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Respiratory symptoms and smoking behaviour in Swiss conscripts

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Summary

Aim: Smoking is a major health hazard in young adults. Reducing smoking is the only well established effective primary prevention of chronic obstructive pulmonary disease. We undertook a prospective cross sectional study to determine the prevalence of respiratory symptoms, smoking behaviour and willingness to participate in a smoking cessation program in Swiss conscripts.

Methods: Conscripts completed a standardized questionnaire on respiratory symptoms, asthma and smoking behaviour and underwent spirometry measurement.

Results: 2604 conscripts were included. 1252 (48%) were current smokers, 144 (6%) were former smokers, 111 (4%) were recent beginners or low intensity smokers and 1097 (42%) were never smokers. Respiratory symptoms were significantly higher in smokers compared to never smokers (wheezing 16% vs. 7%, wheezing without cold 9% vs. 4%, exercise dyspnoea 15% vs. 10%, regular cough 35% vs. 10% and regular phlegm 15% vs. 2%). The mean score of the Fagerstrom Test for Nicotine Dependency (FTND) was 2.6 (± 2.1). According to the transtheoretical model of stage of change 50% were in the precontemplation, 34% in the contemplation, 5% in the preparation, 5% in the action and 6% in the maintenance stage. Amongst the current smokers 33% were willing to participate in a smoking cessation program. Those willing to participate in a smoking cessation program included 17% precontemplators and 53% contemplators.

Conclusion: There is a high prevalence of respiratory symptoms in young current smokers. The Fagerstrom Test for Nicotine Dependence score in conscripts is low thus favouring a potentially successful outcome of a smoking cessation intervention. Using motivational stages to tailor smoking cessation aids might preclude adequate interventions in individuals belonging to the precontemplation stage.

Key words: conscripts; dependency; military; smoking; respiratory symptoms; transtheoretical model; smoking cessation

Introduction

Smoking is a known risk factor for chronic obstructive pulmonary disease, cardiovascular and cerebrovascular diseases [1] and a cause of different cancers [1]. Cigarette smoke can trigger exacerbations of asthma, reduce lung function and increase health care utilization including hospital admissions [2, 3]. Several studies have shown an increase in tobacco consumption in young adults in recent years [4, 5]. Recent reports have shown that Switzerland has a relatively high prevalence of smoking (30%) [6] with direct costs on health of 1.2 billion Swiss francs a year, indirect costs of 3.8 billion Swiss francs a year and intangible costs of smoking of 5 billion Swiss Francs (4.2 billion US dollars) [7]. Since the 1990s, the prevalence of smoking in Switzerland has been increasing in 13 to 14 year old students and in the year 2000, 14.6% were current smokers [8]. Social influences such as peer pressure, imitating behaviour of adult family members or rebelliousness are factors implicated with initiation of cigarette smoking in adolescents [9]. During military service an increase in daily consumption or initiating of smoking has been correlated with having a best friend who smoked, dissatisfaction with the military service, physical inactivity and frequent alcohol consumption [10]. The younger the people initiate cigarette smoking, the higher is the likelihood of becoming strongly addicted to nicotine use [1].

To the authors' current knowledge there are no data regarding the respiratory symptoms and smoking behaviour in Swiss military conscripts. We undertook this study to assess the respiratory symptoms, lung function, smoking prevalence and

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nicotine dependency in Swiss citizens conscripting for the military service, as this information may allow future health interventions to be better adapted. Amongst smokers, we also asked about their willingness to cease smoking and determined the motivational stage.

