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Determining Olfactory Dysfunction Prevalence and Risk factors in Eskisehir, Turkey

ABSTRACT

Objective: Population-based studies of olfactory dysfunction are currently lacking in Turkey. We evaluated the prevalence of subjective olfactory dysfunction, and its risk factors, among the general population of Eskisehir, Turkey.

Methods: In this prospective descriptive study. The “Sniffin’ Sticks” odor test was applied to 478 volunteers selected from among patients and relatives who were admitted to health centers in Eskisehir for any reason.

Results: The participants’ mean odor identification (OI) score was 8.23 ± 2.37 . There were no significant differences between males and females, and no association between smoking status (smokers vs. non-smokers) and OI score ($p < 0.05$). Steroid use was associated with impaired OI. The detection accuracy for pen #5 (banana) was 85.1% compared to 82.6% for pen #12 (fish). Garlic, a frequently used spice in Turkey, was associated with a relatively low detection accuracy rate of 7.1%. This result may be due to insufficient similarity between the odor contained in the test pen and the odor of the type of garlic widely used within Turkish society.

Conclusions: In older subjects, OI scores were decreased; scores were also lower in steroid users, suggesting that topical nasal steroids should only be used when absolutely necessary. By using this test we can detect olfactory dysfunction which can be the earliest sign of serious diseases. A family doctor is the most important step in preventive medicine. And we think that it can be a great earning to our daily practice.

Keywords: Odor, Olfactory Dysfunction, Sniffin’ Sticks, Topical Nasal Steroid Usage.

Eskişehir İlinde Koku Bozukluğu Sıklığının ve Risk Faktörlerinin Belirlenmesi

ÖZET

Amaç: Türkiye’de koku algısı bozukluklarına ilişkin popülasyon bazlı taramalar çok nadirdir. Biz de bu çalışma ile Eskişehir ilinde genel popülasyon üzerinde koku bozukluğu sıklığının ve buna neden olan risk faktörlerinin belirlenmesini sağladık.

Gereç ve Yöntem: Bu prospektif çalışmada Eskişehir il merkezinde bulunan çeşitli sağlık merkezlerine herhangi bir nedenle başvuran 478 hasta ve hasta yakınına “Sniffin’ Sticks” testi uygulandı.

Bulgular: Katılımcıların ortalama koku algılama skorları 8.23 ± 2.37 olarak bulundu. Kadın ve erkek cinsiyetler arasında fark yoktu. Sigara içimi ile koku algılama skorları arasında bağlantı bulunamadı ($p < 0.05$). Steroid kullanımı bozulmuş koku algı skorları ile alakalıydı. Beş numaralı test kalemi için algı oranı %85,1 iken ki kalem muz kokusu ihtiva etmekteydi; oniki numaralı kalem için algı oranı %82,6 olarak bulundu. Bu kalem de balık kokusu içermekteydi. Türk popülasyonda çok sık kullanılan bir baharat olmasına rağmen sarımsak kokusunun algısı oldukça düşüktü (%7,1). Bu durum kalemin içerdiği koku ile ülkemizde yaygın olarak kullanılmakta olan sarımsağın birbirine benzememesinden kaynaklanıyor olabilir.

Sonuç: Bireylerde koku algı skorları yaşla birlikte azalmaktadır. Steroid kullanımı da bu skorlarda düşüşe neden olmaktadır; bu nedenle topical nazal steroidlerin gerçekten gerekli görüldüğü hallerde kullanılmasını öneririz. Bu test ile birçok hastalığın erken belirtisi olabilen koku algısında bozulmayı kolayca tespit edebiliriz. Aile hekimliği koruyucu hekimliğin en önemli basamağıdır. Böyle uygulaması pratik ve kazanımı yüksek olan testlerin aile hekimliği prensibi için önemli bir kazanç olabileceği kanaatindeyiz.

Anahtar Kelimeler: Koku, Koku Bozukluğu, Sniffin’ Sticks, Topical Nazal Steroid Kullanımı.

INTRODUCTION

The olfactory sense is very important for all living organisms. It is essential for quality of life (QOL), and aids in danger awareness by allowing the perception of dangerous situations such as fires, and the early recognition of natural gas leaks. Specifically, chemical stimuli can be detected and converted into neurochemical signals, thereby serving as a warning system. An absence or reduction in the sense of smell is a symptom of numerous diseases; odor also has a significant impact on emotional memory.

It was reported that approximately 5% of the general population is anosmic and about 15% have reduced olfactory function (1-4). Different odors are "archived" (i.e., encoded) in accordance with a unique odor memory. Smell is an emotionally powerful sense and smells put their signature to the brain starting just after the birth. Although numerous studies have been conducted in various countries on olfactory sensitivity (5-7), there is a lot of similar work done by otolaryngology physicians in our country(8-10), but none of them are screening of society and not applied to such a large population.

Olfactory sensitivity can be evaluated using various tests, of which one of the most widely used is the "Sniffin' Sticks" test (SST) (11-13). This test is modern and easy to apply, and is recommended by the Olfactology and Gustology Association of the German Society for Otorhinolaryngology, Head and Neck Surgery. Previous studies have established its test-retest reliability and validity (14).

