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Prevalence and Correlates of Tobacco Smoking in the Sri Lanka Army

RMM Monaragala[1], SN Samage[2]

[1]Army Hospital, Colombo 5, Sri Lanka.
[2] Preventive Medical Services, Sri Lanka Army, Sri Lanka.

Correspondence:
RMM Monaragala
E mail: roshanmonaragala@gmail.com
https://orcid.org/0009-0006-1506-9088

ABSTRACT

Introduction: All service personnel are expected to be psychologically and physically healthy. However, certain behaviours may impede the above, and tobacco smoking is one out of many. Studies reiterate the high prevalence of smoking in the military, and the military culture, low education, younger age, psychiatric conditions childhood adversities, and alcohol and substance use are implicated.
Methodology: This was a retrospective cross-sectional study, done in the Army Security Force Headquarters East, in a sample of 147 Officers and 3519 Other Ranks (ORs), serving > 2 years. A self-administered questionnaire inquired into demographic data, probable depression, high-risk drinking, symptoms of PTSD, symptoms of fatigue, cannabis use, childhood adversities, aggression, and cohesion. Smoking experience was assessed in terms of never, past and current use. The adjusted Odds Ratio determined the significance of the correlates of smoking.
Results: Fifty point nine percent (95% CI 49.4% - 52.6%) were current smokers and 62.4% (95% CI 60.8%-64.0%) smoked in the past. Younger age, lower education, marriage, longer service, cannabis use and high-risk drinking were significantly associated with current and past smoking behaviours.
Discussion: Compared to community surveys, smoking is high within the Army. Younger age, lower education, and lower rank were demographic covariates, which could be due to the inability to cope with stress and the military environment (i.e. due to the availability and the social influence). Alcohol and cannabis complement the effects of smoking. Depression and fatigue could be outcomes or causes of smoking. Health education and stress management programmes and imposing smoking restrictions within military installations are recommended to dissuade smoking in the Army.

Keywords: Smoking tobacco, high-risk drinking, cannabis use, Army

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INTRODUCTION

The maintenance of security from internal and external threats, in a country, is vested in the military, and hence, all service personnel should be in good health. However, stressors unique to the military milieu are shown to cause mental and behavioural issues that may impede health (1), and smoking is highlighted out of many (2, 3).

According to epidemiological studies in other military organizations, the prevalence of current smoking varied between 34% to 56.4% (2, 4, 5), which was noted to be higher than in their general communities (2, 3, 6). Two studies done in the Sri Lanka Navy (2013) and Sri Lanka Army (2018) saw that 50% and 45.1%, respectively, were currently smoking (7, 8). The WHO global report on trends in the prevalence of tobacco smoking asserts that 20.2% of the population above fifteen years, smokes tobacco (9). Extant community studies in Sri Lanka portray the prevalence of current smoking as 27.6% and 36.5% (10, 11).

It is estimated that six million people die each year from active use of tobacco and passive smoking (12). Cancer (lung, pancreas, cervix, kidneys, and stomach), coronary vascular disease, respiratory disease, and stroke are scientifically evinced as causes of death associated with smoking (13, 14). Further, smoking is shown to reduce health status, cause dental diseases, and loss of bone mass leading to fractures, fertility issues, and erectile dysfunction, reducing the quality of life (13). In addition, smoking is discerned to impede military readiness due to diminishing physical performance and endurance (15).

According to the scientific literature, factors such as education, age, nature of employment, the unit climate (e.g., unit cohesion, perceived organisational support, leadership), sources of stress, psychiatric conditions (e.g., depression, PTSD, and anxiety disorders), alcohol and substance use, and childhood adversities are implicated in heavy smoking (3, 6, 16). A qualitative study demonstrated that smoking is difficult to control in the military milieu owing to the wide availability of cigarettes, the influence of the military culture, and the lack of strict laws and measures implemented against smoking (18).

Due to the serious impact of smoking and its probable higher consumption in the military, this study is aimed at extrapolating the prevalence and describing the correlates (i.e., probable risk and outcome factors) of tobacco smoking in the Sri Lanka Army, by using a sample larger than the previous military studies.

