

SUBJECTIVE SLEEP QUALITY IN QUITTERS VERSUS NONQUITTERS ON A TOBACCO SMOKING CESSATION PROGRAM

SİGARAYI BIRAKMA PROGRAMINDA SİGARA İÇENLERE KARŞI BIRAKANLARDA SUBJEKTİF UYKU KALİTESİ

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Cite this article as: Aydın D, Karlıkaya C, Öztürk L. Subjective sleep quality in quitters versus nonquitters on a tobacco smoking cessation program. Med J SDU 2022; 29(4): 553-559.

Öz

Amaç

Uyku kalitesi ile ilişkili faktörler sigara kullananların bırakma programına uyumları ile ilişkilidir. Bu çalışma, en az bir yıldır sigara kullanımını bırakmada başarılı olan ve olamayan kişiler arasındaki uyku kalitesini karşılaştırmayı amaçlamaktadır.

Gereç ve Yöntem

Sigara bırakma programında olan toplam 682 kişi Mart 2004-Şubat 2011 tarihleri arasında çalışmaya alınma uygunluğu açısından incelenmiş ve uygun olanlar telefon ile çalışmaya katılmaya davet edilmişlerdir. Davet edilenlerden 106 kişi (Erkek/Kadın 67/39) çalışmaya katılmayı kabul etmiş ve final analizlerine dahil edilmişlerdir. Pittsburgh uyku kalite indeksi skorları, solunum fonksiyon testi ve karbon monoksit ölçümleri başarılı bir şekilde sigarayı bırakanlar (n=42) ve bırakmayanlar (n=64) arasında karşılaştırılmıştır.

Bulgular

Sigarayı bırakanların bırakmayanlara göre uyku kalitelerinin daha iyi olduğu saptandı. Pittsburgh uyku kalitesi indeksine göre bırakan olguların %23,8'i (10/42), sigarayı bırakmayanların ise sadece %7,8'i (5/64) iyi uyku kalitesi skoruna sahipti (p=0.021). Sigarayı bırakanların vücut ağırlığı ortalama 8,33 kg, vücut kitle indeksi ortalama 3,13 artmıştı (p<0,001) ve %52,4'ü

10 kg üzerinde kilo almıştı.

Sonuç

Bu sonuçlar doğrultusunda sigarayı bırakan kişilerin daha kaliteli uykuya sahip olduğunu, bu düzeltici etkinin kilo alınmasına rağmen ortaya çıktığını ve uyku kalitesindeki bu yüksekliğin solunum fonksiyonlarındaki düzelme dışı nedenlerle de ilişkili olabileceğini saptandı. Bu veriler kişilerin sigara bırakmasında isteklendirme aracı olarak kullanılabilirliği gibi ayrıca sigara ve uyku ile ilgili ileri fizyopatolojik araştırmalara ışık tutacağı düşünülmektedir.

Anahtar Kelimeler: Pittsburgh Uyku Kalitesi İndeksi, Sigara Bırakma, Sigara İçmek, Solunum Fonksiyon Testi

Abstract

Objective

Sleep related factors may affect compliance of tobacco smokers to a cessation program. This study was designed to assess sleep quality among individuals who were at least 1 year smoking free versus individuals who failed to quit smoking.

Material and Method

In total, 682 individuals who were on a smoking cessation program between March 2004 and February

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Müracaat tarihi/Application Date: 01.06.2022 • **Kabul tarihi/Accepted Date:** 04.10.2022

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2011 were examined for suitability and invited by phone call for this cross-sectional study. Of those, 106 patients (Male/Female, 67/39) agreed to participate and included to the final analysis. Pittsburgh Sleep Quality Index scores, respiratory function test results, and carbon monoxide measurements were compared between quitters (n=42) and non-quitters (n=64).

