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## Effects of Opium Smoking Cessation on the Nasopharyngeal Microbial Flora

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### Abstract

**Background:** To determine the effect of opium smoking cessation on the frequency and type of microorganisms in the nasopharynx of opium smokers.

**Methods:** This was a cross-sectional study performed in psychology and ENT department of Moradi Hospital of Rafsanjan University of Medical Sciences in 2008 (Kerman, Iran). Nasopharyngeal cultures were taken from 50 opium smokers before and 2 to 3 months after cessation of opium smoking. Potential pathogens were identified.

**Findings:** Eight potential pathogens were isolated from nasopharyngeal cultures obtained from 43 individuals before opium smoking cessation, and 4 were recovered from 33 individuals after cessation ( $P < 0.0001$ ). Streptococcus pneumonia, staphylococcus saprofiticus, streptococcus  $\alpha$  hemolytic, and staphylococcus aureus in 2<sup>nd</sup> culture were not seen. The most sensitivity to antibiotics was related to ceftriaxone (84%), ciprofloxacin (74%) and cloxacillin (72%); the most resistance was to amoxicillin (26%) and the least resistance was to chloramphenicol.

**Conclusion:** In our study, some potential pathogens decreased or even disappeared after opium cessation. Our patients have not been advised to change their number of cigarettes. We have used methadone pill for substitution of opium. It seems that opium smoking affects nasopharyngeal flora.

**Key words:** Opium, Nasaopharynx, Microbial flora

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## Introduction

Addiction threatens society and family and perishes the base of nation. Opium abuse and its derivatives are one of the most important problems in many countries.<sup>1</sup>

Opioids derive their name from the Greek ὄπιον for poppy sap. Various preparations of the opium poppy *Papaver somniferum* have been used for pain relief for centuries.<sup>2,4</sup> Opium emerged as the first widely used narcotic analgesic in 18<sup>th</sup> century, generally in the form of a powder or sticky gum. It was often combined with alcohol to form laudanum. Prussian pharmacist Frederich Sertürner isolated morphine from opium in the 19<sup>th</sup> century.<sup>5</sup> These drugs led to many medical complications because of their potential abuse and frequent parenteral route of administration. The major cardiac complication of opioid abuse is bacterial endocarditis caused by injection drug use. *Staphylococcus aureus* is the most frequently reported bacterial isolate, and the tricuspid valve is most commonly involved. Left-sided valvar infection is associated with a worse prognosis, as are the uncommon gram-negative and fungal infections.<sup>6</sup> Opioid abusers normally have acute rather than subacute endocarditis. The initial clinical finding can be fever alone in half of the cases, or fever may be associated with pulmonary infiltrates from right-sided emboli or systemic embolic phenomena, such as arthritis, abscess, and osteomyelitis. Other cardiac complications associated with opioid abuse include toxic cardiomyopathy, perivalvar abscess, abnormalities of the conduction system such as QT prolongation and ST-T wave changes, and cor pulmonale.<sup>6</sup>

The nasopharyngeal flora of smokers contain fewer aerobic and anaerobic organisms with interfering capability and more potential pathogens compared with those of nonsmokers. Smoking is associated with an increased risk of respiratory tract infection in adults and also with oral colonization by some potentially pathogenic microorganisms.<sup>7</sup>

The purpose of this study was to determine the effect of opium smoking cessation on the frequency of potential pathogens in the nasopharynx of opium smokers.

## Methods

This was a cross-sectional study performed in Psychology and ENT Department of Moradi Hospital of Rafsanjan University of Medical

Sciences in 2008. The study population included 50 healthy adults with a history of smoking of at least 5 grams opium a day for a year before the study, who had completely ceased opium smoking at the time of study. None of the subjects were immune deficient or had otitis, sinusitis, or tonsillitis. They had not received antimicrobial therapy 3 months before the study, nor had had a respiratory tract infection in the past 2 months prior to the first and second culture sampling. All of the opium smokers were men. We used methadone pill for substitution of opium.

Two culture samples were obtained from each individual: 1 sample before cessation of opium smoking and the other 2 to 3 months after they stopped opium smoking. The culture specimens were taken from the nasopharynx (through the mouth) using sterile calcium alginate swabs, and were immediately plated into media supportive of the growth of aerobic and anaerobic bacteria. The protocol was approved by the institutional review board and ethical Committee of Rafsanjan University of Medical Sciences.

