively. Age of the participants ranged from 11 to 21; the prevalence of cigarette smoking and marijuana smoking among those aged 11 to 14 was 5% (18/400) and 0.7% (3/400) respectively. The prevalence of cigarette smoking and marijuana smoking among those aged 15 to 21 was 9% (35/400) and 0.7% (3/400) respectively. The prevalence of cigarette smoking and marijuana smoking among those in grade 8 was 5% (21/400) and 0.7% (3/400) respectively. Prevalence of cigarette smoking according to region was highest in Kansenshi (34%, 18/53) whilst prevalence of marijuana smoking was also highest in Kasenshi (39%, 5/13) as well as in Lubuto ((39%, 5/13).

Factors associated with smoking – bivariate analysis
Factors associated with smoking in bivariate analysis are shown in tables 2 – 5.

Factors associated with smoking cigarettes – multivariate analysis
Factors associated with smoking cigarettes in multivariate analysis are shown in table 5. Pupils who do not have friends who smoke cigarettes are less likely to smoke than those who have friends who smoke cigarettes; AOR=0.42 (95%CI = [0.28, 0.63]). Compared to those who do not have anyone at home who smokes, those that have anyone at home who smokes were more likely to smoke cigarettes; AOR=1.65 (95%CI = [1.16, 2.35]). Pupils who reported alcohol consumption were more likely to smoke cigarettes than those who did not report alcohol consumption; AOR=2.47 (95% CI = [1.67, 3.64]). Compared to those who have not been educated about the dangers of smoking those educated about the dangers of smoking were less likely to smoke; AOR=0.45 (95% CI= [0.31, 0.67]). Pupils who reported having seen a cigarette brand on television eere less likely to smoke cigarettes than those who had not; AOR=0.67 (95% CI= [0.46, 0.98]).

Factors associated with Marijuana Smoking in multivariate analysis

Factors associated with marijuana smoking in multivariate analysis are shown in table 6. Compared to those who do not have anyone at home who smokes, those that have anyone at home who smokes were more likely to smoke marijuana; AOR= 2.93 (95%CI = [1.50, 5.72]). Pupils who reported alcohol consumption were more likely to smoke marijuana than those who did not report alcohol consumption; AOR= 2.98 (95% CI = [1.65, 5.37])

Table 1: Factors considered in the analyses

VARIABLES
Outcomes
Ever smoked and is a current smoker of cigarettes: Yes No
Ever smoked and is a current smoker of marijuana: Yes No
Demographics
Sex: Male Female
Age: 11- 14 15- 21
Grades: 8 11
Region: Kanini Ndeke Lubuto Masala Kansenshi
Family and Friends smoking habits
Know people who smoke: Yes No
Know who smoke in your class: Yes No
Friends who smoke: Yes No
Know what they smoke: Yes No
Anyone who smokes at home: Yes No
Alcohol and alcohol consumption
Do you take alcohol: Yes No
Is smoking bad for your health: Yes No
Advertisements
Seen anti-smoking message during the past 30 days: Yes No
Ever been educated on dangers of smoking: Yes No
Seen cigarettes brand names on TV in past 30 days: Yes No
Seen actors smoking on TV, movies or music videos: Yes No
Do they influence you to smoke in anyway: Yes No

Table 2: Demographic factors associated with smoking in bivariate analysis

Factor		Cigarette		P value	Marijuana		P value
		Smokers N (%)	Non smokers N (%)		Smokers N(%)	Non smokers N (%)	
Sex	Male	38 (71.7)	167 (48.1)	0.010	8 (61.5)	197 (50.9)	0.451
	Female	15 (28.3)	180 (51.9)		5 (38.5)	190 (49.1)	
Age	11- 14	18 (34.0)	163 (47.0)	0.076	3 (23.1)	178 (46,0)	0.102
	15 - 21	35 (66.0)	184 (53.0)		10 (76.9)	209 (54.0)	
Grade	8	21 (39.6)	179 (51.6)	0.105	3 (23.1)	197 (50.9)	0.048
	11	32 (60.4)	168 (48.4)		10 (76.9)	190 (49.1)	
Region	Kanini	10 (18.9)	70 (20.2)	0.014	1 (7.7)	79 (20.4)	0.770
	Ndeke	3 (5.7)	77 (22.2)		0 (0.0)	80 (20.7)	
	Lubuto	10 (18.9)	70 (20.2)		5 (38.5)	75 (19.4)	
	Masala	12 (22.6)	68 (19.6)		2 (15.4)	78 (20.2)	
	Kansenshi	18 (34.0)	62 (17.9)		5 (38.5)	75 (19.4)	