In the present study, we established normative data for the SST olfactory test in Eskişehir, Turkey, and assessed the relationship between the values obtained and various factors such as sociodemographic characteristics, disease history, drug use, and income. Because all of the odor detection tests used was designed in other countries, a secondary aim was to determine whether they were appropriate for use with a Turkish sample.

MATERIAL AND METHODS

This prospective study was conducted at Eskişehir Osmangazi University, within the Otorhinolaryngology and Family Medicine Departments, according to the principles outlined in the Declaration of Helsinki. The study protocol and consent procedure received ethical approval "28.05.2015; number 4" from the Institutional Review Board of the host institution.

Samples: To adequately represent the population of Eskişehir, we included 478 subjects (females and males) in accordance with calculations performed by the Biostatistics Department. To ensure a homogeneous sample distribution, 10 volunteers were selected using random sampling methods, from among patients and caregivers who applied to 48 health centers within Eskişehir. Then,

the olfactory tests were performed. All of the participants provided informed consent prior to their participant.

Olfactory Test

The SST odor pen: The SST odor pen (Burghart Messtechnik, Wedel, Germany) comprises 12 felt-tip pen-like devices, each of which contains a different, common odor. Participants were presented with a four-alternative forced multiple-choice test, and were asked to identify the correct odor from among these four choices. The experimenter presented the odorant by removing the cap for approximately 3 s, and placing the tip of the pen one to two cm in front of both nostrils of each participant, with an inter-odor interval of 20-30 second employed to clear the olfactory cleft of the prior odor. Participants were allowed to sample the odors once before choosing from among the four options. Total odor identification (OI) scores (between 0 and 12) were recorded, along with the descriptions chosen and degree of certainty regarding each choice. The SST test can evaluate three key aspects of olfactory function: 1) the ability to detect an odor; 2) the ability to discriminate between odors; and 3) the ability to identify odors (Table 1) (11,13).

Statistical Analysis: The SPSS for Windows software package (ver. 16.0; SPSS Inc. Chicago, IL, USA) was used to perform the statistical analyses. Independent samples t-tests and Pearson's correlation were applied. A p value less than 0.05 indicated statistical significance and statistically highly significant as $P < 0.001$.

RESULTS

Among the entire cohort, the mean OI score was 8.23 ± 2.37 . There were no significant differences in OI scores according to gender or smoking status (smokers vs. non-smokers; both $p > 0.05$). OI scores were negatively correlated with age ($p < 0.001$, $r = 0.423$). Comparisons of the groups were summarized in Table 2.

At 25 people of 478 in the study (5.2%) , the usage of nasal steroids were available. When we examine the indications of nasal steroid usage in patients who were using topical steroids; we found allergic rhinitis in the first rank (%72). Other indications for steroid usage were chronic sinusitis, and nasal polyps. And their percentage was calculated as %20 and %8 respectively. In contrast with previous literature, OI scores were lower in participants using steroids ($p < 0.029$); in this group, the mean OI score was 7.32 ± 2.57 compared to 8.28 ± 2.35 in the non-steroid-using group.

The recognition rate was highest for pens #5 and #12, and lowest for pen #9. The detection accuracy for pen #5 (banana) was 85.1% compared to 82.6% for pen #12 (fish). Although garlic is a frequently used spice, its detection accuracy rate was relatively low (7.1%).

Table1. Sniffin' Stick test A list of odors

Pen #	Odor 1	Odor 2	Odor 3	Odor 4
1	Orange	Blackberry	Strawberry	Pineapple
2	Smoke	Glue	Leather	Grass
3	Honey	Vanilla	Chocolate	Cinnamon
4	Garlic	Peppermint	Pine	Onion
5	Coconut	Banana	Walnut	Cherry
6	Peach	Apple	Lemon	Grapefruit
7	Licorice	Gum	Mint	Cookies
8	Cigarette	Coffee	Wine	Smoke
9	Garlic	Pepper	Cinnamon	Mustard
10	Pear	Plum	Peach	Pineapple
11	Chamomile	Raspberry	Rose	Cherry
12	Bread	Fish	Cheese	Ham

Table 2. Comparison OI scores according to gender

		Total Score	p
Gender	Female	9.00 (7.00 - 10.00)	0.034*
	Male	9.00 (7.00 - 10.00)	
Smoking status	Non Smoker	9.00 (7.00 - 10.00)	0.374*
	Smoker	9.00 (7.00 - 10.00)	
Work groups	Unemployed	8.00 (7.00 - 9.00)	<0.001**
	Farmer	7.00 (3.00 - 9.50)	
	Worker	8.00 (7.00 - 9.00)	
	Teacher	7.00 (6.00 - 10.00)	
	health personnel	10.00 (8.00 - 10.00)	
	Physicians and Pharmacists	10.00 (9.00 - 11.00)	
	Officer	9.00 (7.00 - 10.00)	
	Soldier	9.00 (7.00 - 9.00)	
	Student	10.00 (8.25 - 10.75)	
	Sefl-employment	8.00 (6.00 - 9.00)	
Education status	Engineers and Managers	10.00 (10.00 - 10.00)	<0.001**
	Lawyer	10.00 (8.00 - 10.00)	
	No	6.50 (1.50 - 8.50)	
	Primary school	7.00 (6.00 - 9.00)	
	Middle school	8.00 (7.00 - 9.00)	
	High school	9.00 (7.00 - 10.00)	
University	9.00 (8.00 - 10.00)		
Higher education	10.00 (9.00 - 11.00)		

DISCUSSION

Sense of smell is indexed by at least three different components: 1) odor threshold (perception of odors at low concentrations); 2) odor discrimination (nonverbal distinction of different smells); and 3) OI (the ability to name an odor). Tests that evaluate several components of olfaction (including assessment of thresholds) represent the

most-valid approach for diagnosing smell dysfunction (15).