**Microbiologic Findings:** Sheep's blood (5%), chocolate and MacConkey agar plates (Base: Merck) were inoculated for the isolation of aerobic organisms. The culture plates were incubated aerobically at 37°C (MacConkey agar) and under 5% carbon dioxide (blood and chocolate agars), and were examined at 24 and 48 hours. For the recovery of anaerobic bacteria, the specimens were inoculated onto prereduced vitamin K<sub>1</sub>-enriched Brucella blood agar, blood agar contained kanamycin sulfate and vancomycin, and an aerobic blood plate that contained phenylethyl alcohol and enriched thioglycolate broth. These media were immediately incubated in anaerobic containers at 37°C and examined after 48 and 96 hours of incubation at 37°C. All types of colonies on each plate were isolated. Aerobic and anaerobic bacteria were identified by classic standard described methods.<sup>7,8</sup>

## Results

Eight potential pathogens were isolated from nasopharyngeal cultures obtained from 43 individuals before opium smoking cessation, and 4 were recovered from 33 individuals after cessation ( $P < 0.0001$ ). *Streptococcus pneumoniae*, *Staphylococcus Saprophyticus*, *Streptococcus α Hemolytic* and *Staphylococcus aureus* were not seen in 2<sup>nd</sup> culture (Table 1).

**Table 1.** Number and type of microorganisms before and after cessation

Type of Microorganism	Number	Before cessation	After cessation
Enterococcus		3	2
Staphylococcus aureus		5	Not Seen
Staphylococcus epidermis		26	17
Stafilococos saprofiticus		7	Not Seen
Streptococos $\alpha$ hemolytic		1	Not Seen
Streptococos $\beta$ hemolytic		3	2
Streptococcu pneumonia		4	Not Seen
Viridans group streptococci		6	4
Negative		7	17

43 (86%) of the culture results before cessation and 33 (66%) of results after it were positive. Fisher's Exact Test showed a significant deference between them ( $P = 0.03$ ).

The most sensitivity to antibiotics was related to ceftriaxone (84%), ciprofloxacin (74%), and cloxacillin (72%) and the most resistance was to amoxicillin (26%) and the least resistance was to chloramphenicol (Table 2).

The average of the number of nasopharyngial microorganism in the samples was 1.24 before and 1 after cessation and t-test showed a significant difference between them ( $P < 0.0001$ ).

## Discussion

This study compared the rate of potential pathogens anaerobic bacteria in the nasopharynges of opium smokers before and 2 to 3 months after cessation of smoking. However, to our knowledge, it was the first time that the high number of pathogens reverts to normal levels after complete cessation of smoking; but in a holistic our findings confirmed Brook's study.<sup>7</sup>

The most common pulmonary complication is bacterial pneumonia, which is present in one third of injection drug users evaluated for fever. The risk for this infection probably results from a

combination of factors, including hypoventilation, immune dysfunction, suppression of coughing, and aspiration during periods of clouded sensorium. Neurologic complications of opioid abuse are infectious and noninfectious. Seizures, most often generalized, are the most common noninfectious neurologic complication. Psychiatric conditions including alcohol abuse or dependence, major depression, phobic disorders, and antisocial personality are common among opioid abusers and all have a lifetime prevalence of greater than 15%. In vitro, morphine decreases the number of T lymphocytes. The long-term consequences of opioid-related immunologic effects are not clear. The most prominent clinical endocrine effect is amenorrhea. Renal complications of opioid abuse include acute diseases (myoglobinuria, necrotizing angitis, glomerulonephritis associated with endocarditis or hepatitis) and chronic diseases (nephrotic syndrome, renal failure and renal amyloidosis).<sup>6</sup>

For the first time, Brook showed that the high number of pathogens and the low number of interfering organisms in the nasopharynx of smokers could revert to normal levels after complete cessation of smoking.<sup>7</sup> In Taitlin et al study, a significant frequency of brain stem and extrapyramidal disturbances was found in the opium abuse group. Brain stem signs included tendon anisoreflexia, nystagmus, ataxia and corneal hyporeflexia. Among the most frequent extrapyramidal disturbances were positive pushing tests. Statistical analysis revealed a relationship between the degree of extrapyramidal system damage and duration of opiate dependence.<sup>9</sup>

According to Asadi et al, smoking opium increases serum glucose and decreases HDL-c, and thus adds to metabolic disorders in NIDDM