Material and methods

In Switzerland young male citizens have to undergo compulsory conscription for the Swiss Army in their regions nearest recruitment centre at the age of 18 years. Female citizens may volunteer for the army and the recruitment process is the same. All conscripts are scheduled for their conscription and are divided in groups of approximately 150 defined as cycles. All conscripts living in the part of Switzerland that were assigned to the recruitment centre of Windisch were included during weekly cycles from February 21, 2005 to July 14, 2005. Conscripts examined in the recruitment centre of Windisch belong to the north-eastern part of Switzerland. A medical history was obtained, physical examination performed and a spirometry administered to all conscripts, and a status "medically fit for military service" or "unfit for military service" was assigned. Spirometry was performed by soldiers of the medical service who had been instructed and trained in administration of the test. Spirometry (Erich Jaeger GmbH, Höchberg, Germany) was performed according to American Thoracic Society guidelines [11] Daily calibration before measurement was performed. Ventilatory capacity volume reference values were used according to the study by Braendli and co-workers [12]. Core questions from three validated questionnaires were administered after the medical examination and spirometry, which consisted of the SAPALDIA for respiratory symptoms and smoking, Fagerstrom test for nicotine dependence (FTND) and stage of change questionnaire to determine the motivational stage for smoking [13–18]. The questionnaire also asked about the willingness to participate in a smoking cessation program during the base camp.

Current smokers were defined as those who answered positively to both of the following questions: "Have you smoked in the last month and if so have you smoked for a minimum of one year and more than 20 packets of cigarettes or 360 g of tobacco in your entire life?" Recent beginners and low intensity smokers were defined as those who stated that they have smoked in the last month but who answered negative to the question if they have smoked for a minimum of one year and more than 20 packets of cigarettes or 360 g of tobacco in their entire life. Non smokers were further subdivided into those that had never smoked and into ex-smokers [15].

Statistical methods

Continuous variables are expressed as means (standard deviation, SD), and categorical variables are expressed as relative frequencies and percentages. Analysis was performed with use of SPSS and Excel software.

Results

Overall, 2826 conscripts were evaluated during the study period. 2802 conscripts were male and 24 conscripts were female. Complete data was available in 2604 conscripts (92%). 1252 (48%) were current smokers, 144 (6%) were former smokers, 1097 (42%) were never smokers and 111 (4%) were actually smoking but had been for less than a year or had smoked less than 20 packs of cigarettes or 360 g of tobacco in their entire life. The mean age and body mass index were similar in all the groups (table 1). The respiratory symptoms and asthma status are described in table 2. Respiratory symptoms were significantly higher in the smokers compared to the non-smokers (table 2). Regular cough and regular phlegm were also significantly higher in smokers compared to former smokers. Spirometry measurements are shown in table 2.

Of the 1252 current smokers, 464 (37.1%) were smoking 10 or less cigarettes per day, 637 (50.9%) were smoking 11–20 cigarettes per day, 89 (7.1%) were smoking 21–30 cigarettes per day and 23 (1.8%) were smoking 31 or more cigarettes per day. 39 subjects were classified as current smokers but did not smoke cigarettes; 17 smoking hashish/marihuana, 5 cigarillos, one pipe tobacco and hashish/marihuana and 16 did not mention the tobacco products used. The mean duration of smoking was 5 years (SD 2). The smoking behaviour of current smokers is presented in table 3. The

Table 1

Results of body measurements according to smoking status (n = 2604).

Variable	Current smokers N = 1252	Recent beginners and low intensity smokers N = 111	Former smokers N = 144	Never smokers N = 1097
Age (years)	20 (1), range 18–25	20 (1), range 18–23	20 (1), range 18–30	20 (1), range 18–27
Weight (kg)	72 (13), range 48–157	75 (13), range 56–143	74 (12), range 51–123	74 (13), range 43–169
Height (cm)	177 (7), range 151–208	179 (7), range 165–198	179 (6), range 158–196	178 (7), range 157–200
BMI (kg/m^2)	23.0 (3.7), range 16–44	23.3 (3.4), range 17–40	23.2 (3.4), range 17–40	23.3 (3.7), range 16–58

Values are expressed as mean (standard deviation) and range.

Table 2
Respiratory symptoms, asthma and spirometry according to smoking status (n = 2604).

