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Original Article / Çalışma - Araştırma

University of Pennsylvania smell identification test: Application to Turkish population

Pensilvanya Üniversitesi koku belirleme testi: Türk toplumu üzerinde uygulama

Cemil Yücepur, M.D., Berke Özücer, M.D., Nazan Değirmenci, M.D., Yalçın Yıldırım, M.D., Bayram Veyseller, M.D., Orhan Özturan, M.D.

Department of Otolaryngology, Bezmiâlem Vakıf University, İstanbul, Turkey

Objectives: The aim of this study was to investigate whether UPSIT (The University of Pennsylvania Smell Identification Test) clinical olfactory function test is suitable to assess olfactory function in Turkish population.

Patients and Methods: Fifty healthy Turkish volunteers (21 males, 29 females; mean age 31.5±8.7 years; range 20 to 49 years) who underwent a detailed otorhinolaryngological examination were included in the study. Subjects with abnormal findings suggesting olfactory dysfunction were excluded from the study. UPSIT and Connecticut Chemosensory Clinical Research Center (CCCRC) tests were carried out for each individual separately.

Results: Mean CCCRC test score was 6.3±0.6 out of 7. Ten volunteers scored between 5-5.75 were considered mild hyposmia, while 40 volunteers scored between 6-7 were evaluated as normosmic. Volunteers correctly identified 21.4±4.7 odors out of 40 odors in UPSIT test.

Conclusion: We concluded that UPSIT test is insufficient for the evaluation of olfactory function in Turkish population. Our results suggest that UPSIT test contains odors which are unfamiliar to Turkish population. Therefore, it is essential to either modify odors of UPSIT test or establish normative data suitable to Turkish population for evaluating the scores to avoid false olfactory function assessment.

Key Words: Anosmia; hyposmia; olfactory dysfunction; olfactory test; smell; UPSIT.

Amaç: Bu çalışmada, Pensilvanya Üniversitesi Koku Belirleme Testi (UPSIT) klinik olfaktör fonksiyon testinin, Türk toplumunda olfaktör fonksiyonunu değerlendirmede kullanışlı olup olmadığı araştırıldı.

Hastalar ve Yöntemler: Çalışmaya kapsamlı otorinolarengolojik muayene yapılan 50 sağlıklı gönüllü (21 erkek, 29 kadın; ort. yaş 31.5±8.7 yıl; dağılım 20-49 yıl) dahil edildi. Olfaktör fonksiyon bozukluğunu işaret eden anormal bulgulara sahip kişiler çalışmadan dışlandı. Katılımcılar, UPSIT ve Connecticut Kemoduyusal Klinik Araştırma Merkezi (CCRC) testleri ile ayrı ayrı değerlendirildi.

Bulgular: Ortalama CCCR test skoru, 7 üzerinden 6.3±0.6 idi. Skoru 5-5.75 arasında olan 10 gönüllü hafif hipozmik olarak değerlendirilirken, skoru 6-7 arasında olan 40 gönüllü normozmik olarak değerlendirildi. Gönüllüler UPSIT testinde kullanılan 40 kokudan 21.4±4.7'sini doğru tanımladı.

Sonuç: UPSIT testinin Türk toplumunda olfaktör fonksiyonun değerlendirilmesinde yetersiz olduğu sonucuna varıldı. Çalışma sonuçları, UPSIT testinde Türk toplumunun aşina olmadığı kokular olduğunu göstermektedir. Bu nedenle, hatalı olfaktör fonksiyon değerlendirmesinden kaçınmak için skorların değerlendirilmesinde UPSIT testinde yer alan kokuların değiştirilmesi veya Türk toplumuna uygun normatif verilerin oluşturulması gerekmektedir.

Anahtar Sözcükler: Anozmi; hipozmi; olfaktör fonksiyon bozukluğu; olfaktör testi; koku; UPSIT.