Results

Based on Pittsburgh Sleep Quality Index scores, the rate of good sleepers was 23.8% in quitters and 7.8% in non-quitters ($p<0.01$). This difference was independent of body weight change. In fact, weight gain more than 10% of the initial body weight was

present in 52% of quitters versus 8% of non-quitters ($p<0.01$). Both study groups were comparable in terms of respiratory function tests.

Conclusion

Subjective sleep quality was better in quitters when compared to the individuals who failed to quit smoking on a smoking cessation program. Improvement of sleep quality may be used as an additional motivation issue in subjects who are willing to stop smoking.

Keywords: Cigarette Smoking, Pittsburgh Sleep Quality Index, Respiratory Function Tests, Smoking Cessation

Introduction

Sleep related complaints show significant dependence to smoking status. Current smokers more likely to report sleep problems such as difficulty falling asleep, daytime sleepiness, and poor sleep quality when compared to former smokers and never smokers (1). A line of research has investigated the bidirectional association between sleep quality and cigarette smoking. While some studies reported higher prevalence of sleep disturbances in smokers without psychiatric disorders (2), some others suggested that poor sleep quality may affect smoking behavior (3). The degree of poor sleep quality was also related to cravings and years of cigarette smoking (4). Interestingly, poorer subjective sleep quality was common among electronic cigarette users when compared to non-smokers (5,6). Several explanations for the link between sleep and smoking are worth to mention. First, nicotine, a stimulant agent in tobacco, may alter neurotransmitter release and affect sleep generating neural circuits. Indeed, active smokers showed higher dopamine levels in their cerebrospinal fluid (7). Also, current smokers' plasma levels of serotonin and catecholamines was detected higher (8). Cigarettes with a higher nicotine dose were associated with more pronounced sleep problems (9). First, pre-cessation sleep disturbances and premature waking due to greater nicotine dependence may result in failure to quit and heighten the risk of relapse (10). Second, poor sleep quality may lead to smoking behavior together with psychiatric symptoms such as depression and anxiety. It is plausible to think that poor sleepers tend to smoke more than good sleepers due to lower health-related quality of life (11). Although there is a plethora of studies that compared the sleep quality of non-smokers to smokers, no study reported subjective sleep quality

of quitters versus unsuccessful quitters (non-quitters). Thus, the purpose of current study was to investigate subjective sleep quality of quitters who were at least 1 year smoke-free on a cessation program.

Material and Method

The study protocol was approved by local ethics committee (Date-number: March 09, 2011-06/10). In total, 682 individuals who were on a smoking cessation program between March 2004 and February 2011 were examined for suitability and invited by phone call for this cross-sectional study. Of those, 106 patients (M/F, 67/39) agreed to participate and included to the final analysis. Pittsburgh Sleep Quality Index (PSQI) scores, respiratory function test results, and carbon monoxide levels in exhaled air (piCOTM Smokerlyzer®) were measured. Quitters were described as the patients who were at least one-year smoking free with piCO measurements within normal limits. Pulmonary function tests were performed by a spirometer (Vmax 22 SensorMedics, Yorba Linda, US) and a software (Vmax2130V6200, Vision Software version 05-2A) in accordance with the criteria of American Thoracic Society (12). Forced expiratory volume after 1 second (FEV1), forced vital capacity (FVC), and FEV1/FVC were included (13). Before pulmonary function tests, each volunteer underwent anthropometric measurements comprised of body weight and height. Body mass index (BMI) was calculated as body weight in kilograms divided by the square of height in meters. Volunteers with a BMI higher than 30 kg/m² were accepted as obese.

Turkish version of the PSQI was validated with 89.6% sensitivity and 86.5% specificity (14). PSQI is a 24-item questionnaire that comprises of seven component scores including subjective sleep quality,

sleep latency, sleep duration, sleep efficiency, sleep disorders, use of sleep medication, and daytime function. A global PSQI score lower than 5 represents good subjective sleep quality while a global PSQI score equal to or higher than 5 represents poor subjective sleep quality.