**Table 2.** Pattern of antibiogram in the samples

Type of Antibiotic	Antibiogram	Sensitive	Intermediate	Resistance	Total
Amoxicillin	Number (%)	5(12)	27(62)	11(26)	43(100)
Ciprofloxacin	Number (%)	32(74)	8(19)	3(7)	43(100)
Chloramphenicol	Number (%)	14(32)	28(66)	1(2)	43(100)
Ceftriaxone	Number (%)	36(84)	5(12)	2(4)	43(100)
Tetracycline	Number (%)	26(60)	13(30)	4(10)	43(100)
Cephalothin	Number (%)	26(60)	11(25)	6(15)	43(100)
Erythromycin	Number (%)	10(23)	28(65)	6(12)	43(100)
Vancomycin	Number (%)	13(30)	27(62)	3(8)	43(100)
Cloxacillin	Number (%)	31(72)	10(23)	2(5)	43(100)

patients. It also increases potassium and Fe<sup>2+</sup> in males and decreases TIBC in females, and could therefore potentially interfere with water and iron metabolism.<sup>10</sup>

Naderi et al showed that the level of factor VII and CRP in addict group were significantly higher than control group.<sup>11</sup> Ghoreishian et al found that the average IgM and IgG in opium addicts were less significant.<sup>12</sup> In laboratories, it was shown that after injection of morphine, animals' reproduction of lymphocytes decreases 85% and suppressed the lymphocytes activity.<sup>13-15</sup> In conclusion, our study demonstrates the beneficial effects of opium smoking cessation in

restoring the number of bacteria to normal levels. These are potentially beneficial bacteria that can interfere with the growth of potential pathogens. Further studies on smokers are warranted to investigate whether colonization of nasopharynx with interfering organisms and/or cessation of smoking would be beneficial, allowing for the return of the normal inhibitory flora and the reduction in the number of pathogens.

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## تأثیر قطع مصرف تریاک تدخینی بر فلور طبیعی نازوفارنکس

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## چکیده

تأثیر اعتیاد بر سلامتی جسمی و زندگی اجتماعی انسان‌ها بسیار مهم است. این مطالعه با هدف بررسی تأثیر قطع مصرف تریاک تدخینی بر فلور طبیعی نازوفارنکس انجام گرفت.

این مطالعه مقطعی در بخش‌های گوش و حلق و بینی و روانپزشکی مرکز آموزشی درمانی مرادی رفسنجان در سال ۱۳۸۷ انجام شده است. از ناحیه نازوفارنکس ۵۰ فرد معتاد به تریاک تدخینی قبل از ترک و ۳-۲ ماه پس از ترک، کشت گرفته شد. در مصرف سیگار تغییری داده نشد و از قرص متادون جهت ترک اعتیاد استفاده شد.

۸ پاتوژن بالقوه از کشت حلق ۴۳ نفر قبل از ترک و ۴ پاتوژن از کشت حلق ۳۳ نفر بعد از ترک جدا شد ( $P < 0/0001$ ). استرپتوکوک پنومونیه، استافیلوکوکوس ساپروفیتیکوس، استرپتوکوک آلفا همولیتیک و استافیلوکوکوس آرتوس در دومین کشت دیده نشد. بیشترین حساسیت به آنتی‌بیوتیک سفتریاکسون (۸۴٪)، سیپروفلوکساسین (۷۴٪) و کلوگساسیلین (۷۲٪) و بیشترین مقاومت به آموکسی‌سیلین (۲۶٪) و کمترین مقاومت به کلرامفنیکل بود.

با توجه به معنی‌دار بودن اختلاف بین وجود میکروارگانیسم‌ها قبل و بعد از ترک ماده مخدر می‌توان چنین نتیجه گرفت که تأثیر مواد مخدر بر روی وجود این میکروارگانیسم‌ها به سزاست؛ به گونه‌ای که چهار میکروارگانیسم از هیچ یک از مراجعه کنندگان پس از ترک ماده مخدر جدا نشد و نیز می‌توان چنین فرض کرد که ترک اعتیاد عامل مهمی در کاهش ابتلا به عفونت‌های دستگاه تنفسی است. همچنین می‌توان نتیجه گرفت جهت درمان عفونت‌های رایج افراد معتاد بهتر است از آنتی‌بیوتیک‌های با حساسیت بالا (سفتریاکسون و سیپروفلوکساسین) استفاده نمود؛ و نیز این که اعتیاد یکی از عوامل مهم در کاهش توان سیستم ایمنی و مقابله با میکروب‌ها می‌باشد.

فلور میکروبی، نازوفارنکس، تریاک

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روش‌ها:

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نتیجه‌گیری:

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تعداد جدول‌ها: ۲

تعداد نمودارها: -

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