The benefit of OI tests is their ease of use, for both the examiner and the subject; they can also be administered relatively quickly, and can be useful for the early diagnosis of illnesses such as Alzheimer's and Parkinson's disease (16,17). To

improve evaluations, individual countries should develop their own tests (6). In the present study, we investigated OI in a sample recruited from Eskişehir, Turkey; the mean OI score was 8.23 ± 2.37 . There were no significant differences in OI according to gender or smoking status (smokers vs. non-smokers).

Although we found no differences in the OI scores of males and females, Simsek et al. (18) reported a decreased ability to identify certain smells, including leather, pine, and soot, during early pregnancy based on scores on the 12-item Brief Smell Identification Test (BSIT). Their study included 31 healthy pregnant women in the first trimester (group 1), 30 in the second trimester (group 2), 31 in the third trimester (group 3), and 30 non-pregnant healthy controls (group 4). After completing the BSIT, the demographic characteristics and BSIT scores of the groups were compared. The total BSIT scores of group 1 were significantly lower compared to the other groups ($p < 0.001$). Pregnant women in the second and third trimesters had similar OI abilities than the healthy controls ($p > 0.05$). Continuous and significant cardiovascular, hematologic, metabolic, renal, respiratory, and endocrine changes occur throughout pregnancy, such that a suitable environment is provided for the developing fetus; these changes are likely to affect olfactory perception in different ways (18).

In the present study, OI scores were lower in older subjects. Similar to our results, Kim, et al. (6) reported that olfactory function tends to decrease commensurate with increasing age, even using more familiar distractor odors. In their study, there was a significant difference in the OI scores of subjects in their 40s relative to those in their 20s ($p < 0.05$).

In our country, there are studies which show that physical and cognitive abilities decline, the perception disorder occurs with elderly. In the present study, steroid usage also negatively affected OI scores. Clinically, topical nasal steroids are mainly used for nasal polyposis and allergic rhinitis. Nasal polyps and septal deviation may affect odor function. Chung et al. (5) reported that, during chronic rhinosinusitis with nasal polyps (CRSwNP), odor function is reduced to a greater degree than during septal deviation (SD). The authors investigated the impact of olfactory dysfunction on QOL and psychological status in patients with CRSwNP and SD, all of whom underwent computed tomography, allergy tests, and the SST test. Anosmia was defined by threshold-discrimination-identification scores < 16 . Odor discrimination and OI scores were significantly

lower in CRSwNP than in SD ($p = 0.008$). It was concluded that olfactory dysfunction may have significant effects on QOL and psychological health. CRSwNP with anosmia is a distinct mixed-type olfactory loss phenotype that may also contribute to depression.

In the present study, the odor recognition rate was highest for pens #5 and #12, and lowest for pen #9. The detection accuracy rate was 85.1% for pen #5 (banana) compared to 82.6% for pen #12 (fish). Although garlic is a commonly used spice, its detection accuracy rate was relatively low (7.1%). This may be because the garlic odor of the test pen was insufficiently similar to the odor of the garlic frequently used in Turkey; therefore, the odor used in the test pen may require revision to better-suit Turkish participants. OI may vary in accordance with country; individuals tend to identify odors that are more familiar to them.

Tekeli, et al (19) studied on 123 healthy volunteers with a reported normal sense of smell and 51 patients complaining of a reduction in their olfactory function presenting either at rhinology or neurology clinics. The participants were divided into 2 groups according to subjective olfactory function – healthy or abnormal. Each subject's olfactory function was assessed using the "Sniffin' Sticks" test found significant differences in "Sniffin' Sticks" test results between the abnormal and healthy groups. Their study provides an update of normative values for routine clinical use of "Sniffin' Sticks" in a Turkish population.

Shu et al. (7) noted that the OI rate increased from 52% to 62%, 79%, and 100% after substituting with the more familiar leather, cinnamon, and licorice odors, respectively.

CONCLUSION

In conclusion, we investigated odor perception among a sample drawn from Eskişehir, Turkey. In older subjects, OI scores were decreased. Steroid use was also associated with lower OI scores; therefore, topical nasal steroids should only be used when absolutely necessary.

And also we have identified a large number of patients who are anosmotic in our study results. Anosmia can be a sign of many serious illnesses. With this simple method of administration, patients can be tested easily and it can be a convenience for primary care practice.

Competing interests: The authors declare that they have no competing interests.

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