Table 3: Family and Friends related factors associated with smoking in bivariate analysis

FACTOR		CIGARETTE		P value	MARIJUANA		P value
		Smokers n (%)	Non smokers n (%)		Smokers n (%)	Non smokers n (%)	
Know people who smoke	Yes	50 (94.3)	232 (66.9)	0.001	12 (92.3)	270 (69.8)	0.12
	No	3 (5.7)	115 (33.1)		1 (7.7)	117 (30.2)	
Know who smoke in your class	Yes	23 (43.4%)	36 (10.4)	0.001	6 (46.2)	53 (13.7)	0.006
	No	30 (56.6)	310 (89.6)		7 (63.8)	333 (86.3)	
Friends who	Yes	43 (81.1)	119 (34.3)	0.001	10 (76.9)	152 (39.3)	0.007
smoke	No	10 (18.9)	228 (65.7)		3 (23.1)	235 (60.7)	
Know what they smoke	Yes	48 (90.6)	179 (51.6)	0.001	11 (84.6)	216 (55.8)	0.039
	No	5 (9.4)	168 ((48.4)		2 (15.4)	171 (44.2)	
Anyone who smoke at home	Yes	28 (52.8)	93 (26.8)	0.001	10 (76.9)	111 (28.7)	0.001
	No	25 (47.2)	254 (73.2)		3 (23.1)	276 (71.3)	

Table 4: Personal factors associated with smoking in bivariate analysis

FACTOR		CIGARETTE			MARIJUANA		P value
		Smokers n (%)	Non smokers n (%)		Smokers n (%)	Non smokers n (%)	
What do you smoke		53 (13.2)	347 (86.8)		13 (3.2)	387 (96.8)	
Do you take alcohol	Yes	24 (45.3)	29 (8.4)	0.001	7 (53.8)	46 (11.9)	0.001
	No	29 (54.7)	318 (91.6)		6 (46.2)	341 (88.1)	
Is smoking bad for your health	Yes	24 (45.3)	249 (71.8)	0.001	4 (30.8)	269 (69.5)	0.005
	No	29 (54.7)	98 (28.2)		9 (69.2)	118 (30.5)	

Table 5: Advertisements and Campaign against Smoking factors associated with smoking in bivariate analysis

FACTOR		CIGARETTE		P value	MARIJUANA		P value
		Smokers n (%)	Non smokers n (%)		Smokers n (%)	Non smokers n (%)	
Seen anti-smoking message during the past 30 days	Yes	12 (22.6)	136 (39.2)	0.020	4 ((30.8)	144 (37.2)	0.775
	No	41 (77.4)	211 (60.8)		9 (69.2)	243 (62.8)	
Ever educated on dangers of smoking cigarette and	Yes	33 (62.3)	302 (87.0)	0.001	11 (84.6)	324 (83.7)	1.00

marijuana	No	20 (37.7)	45 (13.0)		2 (15.4)	63 (16.3)	
Seen cigarette brand names on TV during the past 30 days	Yes	16 (30.2)	147 (42.4)	0.093	6 (46.2)	157 (40.6)	0.687
	No	37 (69.8)	200 (57.6)		7 (53.8)	230 (59.4)	
Seen actors smoking on TV, music videos or movies	Yes	50 (94.3)	334 (96.3)	0.508	11 (84.6)	373 (96.4)	0.09
	No	3 (5.7)	13 (3.7)		2 (15.4)	14 (3.6)	
Do they influence you to smoke in any way	Yes	16 (30.2)	39 (11.2)	0.001	7 (53.8)	48 (12.4)	0.01
	No	37 (69.8)	308 (88.8)		6 (46.2)	339 (87.6)	

Table 6: Factors associated with Cigarette Smoking associated with smoking in multivariate analysis

FACTOR		AOR (95% CONFIDENCE LEVEL)
Friends who smoke	No	0.42 (0.28, 0.63)
	Yes	1
Anyone at home who smokes	Yes	1.65 (1.16, 2.35)
	No	1
Consumed alcohol	Yes	2.47 (1.67, 3.64)
	No	1
Education on dangers of smoking	Yes	0.45 (0.31, 0.67)
	No	1
Seen cigarette brand on TV	Yes	0.67 (0.46, 0.98)
	No	1

Table 7: Factors associated with Marijuana Smoking associated with smoking in multivariate analysis

