

Assessment of physical activity levels and nicotine dependence among university students

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Abstract. The prevalence of smoking is decreasing but the relative proportion of nicotine dependent smokers is increasing and rates of nicotine dependence vary in different sociodemographic groups in the population. The physical activity levels and smoking have inverse relationship never less there is not enough data about physical activity levels in nicotine dependence. The aim of this study was to compare the physical activity levels of young subjects who smoke cigarette according to their nicotine dependence. *Material and Method.* This cross-sectional study was conducted among volunteer students in Pamukkale University and Dumlupınar University. Four hundred and twenty-nine smoking subjects were included in the study. The subjects were divided into three groups according to level of dependence as Group 1: high nicotine dependence (FTND score 7-10), Group 2: moderate level of nicotine dependence (FTND score 4-6) Group 3: low dependence (FTND score 0-3). The 3 groups were compared according to physical activity levels. The Turkish version of the Fagerström Test for Nicotine Dependence (FTND) test was used for assessing nicotine dependence. Physical activity levels were determined by the Turkish version of the International Physical Activity Questionnaire (IPAQ - International Physical Activity Questionnaire). *Results.* Two hundred and thirty-seven male, 197 female smoking subjects composed university students of were included in this study. There was a significant difference between groups in terms of total physical activity, walking, moderate, vigorous activities ($p < 0.05$) but any difference was not found in terms of sitting ($p > 0.05$). The high nicotine dependence group had the lowest activity levels and the highest sitting score. *Conclusion.* Nicotine dependence may be a factor that affects physical activity among young people.

Key words: physical activity, dependent smokers, student.

Introduction

Cigarette smoking is the leading cause of preventable death and disability whole over the world (1). Repetitive exposure to nicotine produces neuroadaptation resulting in nicotine dependence. Nicotine affects mood and performance and has been clearly implicated as the source of addiction to smoking. Cigarette smoking is particularly addictive due to the repeated delivery of bolus doses of nicotine to the bloodstream (2). Although the prevalence of smoking is decreasing, the relative proportion of nicotine dependent smokers is increasing and rates of nicotine dependence vary in different sociodemographic groups in the population (3). Nicotine dependence, rather than smoking per se, was associated with poor physical and psychological health. Smokers with nicotine

dependence should be distinguished from other smokers in evaluations of the health status of populations (4).

Evidence from a number of large cross-sectional surveys indicates that levels of physical activity are inversely related to smoking rates. Smokers reported less spontaneous exercising than nonsmokers (5). There has been little previous research to confirm this association in individuals reporting their own typical exercise habits (6). Additionally, finding a negative association between smoking and physical endurance (cardiorespiratory and muscular) is consistent with previous research (5-6). Although a number of studies point to the inverse relationship between physical activity and smoking; only a few has examined the role of nicotine dependence

in physical activity participation among smokers (7). Therefore the aim of this study was to compare the physical activity levels of young subjects who smoke cigarette according to their nicotine dependence.

Material and Method

This cross-sectional study was conducted among volunteer students in Pamukkale University and Dumlupınar University in accordance with the principles of Helsinki Declaration. The study was explained to every participant and informed consent was taken. The data collection was done face-to face interview. Four hundred and twenty-nine smoking subjects were included in the study. The inclusion criteria for the study were; being between 18-30 years old, smoking at least for 1 year, and not performing any type of professional sportive activity. The subjects who had musculoskeletal, cardiopulmonary, metabolic system and other systems related to problems, drug usage during last three months, body mass index (BMI) of 35 kg/m^2 were excluded. The data belonging to subjects who did not complete and could not be cooperated with the examiner for the assessments were also excluded. The diagnosis and the presence of systemic diseases or orthopedic problems that might prevent physical activity were questioned. Demographic and socio-cultural information were ascertained. Body mass index was calculated by taking the ratio of body weight in kilograms by the square of height in meters. The participants were asked about smoking history, including the duration of smoking and number of cigarettes smoked per day.

