Cigarette Use and Injury Risk among U.S. Army Soldiers

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Prior tobacco use is a consistent injury risk factor among U.S. Army soldiers during basic training, but less is known about injury risk and tobacco use among soldiers beyond basic training. Purpose: To describe cigarette use and injury risk among soldiers in an infantry brigade. Methods: Demographics, tobacco use, and Army physical fitness test (APFT) results were obtained by survey. Injury-related medical encounter data were obtained from the Defense Medical Surveillance System. Current cigarette smokers were those who had smoked more than 100 cigarettes in their lifetime and at least one cigarette in the past month. Odds of injury (OR) and 95% confidence intervals (95%CI) from multivariable analysis are reported. Results: Of the 1,393 Soldiers surveyed, 46% (n=578) of men and 32% (n=47) of women reported current smoking. Among male smokers, 79% were <30 years old, 17% smoked ≥20 cigarettes per day, 35% had started smoking at age ≤14, and 45% also reported smokeless tobacco use. Among female smokers, 85% were <30 years old, 11% smoked ≥20 per day, 24% had started smoking at age ≤14, and 4% also reported smokeless tobacco use. Male smokers had 1.5 times greater injury risk compared to non-smokers (95%CI:1.2-1.9), controlling for other known risk factors; data were not sufficient to assess smoking and injury risk among females. Conclusion: In this young, employed population, cigarette use is common and injury risk was elevated among male smokers. Results will help focus prevention programs and serve as a reminder of a more immediate, potentially career-influencing adverse outcome.

Introduction

Previous military training-related research has indicted that smokers have a 1.5-2.3 times greater risk of injury compared to non-smokers. (Jones et al. 1993; Knapik et al. 1999; Altarac et al. 2000; Grier et al. 2011). The majority of these studies assess the effect of prior smoking on injury risk in Army initial entry training, during which smoking is not allowed. There is a need to understand the effect of smoking in other military populations such as infantry units, where smoking is not banned and smoking prevalence may be high (Ornelas et al. 2012). The purpose of this analysis was to describe cigarette use and injury risk among soldiers in a U.S. Army infantry brigade.

Methods

In September 2010, the U.S. Army Public Health Command evaluated the effects of a new physical training program implemented in an infantry brigade. As part of the evaluation, demographics, physical characteristics, tobacco use, and Army physical fitness test (APFT) results were obtained by survey. Injury-related medical encounter data (visit date, ICD-9-CM diagnosis) were obtained from the Defense Medical Surveillance System (DMSS) for a 6-month time period following the survey. Injuries were defined as any inpatient or outpatient medical encounters with a primary diagnosis code matching a pre-defined list of ICD-9-CM codes that excluded poisonings and included selected injury-related musculoskeletal conditions. This set of codes was previously developed for use in investigations of Army training-related injuries (Knapik et al. 2004).

For this analysis, cigarette use by gender is summarized, as well as age at smoking initiation, number of cigarettes smoked per day, and smokeless tobacco use. Odds of injury (and 95% confidence intervals) summarizing the effect of cigarette smoking on injury risk are presented, controlling for known risk factors of age, body mass index, and physical fitness as measured by the Army physical fitness test (APFT). Body mass index was calculated from height and weight obtained by survey, and categorized according to Centers for Disease Control and Prevention standards (<18.5=underweight, 18.5-24.9=normal weight, 25.0-29.9=overweight, ≥30.0=obese). Data from the APFT included metrics of aerobic performance (e.g., the 2-mile run time) and muscular endurance (e.g., the number of push-ups completed in 2 minutes and number of sit-ups completed in 2 minutes).

Results

Of the 1,393 Soldiers surveyed, the mean age was 26.6 years (±5.8 years), 90% (n=1,248) were men, 62% were white and 17% were black, 55% were married and 40% were single, and 46% were classified as overweight and 12% as obese according to Centers for Disease Control and Prevention standards (Table 1). Smoking data were missing for 53 soldiers. Of the remaining, 46% (n=578) of men and 32% (n=47) of women were current smokers. Another 4% of men and 1% of women had quit smoking. Among male smokers, 79% were less than 30 years of age, 35% had started smoking at 14 years of age or less, 35% had smoked for 10 years or more, 75% smoked on 16 or more days per month, 17% smoked greater than 20 cigarettes per day, and 45% also reported smokeless tobacco use in addition to cigarette use (Table 2). Among female smokers, 85% were less than 30 years of age, 24% had started smoking at 14 year of age or less, 28% had smoked for 10 years or more, 80% smoked on 16 or more days per month, 11% smoked greater than 20 cigarettes per day, and 4% also reported smokeless tobacco use (Table 2).

Over a six month period, 47% of men and 60% of women in this unit received medical treatment one or more times for injury. Among men, 51% of smokers compared to 43% of non-smokers sustained any injury during the six months (chi square p=0.004) (Table 3). Among women, 66% of smokers compared to 56% of non-smokers sustained any injury during the six month period (Table 3). Female smokers were at 1.5 times greater risk of injury compared to non-smokers (p=0.255). Looking further at predictors of injury risk among male soldiers, the following variables were associated (p<0.1) with injury in univariate logistic regression analyses: age, BMI, current smoking status, aerobic endurance (2-mile run time) on the Army Physical Fitness Test, and muscular endurance (push-ups and sit-ups) performance on the Army Physical Fitness Test. Using backward stepping logistic regression, two statistically significant predictors of injury risk were identified: current cigarette smoking and BMI (Table 4). Male smokers had a 1.5 times greater risk of injury compared to non-smokers (95%CI: 1.2-1.9). Men who were overweight (BMI=25.0-29.9) were at 1.5 times greater risk of injury (95%CI: 1.2-2.0) compared to men of normal weight (BMI=18.5-24.9). Men who were obese (BMI>30.0) were at 2.3 times greater risk of injury (95%CI: 1.5-3.5) compared to men of normal weight (BMI=18.5-24.9). There were insufficient data on female smokers (n=47) for multivariable analysis of injury risk.