METHODOLOGY

Study setting and participants

This study was conducted in a Security Force Head Quarters, in 2019 (i.e., one of the seven areas the troops are deployed). All personnel with two or more years of service and below the rank of Lieutenant Colonel (Lt Col) were included, whereas serving civilians and those above Lt Col were excluded. Since the male-to-female ratio of the study population was 1 into 0.009 (0.95% of the total population), gender was not considered as a variable.

Other ranks were selected from 71 clusters by the multistage extension of the cluster sampling method, and officers were selected via systematic sampling from the officers' seniority list (Fig 1). The sample size was 3343 (i.e., 140 officers and 3184 other ranks), calculated according to the formula described by Lwanga and Lemeshow (1991) (19).

Outcome measure

The questions on tobacco smoking (cigarettes, cigars, beedi, and use of devices such as pipes or makeshift devices by rapping tobacco on paper), which were, never smoked, smoked in the past (i.e., smoked until a year ago), and smokes currently, with the authors' permission, were adapted from the Sri Lanka Naval study (20). The data on demographic variables were collected from questions applied by two local military studies (21, 22). Information on mental health correlates of smoking was gathered using locally validated tools, namely, PHQ-9 for depression (caseness was defined with a score 10≤) (23); PTSD Checklist Military Version (PCL- M) for post-traumatic stress disorder (PTSD) (caseness was defined with a score 45.5≤) (21), and 13 items Chalder Fatigue Scale for fatigue (caseness was

defined with a score 4≤) [24], and high-risk drinking (HRD) (caseness was defined with a score 8 ≤) (25). In addition, standard questions were used to ascertain the degree of unit cohesion, aggression, cannabis use, family history of psychiatric disorders and exposure to childhood abuse (8, 26, 27). Adapting the methodology of a previous military study, psychosocial dysfunction was ascertained with the tenth question of the PHQ-9 (28).

Statistical analysis

SPSS-20 was used for the statistical analysis. The Chi-square test described the significance of the association between mental health correlates and smoking. The Mann-Whitney U test showed the significance of the association between unit cohesion and smoking. Adjusted odds ratios (ORs) with a 95% confidence interval (95% CI), deduced with standard multiple logistic regression, determined the significance of the predictiveness of the socio-demographic and mental health correlates of smoking. The significance of the probability was discerned with Probability (P) values ≤ 0.05.

Ethical approval

The Ethics Review Committee of the Faculty of Medicine, Kotalawala Defense University gave the ethical approval (October 2018). Informed written consent was obtained from all the participants and partaking was voluntary, and anyone either could refuse or discontinue participating in the survey. In addition, measures were taken to avoid duress. The questionnaire did not identify the participants by name.

RESULTS

The total sample population was 3665 (146 officers and 3519 other ranks). Among them, 50.4% (n=1845), which include 75 offers and 1772 other ranks had battle experience. The mean age was 31.78 years (SD 6. 686), 66.1% (n=2423) were married, 56.7 % (n=2079) had not passed GCE OL, 4% (n=146) were officers, 20.5% had 5 ≤ years of service, and 7.6% (n=276) were from the elite units.

Prevalence

Within the sample, 49.1% (95% CI 47.4% - 50.6%) were currently abstinent, 62.4% (95% CI 60.8%-64.0%) smoked until a year ago, and 50.9% (95% CI 49.4% - 52.6%) were currently smoking with an average of 1.6094 (SD 2.29) per day.

The association of sociodemographic factors with smoking

Younger age, lower education, lower rank, and employment in the elite units were significantly associated with smoking (i.e., either currently or smoked until a year ago) (Table 1). And it remained so, even after adjusting the odds ratios (ORs) (Table 2).

The association of mental health factors with smoking

Cannabis use, high-risk drinking (i.e. hazardous, harmful, and dependent drinking), probable depression, fatigue, psychosocial dysfunction, and aggression were significantly associated with either currently smoking or smoking until a year ago (Table 1). Even after adjusting the ORs the latter mental health factors were significantly associated with either current or past smoking (Table 2). Unit cohesion was not associated significantly with either pattern of smoking (Table 1).