The Turkish version of the Fagerström Test for Nicotine Dependence (FTND) test was used for assessing nicotine dependence. Fagerström Test for Nicotine Dependence (FTND) is a non-invasive and easy-to-obtain self-report tool that conceptualizes dependence through physiological and behavioral symptoms. The current version includes six items and though the test is brief, its completion requires a few minutes (8). The Turkish version of FTND was first developed by M.Atilla U et al. The FTND has 6 items with an overall score ranging between 0-10 (9).

The subjects were divided into three groups according to level of dependence as Group 1: high nicotine dependence (FTND score 7-10), Group 2: moderate level of nicotine dependence (FTND score 4-6) Group 3: low dependence (FTND score

0-3). The 3 groups were compared according to physical activity levels.

Physical activity levels were determined by the Turkish version of the International Physical Activity Questionnaire (IPAQ - International Physical Activity Questionnaire) (10-11). In our study, self-administered, the shorter form of the questionnaire, "last seven days" was used in the evaluation of and physical activity levels. This short form consists of seven questions provides information about the time spent in sitting, walking, moderately intense activities and in vigorous activities. The calculation of the total score of the short form, included total activity time (minutes) and frequency (days) of walking, moderate and vigorous activities. Sitting score (sedentary behavior level) was calculated separately. The evaluation of all activities based on the criteria each activity being performed at least 10 minutes at one time. By multiplying minutes, days and MET value (multiples of resting oxygen consumption) a score as "MET-minutes/week" was obtained. The walking score was calculated as multiplying walking time (minutes) by 3.3 METs. In the calculation of moderate to severe activity 4MET and for violent activity 8MET values were used (10).

Statistical Analyses. Analyses of data were performed using SPSS for Windows version 16.00. The mean value, and standard deviation were used for descriptive data. As the physical activity level results do not comply with the normal distribution after Kolmogorov-Smirnov normality test, median and quartile values were given. Kruskal Vallis, One Way Anova, Mann Whitney U and Independent sample *t* tests were used for the comparison. *p* value was accepted as significance.

Results

Two hundred and thirty-seven male, 197 female smoking subjects composed university students of were included in this study. The physical properties of subjects were shown on Table I. There was not any significant difference between groups in terms of physical properties. We also analyzed the BMI of subjects. The subjects who had BMI more than 25 kg/m^2 were considered as overweight. The range of overweight subjects were %21,14 (n=92).

The average duration of smoking was 9.29 ± 10.30 years and the average number of cigarettes smoked per day was 16.23 ± 11.56 . As it

was shown on table II both the duration of smoking and the number of cigarettes smoked per day were significantly higher in males ($p < 0.05$). There was 85 subjects in the first group (FTND score 7-10), 166 subjects in group 2 (FTND score 4-6) and 178 subjects in group 3 (FTND score 0-3). We found that a considerable amount of the smoking university students (%58, 50) had moderate-high levels of nicotine dependence. When the groups were compared in terms of smoking duration and the average number of cigarettes smoked per day the highest results were in moderate level of nicotine dependence group but there was not any significant difference between groups (table III, $p > 0.05$).

The median of total physical activity level was 3216.68 MET ($Q_{25-75} = 3012.34$) and there was not a significant difference between male and female subjects (Table III). The median of Walking, Moderate, Vigorous activities and sitting were; 1260,21 ($Q_{25-75} = 1104,09$), 1058,94 ($Q_{25-75} = 1112.52$), 841.74 ($Q_{25-75} = 786.31$) and 358.22 ($Q_{25-75} = 341.09$) respectively. According to Table IV, there was a significant difference between groups in terms of total physical activity, walking, moderate, vigorous activities ($p < 0.95$) but any difference was not found in terms of sitting ($p > 0.05$). The high nicotine dependence group had the lowest activity levels and the highest sitting score.

