

THE EFFECTS OF SMOKING ON NASAL MICROBIAL FLORA

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Sigara İçmenin Nazal Mikrobiyal Flora Üzerine Etkileri

Özet

Bu çalışmanın amacı, sigaranın nazal mikrobiyal flora üzerine olan etkilerini araştırmaktır.

Sigara içen 145 kişi ve sigara içmeyen 114 kişi olmak üzere toplam 259 kişi çalışmaya alındı. Sigara içen olguların 113'ü erkek, 32'si kadın; sigara içmeyen olguların ise 54'ü erkek, 60'ı kadındı. Olguların burun vestibül cildi %0.5 alkol-klorheksidin solüsyonu ile silindi ve ilave kontaminasyonları önlemek için vestibulum nasi steril spekulum kullanılarak açıldı. Killian nazal spekulum kullanılarak görüş sağlandı ve nazal kavitelelerin her ikisinden pamuk uçlu eküvyon kullanılarak sürüntü örneği alındı. Alınan tüm örnekler yarım saat içerisinde mikrobiyoloji laboratuvarına ulaştırıldı.

Çalışmamızda, sigara içen ve içmeyen olmak üzere toplam 259 olgudan alınan 518 nazal kavite sürüntü kültürü değerlendirildi. Sigara içen olgulardan alınan bilateral nazal kavite sürüntü kültürlerinde 465, sigara içmeyenlerde ise 406 aerop bakteri izole edildi. Sigara içen olguların sürüntü kültürlerinin %10.3'ünde, içmeyenlerin ise %7.9'unda üreme olmadığı görüldü. Her iki grup olguda da en sık izole edilen aerop bakteri koagülaz negatif stafilokok idi. İzole edilen mikroorganizmalar karşılaştırıldıklarında iki grup arasında koagülaz negatif stafilokok hariç diğer mikroorganizmalar açısından istatistiksel olarak anlamlı fark vardı (Tablo 1).

Sigaranın nazal flora üzerine etkisinin olduğu ve sigara içilmesiyle nazal floradaki mikroorganizmaların oranının değişebileceği söylenebilir.

Anahtar Kelimeler: Sigara içme, nasal flora, kültür, nasal kavite.

Summary

The aim of this study was to determine the effects of tobacco smoking on the nasal bacterial flora.

This study included 145 smokers and 114 non-smokers subjects. The study group 113 subjects of cigarette smokers were male and 32 were female. In non-smoker group, there were 54 male and 60 female subjects. The skin of the vestibulum nasi was cleaned with a 0.5% chlorehexidine alcohol solution. Additional contamination was avoided by using a sterile speculum to by-pass the vestibulum nasi. Sterile cotton swabs were used. For what all swabs were taken using a Killian nasal speculum for visualization, and then from the nasal of both vestibules. All of the samples were brought to the microbiology laboratory within half an hour.

In our study, 518 nasal cultures of 256 subject that smoke cigarette or do not were evaluated. 465 aerobe bacteria were isolated from bilateral nasal cavity swab of cigarette smoking and 406 from nonsmokers group. Bacterial growth was not detected in 10.3% of smoker groups and 7.9% of non-smokers group's nasal cavity cultures. Each of two groups, the most isolated aerobe bacteria were *coagulase negative staphylococci*. When the comparison was made between microorganisms isolated from nasal flora of smoking and non-smoking groups we found statistically significant difference except *Coagulase negative staphylococcus* ($p < 0.05$).

Smoking cigarette has impact on nasal flora and the ratio of microorganisms in the nasal flora may be different by smoking.