Symptom	Current smokers N = 1252	Recent beginners and low intensity smokers N = 111	Former smokers N = 144	Never smokers N = 1097
Wheezing	203 (16%)	10 (9%)	16 (11%)	79 (7%)
Wheezing without Cold	117 (9%)	5 (5%)	8 (6%)	42 (4%)
Exercise dyspnoea	192 (15%)	6 (5%)	21 (15%)	103 (10%)
Regular Cough	438 (35%)	20 (18%)	20 (14%)	108 (10%)
Regular Phlegm	183 (15%)	3 (3%)	5 (4%)	18 (2%)
Doctor diagnosed Asthma	162 (13%)	10 (9%)	19 (13%)	133 (12%)
FEV/FVC ratio	0.86 (0.08)	0.86 (0.07)	0.86 (0.07)	0.87 (0.08)
FEV_1%predicted*	102 (12)	103 (12)	104 (11)	102 (12)
FVC%predicted*	100 (11)	101 (12)	102 (12)	100 (12)

Values of respiratory symptoms and asthma are expressed as relative frequencies [percentages]
Values of spirometry are expressed as mean (standard deviation)
* percentage predicted values are based on the Swiss Study on Air Pollution and Lung Diseases in Adults (SAPALDIA) [12].

Table 3
Smoking behaviour of Current Smokers (n = 1252).

Variable	Mean	Standard deviation
Age when smoking started (n = 1241)	15	2
Variable	**Median**	**Inter-quartile range**
Numbers of cigarettes per day (n = 1213)	15	2
Numbers of joints per week (n = 424)	7	13
Numbers of cigarillos per day (n = 38)	2	2
Numbers of cigars per day (n = 26)	10	18.5
Pipe tobacco in g per week (n = 21)	10	14

mean Fagerstrom test of nicotine dependency was 2.6 (SD 2.1). The distribution of the current smokers according to categories of dependence in the Fagerstrom test for nicotine dependency was as follows 646 (52%) very low, 359 (29%) low, 129 (10%) medium, 99 (8%) high and 19 (2%) very high.

According to Etter and Sutton stage of change questionnaire (transtheoretical model) the subjects were grouped as follows: 733 (50%) in the precontemplation stage, 503 (34%) in the contemplation stage, 68 (5%) in the preparation stage, 68 (5%) in the action stage and 87 (6%) in the maintenance stage. By using this model in current smokers as defined in this study subjects were grouped as follows: 677 (54%) in the precontemplation stage, 445 (36%) in the contemplation stage and 49 (4%) in the preparation stage. Nine participants classified as current smokers indicated that they had stopped smoking within the last 12 months. Seventy two (6%) subjects classified as current smokers did not answer all the questions and could therefore not been classified.

Amongst the 1252 current smokers, 1227 answered the question about willingness to participate in a smoking cessation program under supervision by a doctor during base camp. Of these, 409 (33%) indicated that they would participate. Willingness to participate in a smoking cessation program was indicated by 114 (17%) out of 666 subjects in the precontemplation stage, 233 (53%) out of 437 subjects in the contemplation stage and 34 (69%) out of 49 subjects in the preparation stage.

Discussion

Chronic smokers are known to develop respiratory symptoms and reduced lung function measurements [19, 20]. In our young population, the mean duration of smoking was 5 years and current smoking subjects already had a significantly higher prevalence of all respiratory symptoms compared to the never smokers. Asthma diagnosed by doctors was similar in current smokers and never smokers. This finding is similar to that of Ziemlichman and co-workers who have reported an equal prevalence of smoking among mild to moderate asthmatics, who were being screened to enter the Israel defence force [21]. Therefore, the higher occurrence of respiratory symptoms in current smokers cannot be attributed to asthma, which is a common cause of respiratory symptoms in the young population. Our study findings implicate that a significant proportion of current smokers in our study already have health disturbances that might be directly related to smoking. In a study by Urrutia and colleagues in young Spanish adults, smoking was associated with a higher prevalence of respiratory symptoms [22]. Gold and co-workers have shown that smoking is associated with evidence of mild airway obstruction and slowed growth of lung function in adolescents [23]. In an epidemiological study of chronic obstructive pulmonary disease in adults, airway obstruction increased with age and number of cigarettes smoked [24]. In the young population we investigated, the exposure time to tobacco smoke seemed to be too short to show a relevant effect in lung function impairment.