Table 1. The association between smoking and demographic and mental health correlates

	Currently smoking			**Smoked until a year ago**		
	(n)	(%)	Significance	(n)	(%)	Significance
Age						
≤ 26	448	52.3%	X^2=19.412, df = 4, p = 0.001	480	56.0%	X^2=11.308, df = 4, p = 0.023
27 – 29	367	55.9%		407	62.0%	
30 – 33	425	52.6%		508	62.9%	
34 – 38	346	47.6%		445	61.2%	
39 ≤	279	45.2%		388	62.9%	
≤30	951	54.2%	X^2= 15.207, df = 1, p = 0.000	1155	65.9%	X^2= 17.242, df = 1, p=0.000
31≤	914	47.8%		1132	59.2%	
Level of education						
GCE O/L (qualified)	1132	54.4%	X^2= 24.397, df = 1, p = 0.000	867	54.7%	X^2= 44.012, df = 1, p = 0.000
GCE O/L (unqualified)	733	46.2%		1361	65.5%	
Ranks						
Cpl/Bdr* & below	1644	52.5%	X^2= 9.593, df = 2, p = 0.000	1924	61.4%	X^2= 9.593, df = 2, p = 0.008
Sgt** and above	178	46.1%		233	60.4%	
Officers	71	48.6%		71	48.6%	
Officers	43	29.5%	X^2 = 27.954, df = 1, p = 0.000	71	48.6%	X^2 = 9.435, df = 1, p = 0.002
ORs	1822	51.8%		2157	61.3%	
Civil status						
Married	1243	51.3%	X^2= .489, df = 1, p = 0.485	1503	62.1%	X^2= .399, df = 1, p = 0.528
Single	622	50.1%		784	63.1%	
Period of service						
1-5	366	48.6%	X^2= 7.265, df = 5, p = 0.202	457	61.3%	X^2= 7.834, df = 5, p = 0.116
6-10	617	52.2%		723	62.0%	
11-15	454	53.7%		531	62.3%	
16-20	264	49.2%		330	61.0%	
21-25	146	47.4%		173	55.3%	
26≤*	18	47.4%		19	48.7%	
Type of employment						
Elite units	125	44.8%	X^2= 2.245, df = 1, p = 0.134	191	68.5%	X^2= 4.698, df = 1, p = 0.030
None elite units	1711	50.5%		2096	61.9%	
Cannabis use						
No	1539	46.8%	X^2= 219.344, df = 1, p = 0.000	1881	57.2%	X^2= 178.817, df = 1,p = 0.000
Yes	326	87.2%		347	92.8%	

High-risk drinking* **						
No	1034	41.9%	X^2= 240.732, df = 1, p = 0.000	1278	51.8%	X^2= 252.748, df = 1,p = 0.000
Yes	831	69.2%		950	79.2%	
PTSD						
No	952	52.7%	X^2 =0.031, df=1, p=0.859	1146	63.5%	X^2 =0.543, df=1, p=0.543
Yes	20	51.3%		27	69.2%	
Probable depression						
No	1457	49.9%	X^2= 6.633, df = 1, p = 0.010	1748	59.9%	X^2= 4.958, df = 1, p = 0.026
Yes	411	55.1%		480	64.3%	
Fatigue						
No	1225	48.9%	X2= 11.956, df = 1, p = 0.001	1469	58.7%	X^2= 14.630, df = 1,p = 0.000
Yes	640	55.1%		759	65.3%	
Admitted for inward treatment						
No	1670	51.0%	X^2= .223, df = 1, p = 0.637	1994	60.9%	X^2= 0.197, df = 1, p = 0.657
Yes	194	49.7%		233	59.7%	
Expression of aggression						
Verbally						
No	1378	49.1%	X^2= 15.462, df = 1, p = 0.000	1777	58.9%	X^2= 24.868, df = 1,p = 0.000
Yes	487	56.8%		584	68.1%	
physically						
No	1653	49.9%	X^2= 13.594, df = 1, p = 0.000	1978	59.7%	X^2= 17.102, df = 1,p = 0.000
Yes	212	60.2%		250	71.0%	
Vandalism						
No	1485	49.2%	X^2= 19.766, df = 1, p = 0.000	1777	58.9%	X^2= 26.787, df = 1,p = 0.000
Yes	380	58.8%		451	69.8%	
Psychosocial dysfunction						
	1005	49.2%	X^2= 5.221, df = 1, p = 0.022	1238	60.6%	X^2= 6.944, df = 1, p = 0.008
	859	53.0%		1050	45.9%	
Exposure to childhood abuse						
	1169	49.8%	X^2= 3.162, df = 1, p = 0.075	1391	59.2%	X^2= 3.671, df = 1, p = 0.055
	696	52.8%		849	37.1%	
Unit cohesion	U=1640609.000, z =-1.191, p=0.234			U= 1582563.500, z=-0.587, p=0.557		