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Correspondence / İletişim adresi: Cemil Yücepur, M.D. Bezmiâlem Vakıf Üniversitesi Kulak Burun Boğaz Hastalıkları Anabilim Dalı, 34093 Fatih, İstanbul, Turkey. Tel: +90 212 - 453 17 00 Fax *(Faks):* +90 212 - 621 75 80 e-mail *(e-posta):* berkeozucer@gmail.com

Although olfaction plays an important role on quality of life, complaints regarding olfactory function are often neglected by physicians. Assessment of olfactory function in daily practice is subjective, qualitative and lacking in standardization. For the clinician, quantitative olfactory assessment can substantiate diagnosis and guide explanation of many morbidities. Olfactory function testing is vital for diagnosing vital diseases such as congenital anosmia and neurodegenerative disorders. With commercially available quantitative olfactory tests, such as the University of Pennsylvania Smell Identification Test (UPSIT), Cross Cultural Smell Identification Test (CCSIT), Connecticut Chemosensory Clinical Research Center (CCCRC) test and Sniffin' Sticks Test (SST) olfactory function is easily and practically evaluated in daily practice.[1-5]

The UPSIT (Sensonics, Inc., Haddon Hts., NJ 08035) was developed in late 1980's and it has been used for olfactory function assessment in more than 500.000 people.[1,2] The UPSIT test evaluation is performed by comparison of test scores with percentile values of similar age and sex subjects of the American population.[1,2] Most important limitations of the UPSIT test in daily clinical practice are the choice of odors, suitability of American normative data for evaluation of olfactory function and diagnostic criteria.

The aim of this study was to evaluate UPSIT scores of healthy Turkish volunteers and compare the results with CCCRC test scores in order to establish Turkish normative scores and investigate whether the UPSIT test correctly reflects olfaction in the Turkish population.

PATIENTS AND METHODS

The present study was performed at Bezmialem Vakif University, Medical Faculty, Department of Otorhinolaryngology and Head and Neck Surgery according to the Helsinki Declaration (WMA 2010). Fifty healthy Turkish volunteers (21 males, 29 females; mean age 31.5±8.7 years; range 20 to 49 years) were included in the study. All participants were tested for olfactory function with the approval of University Ethics Committee and in accordance with the guidelines for National Health and Medical Research. All volunteers were provided with information about the procedures and written informed consent was obtained prior to the study. Participants were examined in detail: any condition with potential for olfactory dysfunction was a criterion for exclusion. Those with septal deviation, past history of a septal operation, head trauma, chronic rhinosinusitis, allergic rhinitis, nasal polyposis, psychiatric disease, neurological disorders (Parkinson's and Alzheimer's Disease) and congenital olfactory dysfunctions were excluded from the study.

Each volunteer was questioned for occupation, level of education, age and history of smoking on a prepared form. UPSIT and CCCRC tests were carried out on each volunteer individually at different time periods in a well-ventilated quiet room and volunteers were not given a time limit to answer the questions.

The UPSIT is a scratch and sniff smell identification test consisting of four booklets. Each booklet contains 10 different microencapsulated odors with each having four multiple- forced-choices, each participant was informed and forced to select one of the choices and only tests with 40 answers were evaluated. UPSIT odor multiple choices were translated into Turkish and were pasted on the odor page.

The CCCRC test defined by the Connecticut Chemosensory Clinical Research Center consists of smell detection threshold and smell identification test. The CCCRC test was carried out as defined in detail previously[6] MedCalc® v11.4.4 program and paired sample t test was used for statistical analysis, p values of less than 0.05 were accepted as statistically significant.

RESULTS

Fifty volunteers were recruited in Bezmialem Vakif University, Department of Otorhinolaryngology and Head and Neck Surgery for olfactory function assessment. Male volunteers were 29.7±5.9 years old, female volunteers were 32.8±10.2 old. Eighteen of 50 participants (36%) were smokers.

CCCRC test scores

Mean CCCRC scores (butanol smell detection threshold test and smell identification scores) were 6.3±0.6 out of 7. Ten volunteers who scored between 5-5.75 were evaluated as having mild hyposmia and 40 volunteers who scored between 6-7 and were evaluated as normosmic.

UPSIT test scores

Fifty volunteers correctly identified 21.4±4.7 odors out of 40. The mean score of females was 21.6±4.4,

whereas males scored 21.1±5.1. The difference between the scores of males and females was not statistically significant (p=0.19). The mean score of smokers was 21.1±5.4, whereas the score of nonsmokers was 21.0±5.0; because there was no statistically significant difference (p=0.677) due to smoking, smokers were included in the data.

The analysis of familiarity with each odor is detailed in terms of correct odor identification in Figure 1. Odor identifiably was highest for onion (98%), pine (92%), mint (90%), gasoline (88%) and banana (80%). Least identified odors were dill pickle (12%), cherry (18%) and chocolate (18%). Root beer (32%) and cheddar cheese (34%) were also among the least identified odors.