Smoking has been identified as a important determinant of ill-health in the British Armed Forces [25] and as a risk factor for exercise-related injuries

in basic training [26, 27]. Smoking officer cadets performed less well in an army personal fitness assessment compared to non-smokers [28] and in Swiss smoking conscripts performance in a 12-minute endurance run was inversely related to daily cigarette consumption and years of smoking [29]. In a retrospective study in the United States Air Force, current smoking has been estimated to cause a higher rate of short term hospitalizations and lost workdays among military personnel [30] and therefore increased costs for healthcare [31]. When deployed to a war zone smoking prevalence has been shown to increase in military personnel [32]. Several smoking cessation interventions among military personnel have been proven to be successful [33–36]. In the United States, Air Force and Navy basic military training recruits are not allowed to smoke for a period of six weeks. Unfortunately a high proportion of former smokers relapse after the smoking ban but they seemed to be more motivated to quit smoking at the one year follow-up compared to when they were in the basic military [37–39].

The prevalence of smoking in the Swiss population is high when compared with other countries in Western Europe [40]. In Switzerland, the prevalence of current smokers has been reported to be higher in the group of 15–24 year old males with better education (36.2%) when compared with males who just had a finished the obligatory school (30.4%) [6]. The mean age of our study population was 20 years and the overall prevalence of smoking was much higher at 48%. The very low proportion of females in the population studied reflects the nature of gender distribution in the Swiss army. 111 (4%) subjects were smokers at the time of the survey but could not be classified as current smokers by the definition used in previous publications as they could be recent beginners or low intensity smokers [15, 18]. The findings of our study provide clear arguments for initiating smoking prevention programs in school and to address the current situation by initiating intervention programs aimed at this age group. Further it is important to plan interventions that are attractive to adolescent females.

Early onset of smoking is associated with higher score in the Fagerstrom Test for Nicotine Dependence (FTND) [41]. Low FTND scores have been identified as positive predictors of abstinence six month after a smoking cessation intervention [42]. Our sample of current smokers had a relatively low FTND score indicating a low nicotine dependency in our population. In a Spanish military study (mean age 22 years), the mean FTND score was also low at 3.79 [43]. Therefore, one can estimate that the chances of success with a smoking cessation intervention are likely to be higher if implemented at this stage.

Since the 1980s the proportions of smokers in the precontemplation and contemplation stages remained between 40 to 50% in North America despite increasing efforts to control smoking [44–46]. In Swiss studies, the proportion of subjects in the precontemplation stage was 50% and 40% were in the contemplation stage. The proportion of subjects in the preparation stage was higher in North American studies (20%) compared to Swiss studies (5–7%) [45, 47, 48]. There is limited evidence that tailoring intervention to the stage of change of the intervention group produces better outcome [49]. The transtheoretical model has been criticized as artificially dividing subjects into different groups and neglecting the concept of addiction [50]. It has been shown that the majority of quit attempts in smokers in a general practice sample involved no planning or preparation [51] and therefore weak interventions or no interventions would be given to precontemplators. West and Sohal investigated smokers having made at least one quit attempt and ex-smokers and reported in 48% the most recent quit attempt involved no previous planning and that unplanned quit attempts were more likely, than planned ones to be successful [52]. In our study population 54% of current smokers were in the precontemplation stage, 36% in the contemplation stage and only 4% in the preparation stage. However, 17% subjects in the precontemplation stage and 53% subjects in the contemplation stage report a willingness to participate in a smoking cessation program during base camp. In a study by Pisinger et al. help for smoking cessation was offered to smokers in all motivational stages and sustained abstinence was obtained even in smokers of originally early motivational stages [53]. These data clearly highlight the potential importance of offering aids for smoking cessation unrelated to the widely used transtheoretical model of stage of change. The subjects investigated in this study are at a unique stage of their life as most of them are just about to finish their education (college, apprenticeship). It is possible that not all the subjects from the current study proceed to the base camp and hence they should have the possibility of access to alternative smoking cessation programs.

In summary, there is a high prevalence of respiratory symptoms in young current smokers. The FTND in conscripts is low thus favouring a successful outcome of a smoking cessation intervention. Using motivational stages to tailor smoking cessation aids might preclude adequate interventions in individuals belonging to the precontemplation stage.

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