FACTOR		AOR (95% CONFIDENCE LEVEL)
Anyone smoking at home	Yes	2.93 (1.50, 5.72)
	No	1
Consumed alcohol	Yes	2.98 (1.65, 5.37)
	No	1

Discussion

Smoking cigarettes or marijuana among adolescents has become a common trend, its all about trying to be part of the group or feeling like you belong. Adolescence is a stage in life that is full of self-discovery and often making wrong decisions. As Erickson [13] clearly stated that a crisis develops at every stage of development. He also added that adolescence is a transition from childhood to adulthood and during this period they explore possibilities and begin to form their own identity based upon the outcome of their explorations. In our study, the prevalence of smoking cigarettes was 13.2% and that of smoking marijuana was 3.2%. Males are more likely to smoke than females. This was similar to the findings done by Siziya et al [14] were they commented that the situation is globally diverse in some countries there is male predominance whilst in others there is no such thing as male predominance. Most smokers of cigarette and marijuana fell in the age range of 15-21 years.

According to this study, an adolescent who has friends that smoke is more likely to start smoking cigarettes. This may be due to the fact that peer pressure plays a significant role. An adolescent whose friends smoke is more likely to be initiated by his/her friends and the reason for this is varied but one of them could be to fit into the group or fill the need of belonging. These were similar findings to those done in Chongwe[11] and Northeast Nigeria5[15]. these studies also showed that an adolescent whose parents or any family member that smokes cigarettes or marijuana is more likely to start smoking. They tend to see it as normal since it becomes part of their environment and the adverse

effects of smoking are seen in the long-term. Therefore, if they have no exposure to the adverse effects they are less likely to stop smoking. Alcohol consumption has become more like a rite of passage for many adolescents not only in the western world. Most adolescents start taking alcohol in their teens unfortunately; alcohol consumption is not enough for some hence they tend to smoking cigarettes and marijuana. In South Africa, the commonly used substance is alcohol, cannabis and tobacco. Among the learners in a high school survey conducted in 2002, about half (49.1%) reported ever having drunk alcohol, one third (30.5%) ever having smoked cigarettes and 12.8% ever having used cannabis in their lifetime [16]. In the study it was discovered that the adolescents that took alcohol were more likely to smoke cigarettes and marijuana. The odds of smoking among adolescents who reported having taken alcohol was 2.47 for cigarettes and 2.98 for marijuana compared to those who were non-smoker. In a research done in Zaria, Nigeria [17] the prevalence of smoking marijuana was 9.43% and the associated factors were the friends at parties, schoolmates and relations at night parties and the one thing that all these places have in common is alcohol. They also compared the academic performance between the smokers and non-smokers of marijuana and discovered that the better academic performance was among the non-smokers but attributed this not to their intellectual capacity but the absenteeism of the smokers.Adolescents who saw cigarette brand names on television were also more likely to smoke. The adolescents who have been educated on the dangers of smoking cigarettes were less likely to start smoking. In a study conducted in Somaliland [14] they made an unusual discovery, the exposure to anti-smoking messages through sports or community events seemed to have had achieved a negative result on the smoking status. This finding highlighted the fact that the content and the delivery mode of anti-smoking messages may result in possibly unintended consequences. In their conclusion they stated that adolescents who were exposed to anti-tobacco messages or discussions in school and at home were less likely to have reported smoking than those who were not exposed to such experiences. Adolescents who saw cigarette brand names on television were more likely to smoke.

Conclusion

This study has revealed that cigarette smoking and marijuana smoking are prevalent among school going adolescents in Ndola Zambia, and that smokers at home and alcohol consumption are associated with smoking cigarettes. Non-smoking friends, education on dangers of smoking and seeing cigarette brands on TV are protective factors of smoking cigarettes. The study has also revealed that smokers at home and alcohol consumption are associated with marijuana smoking. Interventions to arrest the prevalent use of the two substances among the adolescents in Ndola Zambia need to be formulated. The interventions need to integrate the fact that family and friends' behaviour, education and media messages, as well as alcohol consumption are related to adolescent smoking of cigarettes and marijuana.

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Authors' contributions

MM conceptualized the study, participated in the protocol preparation, data collection, analysis and interpretation of data, drafting and revision of manuscript. DKM participated in data management and analysis, interpretation of findings, and revision of manuscript. DM participated in the development of the methodology of the study, supervised the data collection process, and developed the questionnaire. SS supervised data analysis and preparation of the manuscript.

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