Statistical Analysis

Statistical analysis was performed by using Statistica AXA 7.1 version (StatSoft Inc., USA). Statistical analysis of the data included descriptive statistics given by means and standard deviations. Gender distribution between the study groups were analyzed by Chi-square test. Comparisons between quitters versus non-quitters were performed by Student-t test for parametric variables and by Mann-Whitney U test for non-parametric variables. A p value lower than 0.05 was accepted significant.

Results

General characteristics of the two study groups are given in Table 1. Both groups were similar in terms of gender distribution, mean age, education level, occupation, marital status and smoking history on admission. Figure 1 depicts the comparative change in pulmonary function test parameters in quitter and non-quitter groups. FVC measurement showed an increase in quitter group whereas it remained comparable in non-quitters (Figure 1A). FVC increase in quitter group failed to reach statistically significance level due to high rate of standard deviations ($p=0.219$). FEV1 and FEV1/FVC measurements showed no significant change during the smoking cessation program both in quitters and non-quitters (Figure 1B and C; $p=0.133$, $p=0.784$ and $p=0.346$, $p=0.240$, respectively).

Table 1

General characteristics of quitters and tobacco smokers

	Quitters (N=42)	Smokers (N=64)	P value
Male/Female, n (%)	29 (69)/13 (31)	38 (59)/26 (41)	0.312*
Age, year	49.5 ± 10.7	47.4 ± 10.7	0.128**
Education, n (%)			0.782*
Elementary	12 (11.3)	21 (19.8)	
High school	13 (12.3)	16 (15.1)	
College	17 (16.0)	27 (25.5)	
Occupation, n (%)			0.294*
Housewife	3 (2.8)	9 (8.5)	
Retired	22 (20.8)	22 (20.7)	
Unemployed	2 (1.9)	4 (3.8)	
Employed	15 (14.2)	29 (27.4)	
Marital status, n (%)			0.944*
Married	33 (31.1)	52 (49.1)	
Single	3 (2.8)	4 (3.8)	
Widow/Divorced	6 (5.7)	8 (7.5)	
Smoking history on admission			
Smoking, cigarette/day	24.9 ± 12.8	23.4 ± 10.5	0.537**
Smoking, pack/year	34.1 ± 22.4	32.9 ± 22.4	0.788**
ESS score			
<10, n (%)	33 (78.6)	54 (84.4)	0.446*
≥10, n (%)	9 (21.4)	10 (16.6)	

*Chi-square **Student's t-test ESS: Epworth sleepiness scale

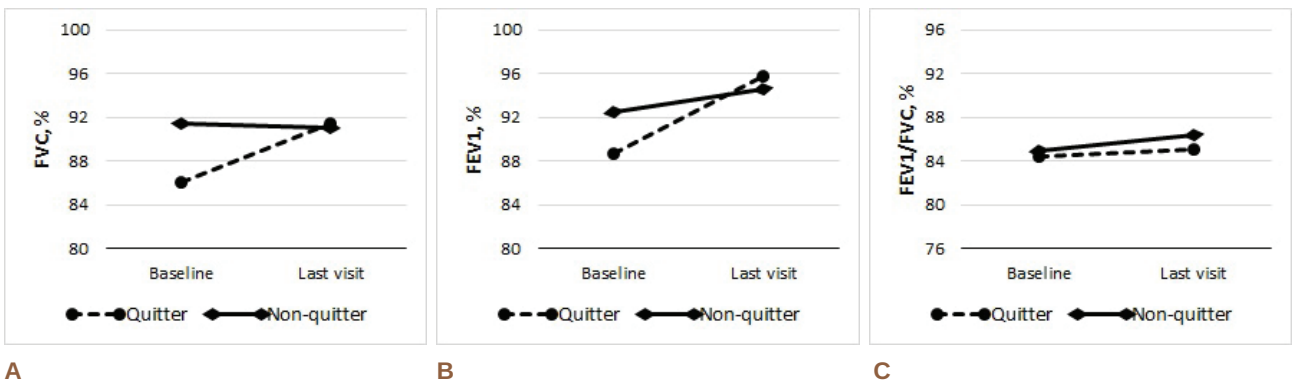


Figure 1
Comparison of the change in pulmonary function test results of ex-smokers versus non-quitters