*Corporol/ Bombardier

**Sargeant

****Included are hazardous, harmful, and dependent drinking

Table 2. Correlates that are predictive of smoking after adjusting the odds ratio with multiple logistic regression

Correlates of smoking	Currently smoking Adjusted Odds ratio (OR) (95% Confidence interval)*	Smoked until a year ago Adjusted Odds ratio (OR) (95% Confidence interval)*
Demographic factors		
Younger age	OR 1.334(1.167-1.525), p=0.000	OR 1.371(1.194-1.574), p=0.000
Lower education level	OR 1.388(1.211-1.592), p=0.000	OR 1.388(1.205-1.598),p=0.000
Lower rank	OR 2.061(1.423-2.987), p=0.000	OR 1.706(1.209-2.405), p=0.002
Employment (Elite units)	OR 1.201(0.937-1.539), p=0.147	OR 1.327(1.019-1.728), p=0.036
Mental health factors		
Cannabis use	OR 77.258(5.312-9.917), p=0.000	OR 19.937(11.162-35.611), p=0.000
High-risk drink	OR 3.084(2.660-3.576), p=0.000	OR 3.916(3.311-4.632), p=0.000
Probable depression	OR 1.193(1.013-1.405), p=0.034	OR 1.349(1.134-1.605), p=0.001
Fatigue	OR 1.250(1.086-1.439), p=0.002	OR 1.254(1.083-1.453), p=0.003
Aggression		
Verbal	OR 1.390(1.189-1.626),p=0.000	OR 1.505(1.275-1.776),p=0.000
Physical	OR 1.470(1.172-1.843),p=0.001	OR 1.568(1.227-2.004),p=0.000
Vandalism	OR 1.425(1.198-1.696), p=0.000	OR 1.498(1.244-1.804), p=0.000
Psychosocial dysfunction	OR 1.390 (1.189-1.626),p=0.000	OR 1.178(1.026-1.353), p=0.020

* ORs were adjusted for age, level of education, rank, and type of employment.

DISCUSSION

Concordant with the prevalence values of the previous Army and Naval study (7, 8), our survey saw over fifty per cent either had or are currently smoking (cigarettes, cigars, beedi, and use of devices such as pipes or makeshift devices by rapping tobacco on paper). Comparatively, the prevalence of smoking estimated by the community studies ranged between 27.6 % to 29.4% (10, 29), implying a lower smoking prevalence than in the Army. Corroborating with the latter, studies of the US, Chinese and Singapore militaries, observed that the prevalence of smoking was higher than in their civilian counterparts or communities (4, 5, 30, 31), and is attributed to the availability, of peer use and tobacco-promoting milieu in the military (32, 33). Further, the military culture (32), lack of knowledge of the consequences (5), social and role model influence (34), and initiation of smoking at training and during foreign and local missions (35) are implicated as factors for higher prevalence of smoking in the military. In fact, studies assert that being in the military is an independent factor for smoking (32, 36). However, more studies are warranted with age and gender-matched control to consolidate the premise of the higher prevalence of smoking in the Army compared to the community.

Lastly, our observation on the significance of the association between smoking and being in the elite units was reflected in the naval study too (20), and, intriguingly, results remained as so, even repeating the study after three years (8). However, we could not find any other study corroborating such an association, hence, more studies are warranted to substantiate our observation.

Smoking and demographic correlates

As indicated by the Naval study (20), we saw a higher prevalence of smoking in the younger personnel even after adjusting the OR (Table 2). In contrast, in the general community, smoking prevalence rose with age (10, 29, 37, 38). However, in concert with our observation, international

military studies too, portray that younger military members smoke more than their older counterparts (3, 39, 40), and attribute it to the strive to establish an identity (41, 33) and peer and role model influence (16, 30, 34).