Table 1: Descriptive Information on Infantry Brigade (n = 1,393 surveyed)

Variable	Category	n (%)
Gender	Men	1248 (90%)
	Women	145 (10%)
Race	White	864 (62%)
	Black	239 (17%)
	Hispanic	153 (11%)
	American Indian / Alaskan	11 (1%)
	Asian / Pacific Islander	113 (8%)
	Unknown	13 (1%)
Marital Status	Single	559 (40%)
	Married	766 (55%)
	Other	68 (5%)
Body Mass Index (BMI)	Obese (BMI ≥ 30)	168 (13%)
	Overweight (BMI 25-29.9)	642 (48%)
	Normal (BMI 18.5-24.9)	535 (40%)
	Underweight (BMI < 18.5)	0 (0%)
Current cigarette use	Yes (Smokers)	625 (45%)
	No (Non-smokers)	710 (51%)

Table 2: Descriptive Information for Male Smokers (n=578)

Variable	Category	n (%)
Age	< 24 years old	213 (36.9%)
	24 – 25 years old	124 (21.5%)
	26 -29 years old	113 (19.6%)
	30 years or older	118 (20.4%)
Smoked for How Long	<= 1 year	80 (14.8%)
	2-9 years	283 (52.4%)
	10 years or more	177 (32.8%)
Days Smoked per month	<= 15 days per month	143 (25.0%)
	16 or more days per month	430 (74.4%)
Cigarettes per day	1-10 cigs per day	388 (67.8%)
	11-20 cigs per day	89 (15.4%)
	21 or more cigs per day	95 (16.4%)
Smokeless use	Yes	262 (45.3%)
	No	316 (54.7%)
	No	45 (96%)

Table 3: Descriptive Information for Female Smokers (n=47)

Variable	Category	n (%)
Age	< 24 years old	14 (30.4%)
	24 – 25 years old	11 (23.9%)
	26 -29 years old	14 (30.4%)
	30 years or older	7 (15.2%)
Age Started Smoking	<= 14 years old	11 (23.9%)
	15 – 16 years old	10 (21.7%)
	17-18 years old	13 (28.3%)
	19 years old or older	12 (26.1%)
Smoked for How Long	<= 1 year	5 (11.1%)
	2-9 years	27(60.0%)
	10 years or more	13 (28.9%)
Days Smoked per month	<= 15 days per month	9 (19.6%)
	16 days or more per month	37 (80.4%)
Cigarettes per day	1-10 cigs per day	37 (78.7%)
	11-20 cigs per day	5 (10.6%)
	21 or more cigs per day	5 (10.6%)
Smokeless use	Yes	2 (4%)
	No	45 (96%)

Table 4: Injury Incidence by Current Smoking Status and Gender

Variable	Category	% Men Injured	Women (%Injured)
Current Cigarette Use	Smoker	293 (51%)	31 (66%)
	Non-smoker	262 (43%)	52 (56%)

Table 5: Injury Risk Factors: Results of Multivariate Analysis (Men)

Variable	Category	N	Risk Ratio (95% CI)	p-value
Current Cigarette Use	Non-smoker	556	1.00	
	Smoker	488	1.49 (1.16-1.91)	<0.01
BMI	< 25	407	1.00	
	25-29.9	512	1.54 (1.18-2.02)	<0.01
	30+	125	2.32 (1.54-3.50)	<0.01

Variables included in analysis: current cigarette use, body mass index (BMI), age, Army Physical Fitness Test (APFT) 2 mile run time, APFT push-up event performance

Discussion

This analysis provides a recent look at cigarette use in the U.S. Army in an operational, or non-training, environment. The prevalence of cigarette smoking was high among both men (46%) and women (32%), much higher than the prevalence of cigarette smoking among men and women aged 25-44 in the U.S. general population (24.5% and 19.7%, respectively) (MMWR, 2012). These rates are also higher than those reported for the U.S. Army overall. The 2008 DoD Survey of Health-Related Behaviors found that 36% of male soldiers age 26-35 and 20% of female soldiers age 26-35 were current smokers (Bray et al., 2009). The higher prevalence in this unit is a concern, given the previously reported higher incidence of injury among smokers in the military (Jones et al., 1999), the immediate adverse physiologic effects of nicotine that delay wound healing and longer-term effects such as lower bone density among women and connective tissue atrophy (Amoroso et al. 1996; Centers for Disease Control and Prevention 2002).

The higher prevalence of smoking in the current study may be attributed to the soldiers recently returning from deployment. Prior studies of military populations suggest that tobacco use is associated with deployment (Sirratt et al., 2012).

During deployment, smoking is perceived as "common and normalized behavior", used to maintain alertness, relieve boredom, socialize, and manage stress (Gierisch et al., 2012). This behavior is likely to persist when soldiers return from deployment and are faced with stresses resulting from adjustments to non-combat life (Gierisch et al., 2012).

In conclusion, this analysis indicated that cigarette use is common and injury risk was elevated among male smokers in U.S. Army infantry units. Results will help focus prevention programs and serve as a reminder of injury risk, an immediate, potentially career-influencing adverse outcome. Future analyses and additional data collection will enable the investigation of previously limited or unknown risks associated with tobacco use in the operational U.S. Army, such as the use of smokeless tobacco and its association with injury, types of injuries sustained by smokers as compared to nonsmokers, and the effect of smoking on injury risk among female soldiers.

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