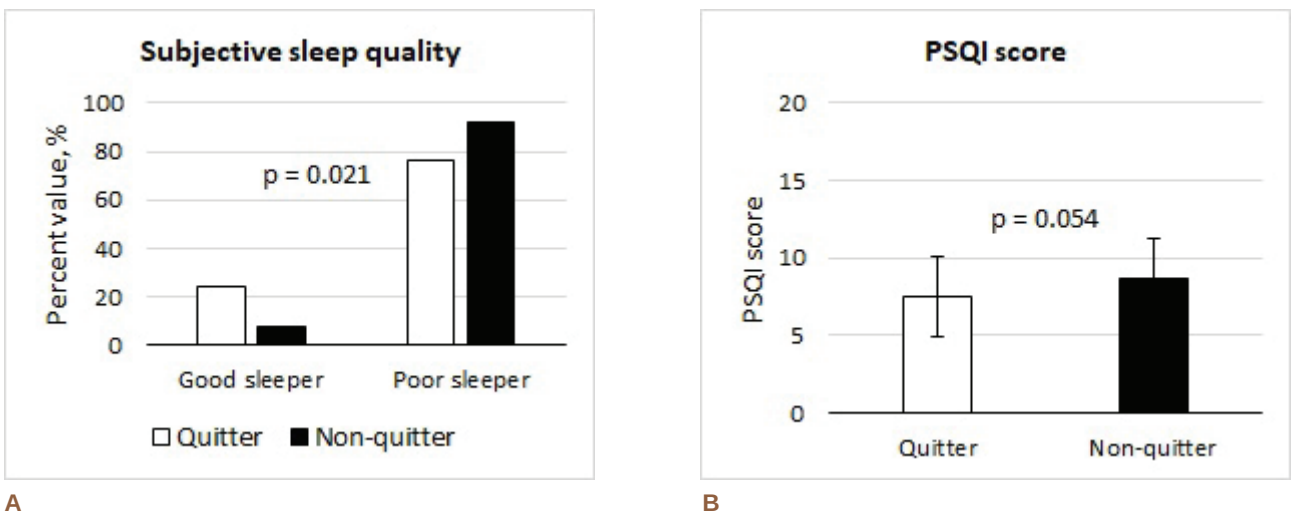


Figure 2
Subjective sleep quality of ex-smokers versus non-quitters based on Pittsburgh Sleep Quality Index scores. P values are from Chi-square tests.