Key Words: Smoking, nasal flora, culture, nasal cavity

Introduction

Smoking is the largest preventable risk factor for morbidity and mortality in industrialized countries. WHO estimates that tobacco will become the largest single health problem by 2020, causing an estimated 8.4 million deaths annually (1). In the US alone, tobacco use kills 430 000 people each year. The global mortality toll is approximately 5 million annually and this is increasing (2). Cigarette mortality velocity was reported 10.6% in our country. This means that 10.6% of all mortalities for peoples over then 35 years old were associated with smoking cigarette. Tobacco smoking has central importance in the etiology of cancers of the lung, head and neck, urinary tract and pancreas. Tobacco or nicotine dependence is a common, chronic, relapsing medical condition (3). The impact of tobacco smoke on disorders of the nose and paranasal sinuses is less well understood, although there is growing evidence that such exposure can have a significant impact on nasal and sinus function. A comprehensive review of the literature reveals that tobacco smoking is associated with acute and chronic rhinitis (4,5). Tobacco smoke may also disturb the nasal defense system both paralyzing the microcilial clearance and reduce secretory components. It is possible that microbial composition of the anterior nares might be affected by these alterations (6). As a result of these effects, a higher frequency and more severe periodontal and respiratory infections have been reported in smokers than non-smokers (7,8).

The aim of this study was to determine the effects of tobacco smoking on the nasal bacterial flora.

Material and Method

This study was performed between January 2002 and May 2002. A total of 259 patients were evaluated, at Firat Medical Center ENT Clinic of Firat University. The sampling method was explained and written consent was obtained from each patient. Subjects were excluded if they had a history of systemic disease (cystic fibrosis, ciliary dyskinesia, diabetes mellitus); a history of ENT disease (inhalant allergy, known chronic sinusitis, nasal polyps, previous sinus- or nose surgery, an upper respiratory tract infection in the past eight weeks); signs or symptoms suggestive of nose or sinus disease (purulent nasal secretions or post-nasal drip, nasal obstruction, headache or facial pain, diminished

smell or taste, visible septal deviations or other significant anatomical anomalies); or if they had taken systemic or topical medications in the previous two months (antibiotics, steroids, nasal sprays). This study included 145 smokers and 114 non-smokers. The study group, 113 subjects of cigarette smokers was male and 32 were female and their mean age was 36.15 ± 11.59 (range: 17-71 years). In the non-smoker group, there were 54 male and 60 female subjects and their mean age was 34.26 ± 15.15 (range: 17-75 years).

The skin of the vestibulum nasi was cleaned with a 0.5% chlorehexidine-alcohol solution. Additional contamination was avoided by using a sterile speculum to by-pass the vestibulum nasi. A Killian nasal speculum was used for visualization, and then, swab specimens were taken from the nasal of both vestibules using sterile cotton swabs. For what all. All of the samples were brought to the microbiology laboratory within half an hour. The swab specimens were inoculated onto blood agar and EMB agar, and incubate for 16-24 h at 37 °C. After incubation period, isolated microorganisms were identified by traditional methods. Statistical comparison between smokers and non-smokers was performed using nonparametric chi square test. Differences at the level of 5% were considered statistically significant.

Results

In this study, 518 nasal cavity cultures of 259 subjects who smoke cigarette or not were evaluated. Duration for cigarette smoking in smoker group was 15.39 ± 9.2 (range: 1-40 years) years and mean number of daily smoked cigarette was 17.28 ± 9.3 (range: 5-40) smoking cigarette was more common among males then females.

In this study, 465 aerob bacteria were isolated from bilateral nasal cavity swab of cigarette smoking and 406 from nonsmokers group. Each of two groups, the most isolated aerob bacteria was *Coagulase negative staphylococcus*. Bacterial growth was not detected in 30 subjects of smokers and 18 of nonsmokers group. When the isolated microorganisms were compared, there were statistically significant difference between two group except *Coagulase negative staphylococcus* (Table 1).

Table 1. Distribution of the microorganisms isolated from bilateral nasal cavity swab of smokers and non-smokers.