DISCUSSION

Upper respiratory infections, nasal and sinus disorders and head trauma are the leading causes of olfactory dysfunction.[5] Olfactory function is also affected by exposure to toxic chemicals, alcoholism, endocrine diseases such as hypothyroidism, diabetes, Kallman Syndrome, renal failure and hepatic diseases; neurodegenerative diseases such as Parkinson's, Alzheimer's and multiple sclerosis; schizophrenia, intranasal and intracranial tumors, endoscopic sinus and nasal operations.[7-10]

Healthy Turkish volunteers identified 21.4±4.7 odors out of 40, whereas the American normative population mean score is 36±0.8.[11] When Figure 1 is scrutinized in detail the odors familiar to the Turkish population were identified correctly by up to 98% of the subjects, whereas some unfamiliar odors had a correct identification rate in the vicinity of 12%. This range suggests that a difference of 15 points is caused mainly by cultural and odor familiarity differences of the Turkish population rather than biological variations. Some odors in the UPSIT test are not suitable for Turkish population; odors such as wintergreen, lime, root beer, and whisky are especially strange to the Turkish population. This is an important factor that decreased the overall identification score of participants.

Odor familiarity is a very important factor while evaluating olfactory function, because a person should be familiar with an odor in order to identify it correctly.[12-15] The UPSIT has been modified in many countries such as Brazil, China, Australia and Italy.[12-15] As similar to our results, Parola and Liberini[15] tested odor familiarity of Italian subjects and found more than 20% of the subjects were unable to identify 6 unfamiliar odors, whereas Mackay-Sim et al.[14] suggested a correction score of 2 for the Australian population.

In our study healthy Turkish people were able to identify 21/40 of odors correctly, which is evaluated as 'severe microsmia' according to normative American percentile values. Diagnostic criteria and percentile values based on the normative American population defines 35 to 40 correct smell identifications out of 40 as normosmic individuals.

The CCCRC test is a suitable test for evaluation of olfactory function in the Turkish population.[16] In our study, the CCCRC test evaluated volunteers as either normosmic or mildly hyposmic. When compared with UPSIT test results, our CCCRC evaluation of olfactory function differs immensely, which in our opinion, results from the incompatibility of UPSIT odors and evaluation criteria to the Turkish population.

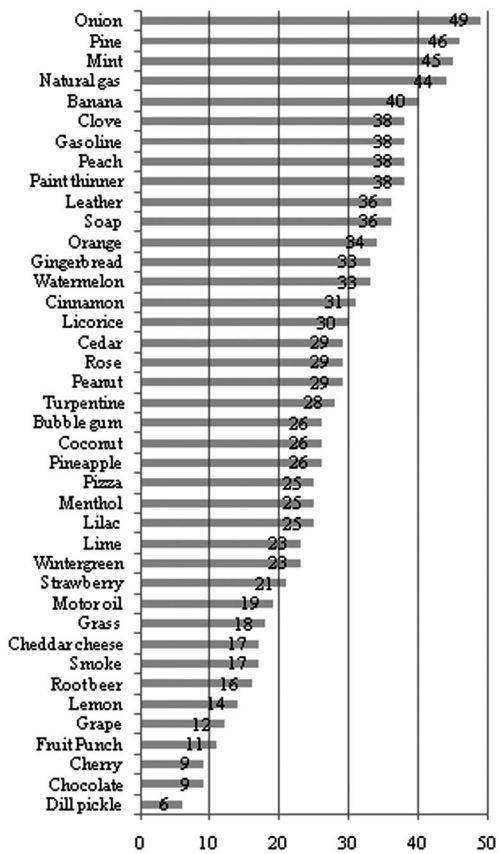

Figure 1. *Total number of correct answers (out of 50 subjects).*

These diagnostic criteria have not been validated in the Turkish population and the UPSIT test, as is, will result in false-positive diagnoses, namely, normosmic individuals will be diagnosed with olfactory loss.

In conclusion, the UPSIT test is insufficient, as is, for evaluation of olfactory function in the Turkish population. Our results suggest that the UPSIT test contains odors that are unfamiliar to the Turkish population. It is essential to either modify odors of the UPSIT test or establish normative data suitable to the Turkish population for evaluating the scores in order to avoid faulty olfactory function assessment.

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