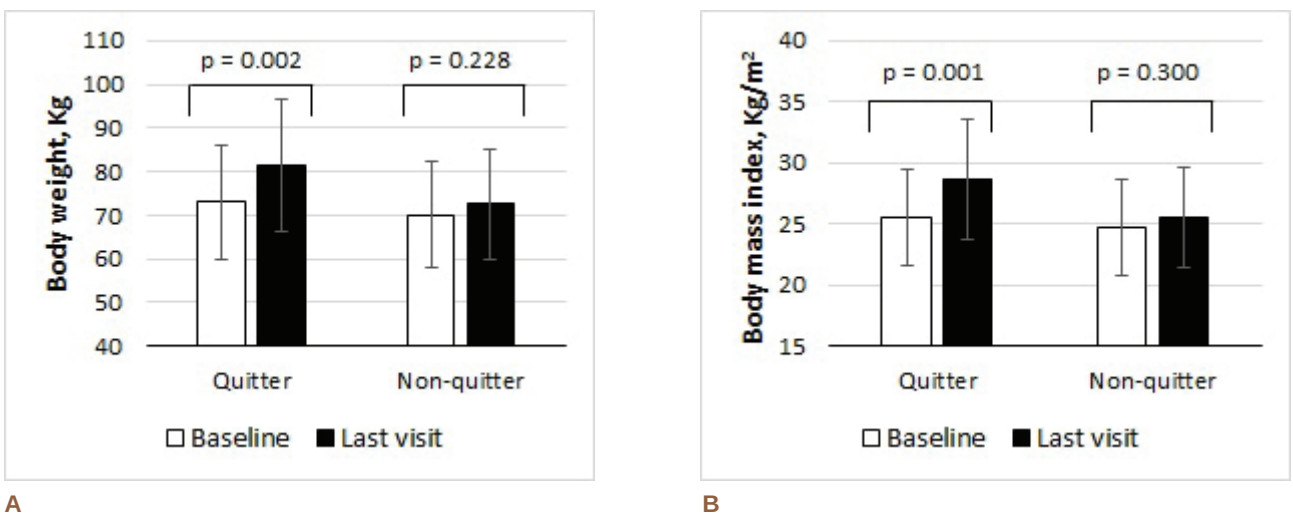


Figure 3
Body weight and body mass index at two timepoints (baseline versus last visit) in ex-smoker and non-quitter groups. P values are from paired samples t-test.

Table 2 Component scores of PSQI in quitters and smokers

	Quitters (N=42)	Smokers (N=64)	P value*
Subjective sleep quality	0.86 ± 0.75	1.02 ± 0.77	0.296
Sleep latency	1.05 ± 0.94	1.33 ± 0.94	0.136
Sleep duration	0.88 ± 0.92	1.19 ± 0.83	0.078
Habitual sleep	2.90 ± 0.48	3.00 ± 0.00	0.118
Sleep disorder	1.10 ± 0.53	1.20 ± 0.69	0.394
Sleeping drugs	0.26 ± 0.83	0.20 ± 0.72	0.699
Daytime function	0.50 ± 0.77	0.66 ± 0.91	0.362
Global PSQI score	7.55 ± 2.65	8.59 ± 2.74	0.054

*Student's t-test; All data are given as means and standard deviations PSQI: Pittsburgh Sleep Quality Index

We analyzed the ratio of good and poor sleepers in both study groups and found that 23.8% of the quitters were good sleepers versus only 7.8% of the non-quitters were good sleepers. In other words, 92.2% of the non-quitters reported poor sleep quality whereas 76.2% of the quitters reported poor sleep quality ($p < 0.05$, Figure 2A). The mean PSQI score was slightly lower in quitter group than in non-quitter group. But the difference failed to reach statistical significance level ($p = 0.054$). Besides a global PSQI score, the seven component scores of PSQI provide standardized evaluation of areas that routinely assessed in clinical interviews of sleep patients. Table 2 gives component scores of PSQI in quitters versus non-quitters. Based on component scores, the two groups were comparable in terms of subjective sleep quality, sleep latency, sleep duration, habitual sleep, sleep disorder, sleeping drugs, and daytime function (Table 2). Epworth sleepiness scale scores were also similar in both quitter and non-quitters (Table 1).

Two important factors that may affect both sleep quality and pulmonary function tests are body weight and body mass index. Figure 3 shows body weight and body mass index at two timepoints (baseline versus last visit) in quitters and non-quitters. The mean body weight of quitters increased significantly at the end of smoking cessation program ($p = 0.002$) whereas it remained similar in non-quitters (Figure 3A). Likewise, the mean body mass index showed a significant increase in quitter group ($p = 0.001$) whereas it remained unchanged in non-quitters (Figure 3B).