Table I. The Comparison of Physical Properties of Subjects

Physical properties	All Subjects (x±sd)	Group 1 (x±sd)	Group 2 (x±sd)	Group 3 (x±sd)	*p
Weight (kg)	64.13±7.54	65.28±8.71	65.16±10.11	64.91±7.75	> 0,05
Height (cm)	167.12±15.32	168.23± 19.22	167.04±23.64	167.18±28.31	> 0,05
BMI (kg/m ²)	23.34±3.51	22,89±2.81	23.68±3.99	22.71±3.42	> 0,05
Age(years)	22.64±4.12	21,92±6.23	21.48±5.34	22.53±5.26	> 0,05

* One Way Anova

Table II. The Comparison of Data Associated with Smoking

Data Associated with Smoking	*F (n=192) (x±sd)	**M (n=237) (x±sd)	***p	Group 1 (x±sd)	Group 2 (x±sd)	Group 3 (x±sd)	****p
Average Duration of Smoking	8,13±3,24	11,44±5,37	< 0,05	9,83±4,12	10,35±3,38	9,62±4,09	>0,05
Average Number of Cigarettes Smoked per Day	10,71±6,33	18,26±6,67	<0,05	11,16±4,31	13,21±5,44	12,24±4,88	>0,05

* F: Female, **M: Male, *** Independent samples t test, **** One Way Anova

Table III. The Comparison of Physical Activity Level According to Gender

IPAQ	All Subjects		F		M		*p
	Median	Q ₂₅₋₇₅	Median	Q ₂₅₋₇₅	Median	Q ₂₅₋₇₅	
IPAQ total	3216.68	3012.34	3123.41	2945.62	3298.36	3054.78	>0.05
Walking	1260.21	1104.09	1119.34	1121.04	1284.51	1155.38	>0.05
Moderately Intense Activities	1058.94	1112.52	998.81	865.74	1103.94	1107.51	>0.05
Vigorous Activities	841.74	786.31	821.67	765.73	844.36	766.52	>0.05
Sitting	358.22	341.09	364.48	352.22	361.19	358.26	>0.05

* Mann-Whitney

Table IV. The Comparison of Physical Activity Level According to Nicotine Dependence

IPAQ	Group 1		Group 2		Group 3		*p
	Median	Q ₂₅₋₇₅	Median	Q ₂₅₋₇₅	Median	Q ₂₅₋₇₅	
IPAQ total	2986,77	2786,65	3184,65	3056,77	3228,12	3106,45	<0,05
Walking	996,81	965,78	1192,21	1102,09	1271,42	1104,22	<0,05
Moderately Intense Activities	985,44	974,34	1045,45	1019,92	1096,35	982,46	<0,05
Vigorous Activities	794,31	789,32	842,51	794,65	852,99	831,23	<0,05
Sitting	362,06	311,12	357,34	338,12	355,13	326,63	>0,05

* Kruskal Wallis

Discussion

We found that although smoking was more common among male university students ($n=237$), the range of female smokers were very close to males (%45.92 and %55.22 respectively). In another study, the prevalence of current smokers was higher in men (32.6%) than in women (23.3%) (3). The literature consistently suggests that the rate of substance abuse and dependence is higher in men, compared to women and current cigarette smoking was associated with male gender (3) (12-13). Even though there were gender differences in the distributions of some smoking-related variables, associations between these variables were similar in men and women. This suggests that smoking behavior is regulated by similar psychological mechanisms in men and women.

There is a controversy about the effects of gender differences and smoking in physical activity level. Although there are studies that suggest physical activity level differs with gender and females have lower physical activity level than males, no differences in terms of physical activity level were reported in some of the studies especially searching young population (13-14). In our study smoking was more prevalent in males but ranges of smoking in two genders were close to each other. The level of physical activity was high both in males and females and there wasn't a significant difference ($p > 0.05$).

In one of the studies, held out in adult population, when compared with non-smokers, smokers walked less in daily life (7923 ± 3558 vs. 9553 ± 3637 steps/day, respectively), presented worse lung function, functional exercise capacity, quality of life (15). Physically active adolescents were less likely to initiate smoking and progress to regular smoking and adolescents who were current smokers were less likely than non-smokers to participate in sports or engage in other regular exercise (16). The physical activity level was high in our study probably because our population was young university students; the social and sportive facilities of both universities allow students to do regular physical activity, and there is an increasing trend of attending to physical activity and exercise groups among university students. Also the awareness of students about the benefits of exercise and physical activity on physical and psychological health, body image, healthy aging and even cognitive functions could be the other reasons.