Complimenting with our findings, in other militaries, smoking was higher among the lesser educated personnel (3, 42, 43, 44, 45). The acute and chronic stressors stem from occupational stressors and economic deprivation associated with low educational attainments are implicated in starting, intensifying, or continuing smoking (46). Moreover, education provides cultural, intellectual and psychosocial resources necessary to cope with stress and prevent smoking (5).

Concordant to our study, in a military setup, lower rankers were observed to smoke more than their senior counterparts (47), and we posit that the stress factor may be attributed to it. The latter assumption is based on three premisses: first, soldiers smoke to relieve stress (6, 39, 48); second, stress is responsible for the initiation, maintenance and relapse of smoking after a period of abstinence (49); and third, lower rankers experience more stress than their senior counterparts (47, 50).

Smoking and mental health correlates

High-risk drinking (i.e., hazardous, harmful and dependent drinking) is extrapolated to be a significant predictor for smoking [OR 3.084 (95% CI 2.660-3.576) and OR 3.916 (95% CI 3.311-4.632)] (Table 2), which is corroborated by studies (51, 52, 53). The cue-eliciting cravings for each other, increasing the desire to continue one after quitting the other, and reducing the sedative property of alcohol by nicotine making way to consume more in quantity are reasons that explain the reciprocity of alcohol and nicotine use (52). Moreover, nicotine enhances the euphoric effect of alcohol, encouraging the concurrent use of both substances (54). Similar to alcohol, as we depicted (Table 2), a significant association between cannabis use and smoking is demonstrated [55], and the reciprocal enhancing effect on each other and the capacity one has on the other in relieving the symptoms of withdrawal are explained as reasons (56).

Converging with our findings (Tables 1 and 2), studies show that smoking is strongly associated with depression (55, 57), fatigue (58, 59), and aggression (60, 61, 62, 63). Empirical evidence highlights that stress gives rise to depression (64), fatigue (58, 65, 66) and expression of aggression (67, 68); similarly, the initiation, maintenance, and relapse of smoking are significantly associated with stress (39, 49). Hence, we contend that, in the military, irrespective of the source, stress moderates the association of smoking with depression, fatigue and aggression.

Finally, the popular belief within the military that "smoking increases unit cohesion" (69) was refuted by our observation, where unit cohesion did not show a significant association with smoking (Table 1).

Imitations

This was a cross-sectional study and hence, the causation cannot be determined from the variables. Further, since the information was obtained solely from questionnaires, recall bias, unacceptability bias (i.e., reluctance to expose perceived sensitive information), and misinterpretation bias cannot be ruled out. The type I and II errors that could arise due to false positive and negative responses need to be considered. As only serving personnel were included, outcome bias is a possibility due to the healthy worker effect (70). This study should have an age and gender-matched cohort of non-serving personnel as a control to specify the uniqueness of the military. Gender should be included as a variable, however, as mentioned, since the sample was from a male-predominant population, presumably, this could not have impacted the outcome. Furthermore, questions on smoking should have been further elaborated by including the use of electronic cigarettes and nicotine vapes. Finally, the clusters, for the sample, should have been from all military establishments in the country to increase the generalizability of the results. Nevertheless, as a designated SF HQ proportionally represents that of the entirety of the Army (i.e., in terms of officers, other ranks and unit distribution), our sample population can be contended as reflecting the total population of the Army.

CONCLUSIONS AND RECOMMENDATIONS

The prevalence of smoking in the Army, in comparison to community studies, is high. Young age, low education, and lower rank were demographic military factors, while depression, fatigue, high-risk drinking, cannabis use and expression of aggression were mental health factors that were significantly associated with smoking. The availability, the nature of the military culture, and stress can be attributed to the association of smoking with demographic and mental health factors. Since smoking is associated with serious health complications, we recommend health education and stress management programmes followed by imposing smoking restrictions by introducing rules and regulations for both the vending and consumption of cigarettes within military installations.

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Authors' contributions:
Study concept and design: R.M.M.M. and S.N.S..; Acquisition of data, analysis, and interpretation of data: R.M.M.M. and S.N.S.; Drafting of the manuscript and Study supervision: R.M.M.M.

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