Organisms	Smokers (n=290)	Non-Smokers (n=228)	Chi Square (p=)
Coagulase (-) staphylococci	134 (46.2%)	107 (46.9%)	0.114
Staphylococcus aureus	113 (38.9%)	117 (55.3%)	0.011
Neisseria spp.	88 (30.3%)	68 (29.8%)	0.000
Streptococcus spp.	83 (28.6%)	41 (17.9%)	0.000
Diphtheroid bacilli	27 (9.3%)	47 (20.6%)	0.000
Klebsiella spp.	10 (3.4%)	10 (4.3%)	0.000
Candida spp.	7 (2.4%)	7 (3.0%)	0.000
Proteus spp.	2 (0.6%)	1 (0.4%)	0.000
Escherichia coli	1 (0.3%)	4 (1.7%)	0.000
Haemophilus spp.	-	4 (1.7%)	0.000

P<0.05 (Chi square) compared smokers with non-smokers.

Discussion

Recently it was shown that, the most important environmental factor which threat people's health is cigarette smoking and it has determinental effect on body systems. Contrary to developed country, cigarette smoking velocity is increasing in our country. It is reported that long duration and more number of smoking cigarette increases the carcinoma risk of larynx and upper respiratory tract in persons especially over 55 years old (9).

Cigarette is a mixture of over 4000 substances. These include pharmacologically active, toxic, mutagenic and carcinogenic structures. Among these substances, 43 carcinogens are defined mainly polyaromatic and heterocyclic hydrocarbons (3).

In spite of a few studies in literature about the impact of smoking on nasal bacterial flora, it is known that smoking cigarette demolished respiratory ciliar activity and mucous secretion (6). Mucosal lining of the larynx and other upper respiratory tract is directly affected by the cigarette smoke and gases (9). In respiratory system, cigarette smoke has negative effects on cleaning function, on the cells that surround the respiratory tract, ciliary activity, fluidity of secretion that cover the respiratory mucosa, respiratory function and immune system. Outcomes of these pathophysiological affects, loss of ciliars, hyperplasia of mucosal gland increase in mucosal secretion and goblet cells, decreases in mucociliar clarence and macrophage activity and minor structural variation can be observed in respiratory epithelia. As a result of these affects, defense mechanisms of respiratory tracts may be loss and chronic infection can be developed (10-12).

The normal nasal flora contains; *Coagulase negative staphylococci*, *Corynebacterium sp*,

Staphylococcus aureus, *Enterobacteriaceae*, *Streptococcus viridans*, *Propionobacterium sp* and *Peptostreptococcus sp*. In addition, *Streptococcus pneumonia*, *nonpathogenic Neisseria*, *Moraxella lacunata* may be found (13,14). In our study the same microorganisms growth in the nasal flora. The most common isolated microorganisms in the each two groups were *Coagulase negative staphylococci*. When the comparison was made between microorganisms isolated from nasal flora of smoking and non-smoking group we found statistically significant difference except *Coagulase negative staphylococcus* (p<0.05).

Because the effect of smoking cigarette on respiratory tract, nasal potential bacterial pathogens (*S. aureus*, *Neisseria meningitis*) may be come an infective microorganisms (13,14). In previously reported studies, passive cigarette smoking by the babies and yang children, increases the morbidity dependent with respiratory infections especially in the first two years of life (15). Durmaz et al (6), investigated the nasal carriage of methiciline resistance *S. aureus* between smokers and the persons who are working in cigarette factory and non-smoker subjects. Methiciline resistant *S. aureus* carriage was not statistically significant between two groups but it was found significantly comparing to the non-smoker control group. Ylikoski et al (16), reported that *H. influenza* and *S. pneumoniae* were growth on 6% of nasal cavity. In our study the ratio of *H. influenzae* isolation was 1.7% even no bacteria isolated from non-smoker group.

In conclusion; smoking cigarette may be a cause of nose and sinuses disease by affecting the nasal flora and may be considered that these diseases are seen among smokers more frequently.

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