Nicotine is the most addictive and most widely used psychoactive component of smoking that is responsible for dependence through a nicotine stimulated reward system that is thought to be mediated by the dopaminergic system of the brain (17-18). Nicotine involves cholinergic receptors and strengthens the release of acetylcholine, serotonin, and beta-endorphin (7). Recent research has identified behavioral, environmental and genetic factors that influence the various stages of smoking behavior, including smoking initiation, development of addiction and smoking cessation (19). Nicotine dependence, which can be identified by simple assessment tools like FTND, was found in high relation with heavy smokers (those who smoke 25 or more cigarettes a day) but a number of studies reported that smokers had similar nicotine dependence levels when compared with heavy smokers (2, 4, 8). In our study, most of the subjects had moderate and high levels of nicotine dependence although they were not heavy smokers (and the average number of cigarettes smoked per day was 16.23 ± 11.56). Nicotine dependence is one of the most common psychiatric disorders and emotional status was predictive of higher levels of nicotine dependence. It was reported in the study of Kendler et al., nicotine dependence was associated with extroversion, mastery, and self-esteem, high levels of neuroticism and dependency and a history of mood and alcohol use disorders whereas smoking could be associated environmental factors, religiosity, level of education (20). Therefore the etiological factors that influence smoking and nicotine dependence may be different.

As mentioned above there is uncertainty about the relationship between smoking and physical activity level as there is wide range of types of studies among different types of study population. On the other hand nicotine dependence appears to play an important role in shaping longitudinal exercise patterns among young adult smokers. In one study, they found that nicotine dependent smokers were significantly less likely to be physically active compared to non-smokers (21). An inverse relationship was reported such that more nicotine dependent smokers would be less physically active than lighter in the study of Mei-Chen H et al. (22). One recent study found a negative correlation between activity level and smoking frequency among adolescents and young adults

Importance of and satisfaction with physical activity decreased with increase in degree of nicotine dependence (23).

In our study we divided the subjects in to three groups according to their level of nicotine dependence.

Although the total, walking, moderate and vigorous physical activity levels of our subjects were high, when we compared the physical activity levels in three groups according to their level of nicotine dependence, we found that The high nicotine dependence group had the lowest activity levels and the highest sitting score.

The psychological factors causing nicotine dependence might be a reason for this as psychological distress, depression; high levels of neuroticism could affect participation to physical activities. In one study, it was shown that smokers with high compared to moderate and low degrees of nicotine dependence consumed unhealthy foods more frequently and more hazardous alcohol drinking (24).

Importance of and satisfaction with physical activity decreases with increase in degree of nicotine dependence. This leads to unwillingness for participation in a physical activity or exercise.

Conclusion

The effects of smoking on health behavior were discussed in many studies but the effects on physical activities remains unclear.

There are not many studies that search the levels and participation to physical activities in nicotine dependence.

As a result of our study we suggest that nicotine dependence may be a factor that affects physical activity among young people.

Beside smoking, a special consideration to nicotine dependence and physical activity should be given when planning health policies for young people and the others. As there are very few studies about nicotine dependence and physical activity further studies with more populations are needed.