Discussion

Based on a report of Centers for Disease Control and Prevention almost 70% of all current smokers reported their will to stop smoking and more than half of the smokers attempted to quit (15). Despite pharmacotherapy and psychotherapy, relapse rate is above 50% (16). As poor sleep quality or sleep-related symptoms are common among smokers (4), promise of good sleep may be used as one of the convincing factors to quit. In this study, we showed that the subjective sleep quality was better in quitters when compared to non-quitters on a smoking cessation program.

Large epidemiologic data revealed that the poorer sleep quality was positively correlated with the number of years smoking, the number of quit attempts and intensity of craving for smoking (4). Current smokers usually report significantly longer sleep latency, increased difficulty falling asleep, and less total sleep time (1). Furthermore, heavier smoking is associated with poorer subjective sleep quality (17). Thus, informing smokers about the benefits of smoking cessation on sleep quality may provide a strong incentive. Besides, physicians should be aware of poor sleep quality as a barrier for abstinence following quit-day. A previous study showed that poorer sleep quality (as measured by PSQI) during the month prior to a scheduled quit attempt led to a greater likelihood of non-abstinence 1 and 3 months after cessation (18). Better subjective sleep quality in the last visit compared to baseline visit in quitters may stem from several factors including improvement in pulmonary

function parameters. As expected, lung function was found to be related with sleep disturbance in patients with chronic obstructive pulmonary disease and pulmonary rehabilitation was effective in improving subjective sleep quality (19). Accordingly, it may be suggested that quitting smoking improved pulmonary function which led to a better sleep quality in our study.

During a quit attempt women were more disadvantageous than men in terms of maintaining abstinence (20). In contrast, Lee et al. (21) found no difference between non-relapsed and relapsed individuals in terms of gender. In the present study, male/female ratio was comparable between quitters and non-quitters. A strong barrier for smoking cessation may be fear of weight gain. Many individuals state that they continue smoking to prevent obesity. A previous study demonstrated that quitters gained more weight and had higher BMI scores than currently smokers (22). It was stated that smoking cessation decreased the risk of chronic diseases although the increased weight in quitters weakened the favorable effects (23). In parallel with the previous reports, we found significantly higher weight gain in quitter group when compared to non-quitters. The mean BMI was also significantly higher at last visit compared to baseline in quitter group. Conversely, the changes in bodyweight and BMI were insignificant in non-quitters. This finding stresses the importance of worries and concerns of non-quitters about their weight when deciding to participate in a smoking cessation program.

The present study has several limitations that deserve comment. First, only one-sixth of the eligible patients accepted to participate in this study. A larger group would be beneficial. However, there was no significant difference between the participated group and individuals who declined to participate in terms of mean age and gender distribution. Thus, our study group still represented the eligible whole patients. Second, dividing the whole study group into subgroups based on piCO measurements and comparison of those groups in terms of subjective sleep quality would add to the current results. Limited number of patients prevented a statistical subgroup analysis.

Conclusion

In conclusion, we showed that the subjective sleep quality was better in quitters when compared to non-quitters on a smoking cessation program. And the ratio of good sleepers was significantly higher in quitter group than in non-quitter group. In addition,

improvement in subjective sleep quality was still significant despite an increase in body weight in quitters. Finally, we suggest that informing smokers about the benefits of smoking cessation on sleep quality may provide a strong incentive and increase success rate.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Ethical Approval

The study protocol was approved by Ethics Committee of Trakya University Faculty of Medicine (Date-number: March 09, 2011-06/10). All procedures performed in studies involving human participants comply with the universal ethical standards and the Helsinki declaration and its subsequent amendments or comparable ethical standards.

Consent to Participate and Publish

Written informed consent to participate and publish was obtained from all individual participants included in the study.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of Data and Materials

Data are available on request due to privacy or other restrictions.

Authors Contributions

DA: Conceptualization, Writing-review & editing, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing-original draft.

CK: Formal analysis, Writing-review & editing, Methodology, Project administration, Resources, Supervision, Validation, Writing-original draft

LÖ: Investigation, Validation, Writing-original draft

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