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References

1. Jacek M, Giriya S, Brian AK, Robert M Castellan (2014). Smokeless Tobacco Use Among Working Adults — United States, 2005 and 2010. *Morbidity and Mortality Weekly Report*; 63: 478-482.
2. Naomi B, Eric OJ, Eva H, Ronald K (2001). Nicotine Dependence in the United States Prevalence, Trends, and Smoking Persistence. *Arch Gen Psychiatry*; 58: 810-816.
3. Giuseppe V, Simone A, Gi ang N, Pierpaolo M, Lucia C, Marcello F et al (2014). Socioeconomic inequalities in smoking habits are still increasing in Italy. *BMC Public Health*; 14:879.
4. Pérez-Ríos M, Santiago-Pérez MI, AlonsoB, MalvarA, HervadaX Leon J (2009). Fagerstrom test for nicotine dependence vs. heavy smoking index in a general population survey. *BMC Public Health*; 9: 1-5.
5. George P, Maria P, Antonis G, Eleni K, Elias T, Vasiliki K et al (2012). Smoking and Physical Activity Interrelations in Health Science Students. Is Smoking Associated with Physical Inactivity in Young Adults? Hellenic. *J Cardiol*; 53: 17-25.
6. Luisa B (2014). The effects of smoking and physical inactivity on advancing mortality in U.S. adults. *Annals of Epidemiology*; 24: 484-487.
7. Sunday A, Mark A (2013). Nicotine dependence matters: examining longitudinal association between smoking and physical activity among Canadian adults. *Prev Med*; 57: 652-7.
8. Karl Olov F, Todd FH, Lynn TK (1990). Nicotine Addiction And Its Assessment. *Ear, Nose And Throat Journal*. 69: 763-65.
9. M.Atilla U, Figen K, Çağatay K, Nazan Gülhan B, Ömer U, Veysel Y (2004). Fagerstrom Test For Nicotine Dependence Reliability in A Turkish Sample And Factor Analysis. *Journal Of Tuberculosis And Thorax* 52:115-121.
10. Cora L. C, Alison L. M, Micheal S, Adrian B, Micheal L.B, Barbara A et al.(2003) International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 35:1381-95.
11. Melda S, Hulya A, Sema S, Deniz I-I, Meral B-G, Erdem K et al. (2010). International Physical Activity Questionnaire: Reliability And Validity Of The Turkish Version. *Perceptual and Motor Skills* 111:278-284.
12. Thomas B, Silja G, Mathias S (2007). Gender differences in smoking behavior. *Health Economics*; 16: 895-909.

13. Sara H, Geoffery F (2011). Gender empowerment and female-to-male smoking prevalence ratios. *Bull World Health Organ*; 89: 195-202.
14. Nerín I, Crucelaegui,P, Novella P, Ramón Y, Cajal,N, Sobradie N, Gericóc R (2004). A Survey on the Relationship Between Tobacco Use and Physical Exercise Among University Students. *Arch Bronconeumol* 40: 5-9.
15. Mesquita R, Gonçalves CG, Hayashi D, Costa VD, Teixeira DD, De Freitas ER et al (2014). Smoking status and its relationship with exercise capacity, physical activity in daily life and quality of life in physically independent, elderly individuals. *Physiotherapy*. Article In Press.
16. Erika Litvin B, Ana MA, Kathryn FF, Susan ER, Richard AB (2012) Gender Differences in the Relationship Between Physical Activity and Smoking Among Psychiatrically Hospitalized Adolescents. *Ment Health Phys Act*. 5: 136-140.
17. Paul D. L, Jerome F. W, Bradley J. C (2014) Nicotine dependence and transitional shifts in exercise behavior among young U.S. adult smokers. *Prev Med*; 6: 96-8.
18. Mir MA, Aliaksandr A, Lauren RH (2014). The Influence of Physical Activity on Cigarette Smoking among Adolescents: Evidence from Add Health *Nicotine Tob Res* Epub ahead of print.
19. Micheal SD (2014). Association between physical activity and substance use behaviors among high school students participating in the 2009 Youth Risk Behavior Survey. *Psychol Rep*; 114: 675-85.
20. Kendler K, Neale M, Sullivan P, Corey AL, Gardner OC, Prescott C (1999). A population-based twin study in women of smoking initiation and nicotine dependence. *Psychological Medicine*; 29:299-308
21. Gawlikowska S, Dzieciolowska E, Szczurowski J, Kamienska E, Czerwinski F (2009). Tobacco abuse and physical activity among medical students. *Eur J Med Res*; 14: 86-89.
22. Mei-Chen H, Mark D, Denise BK (2006). Epidemiology and Correlates of Daily Smoking and Nicotine Dependence Among Young Adults in the United States. *American Journal of Public Health*; 96: 299-308.
23. Marianna C, Maria K, Marios C, Steve P (2009). Relationship between physical activity and type of smoking behavior among adolescents and young adults in Cyprus. *Nicotine Tob Res*; 11: 969-976.
24. Anja S, Ulfert H, Hans-Jurgen R, Christian M, Ulrich J (2001). The association between degree of nicotine dependence and other health behaviours: Findings from a German general population study. *Eur J Public Health*; 11: 450-452

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