

Survey of the Frequency of Olfactory Dysfunction in Taiwan

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Background: Olfactory function is related to the scrutiny of environmental dangers and the tasting of food. However, olfactory dysfunction is not as distinctive as visual loss and may go unnoticed, especially when olfactory function deteriorates slowly. Most studies have used either questionnaires or relatively insensitive tests to assess olfactory dysfunction. Therefore, the objective of this study was to evaluate the frequency of olfactory dysfunction in Taiwan.

Methods: A total of 211 participants were recruited randomly from the community, factories or offices in Taichung City, Taiwan from April 2005 to March 2006. Age ranged from 19 to 89 years (mean age, 43.3 ± 12.7 years). All participants filled in questionnaires about sociodemographic data, self-rated olfactory function and impact on quality of life. The olfactory test was performed with identification task of the "Sniffin' Sticks" olfactory function test.

Results: The frequency of olfactory dysfunction in our series was 12.3%. There was a statistically significant difference in the ages of the normal and olfactory dysfunction groups (t test, $p < 0.0001$). The incidences of parosmia and phantosmia in the 211 participants were 10% and 30.8%, respectively. Most subjects did not rate their olfactory function well. There was no correlation between olfactory function and self-ratings of impact of olfactory function on quality of life.

Conclusion: Our present results provide preliminary data and clinical experience regarding the frequency of olfactory dysfunction in Taiwan. Future modifications and suggestions for the study of the prevalence of olfactory dysfunction are also mentioned. [*J Chin Med Assoc* 2009;72(2):68–71]

Key Words: olfactory dysfunction, smell, Sniffin' Sticks

Introduction

Olfactory function is related to the scrutiny of environmental dangers and the tasting of food. However, olfactory dysfunction is not as distinctive as visual loss. It may even go unnoticed, especially when it deteriorates slowly. The incidence of olfactory dysfunction has been an issue of debate.^{1–3} The incidence of self-reported olfactory dysfunction in the general population was estimated to be about 1–3% in a previous report,² but an incidence as high as 15.3% has also been reported.⁴ A survey using olfactory testing in otolaryngology outpatients without sinonasal diseases or head and neck cancers revealed the incidences of hyposmia and anosmia as being 16% and 5%, respectively.⁵

Measured olfactory dysfunction in a population-based survey revealed that 24.5% of elderly adults had olfactory impairment.³

Various aspects of olfaction can be evaluated using olfactory threshold, olfactory discrimination and olfactory identification test. Olfactory identification is the most commonly used technique in modern olfactory tests. It can also be used to screen for olfactory dysfunction in the general population.⁶ The "Sniffin' Sticks" olfactory test contains olfactory threshold, discrimination and identification tests. These tests can be used together or separately.⁵ The Sniffin' Sticks odor identification test is comprised of 16 odors, and it only takes minutes to assess olfactory function. Therefore, it is quite suitable for screening olfactory dysfunction.



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The objective of our study was to evaluate the frequency of olfactory dysfunction in Taiwan with an olfactory identification test.

Methods

Patients

A total of 211 participants were recruited randomly in Taichung City, Taiwan, from April 2005 to March 2006. Age ranged from 19 to 89 years (mean age, 43.3 ± 12.7 years); 115 (54.5%) were female, slightly outnumbering males (45.5%), and the male to female ratio was 1:1.2. Information about nasal symptoms and signs together with allergic rhinitis or rhinosinusitis history were also collected.

Questionnaires

All participants filled in questionnaires about sociodemographic characteristics, self-rated olfactory function and impact on quality of life.

The sociodemographic questionnaire included data on smoking and drinking habits, general diseases (diabetes mellitus, hypertension, heart disease, liver disease, depression, cancer), medication habits and occupational hazards.

People rated their olfactory function as “complete loss”, “worse”, “normal” or “better than normal”, and also on a visual analog scale of 0 (complete loss) to 10 (normal or better than normal). The presence of parosmia or phantosmia and possible origin of dysosmia were also recorded.

Participants rated the impact of olfactory dysfunction on quality of life as “no effect”, “slight effect”, “obvious effect” or “strong effect”, and also on a visual analog scale of 0 (no effect) to 10 (strong effect).

Olfactory testing

The identification task was performed using the olfactory Sniffin' Sticks test. Sixteen odorants were presented to the participants by means of an odorant-filled pen.⁷ Each pen was positioned 2 cm in front of the nostrils for 2–3 seconds for the subjects to sniff. Examinees chose an answer from a list of 4 descriptors. One point was given if the answer was correct. The identification test score (IdS) ranges from 0 to 16. Normal olfactory function scores 12 and above, hyposmia scores between 9 and 11, and anosmia scores 8 and below.^{5,8,9}

Statistical analysis

Results were analyzed using SPSS version 11.0 (SPSS Inc., Chicago, IL, USA) for Windows. Descriptive statistics are presented within the body of the text as

mean values for comparisons between groups; *t* tests for unpaired samples were employed. The alpha level was set at 0.05.

Results

Distributions of Sniffin' Sticks IdS

Of the 211 participants, 3 (1.4%) men had anosmia (score, ≤ 8), and 23 (10.9%) individuals had hyposmia (score, 9–11). As a subtotal, 26 (12.3%) who scored less than 12 were diagnosed as having olfactory dysfunction (Table 1). Sixteen were male and 10 were female, with a male-to-female ratio of 1:0.6. Their ages ranged from 28 to 89 years (mean age, 55.2 ± 14.5 years).

The 3 anosmic men scored 5, 6 and 7. Their ages were 53, 72 and 89 years. Among the 23 hyposmic individuals, 5 (2.4%) scored 10 and 18 (8.5%) scored 11. Their ages ranged from 28 to 76 years (mean age, 53.1 ± 13 years).

One hundred and eighty-five (87.7%) subjects had normal olfactory function. Their ages ranged from 19 to 73 years (mean age, 41.7 ± 11.5 years). There was a statistically significant difference in the ages of the normal and olfactory dysfunction groups (*t* test, $p < 0.0001$). The male-to-female ratio was 1:1.3 (80 and 105, respectively).

Although the sex ratio of the normal olfactory function group was reversed as compared to the 1:0.6 of the olfactory dysfunction group, the sex difference between the 2 groups was not statistically significant.

Self-ratings of olfactory function

One hundred and eighty-five (87.7%) subjects rated their olfactory function as normal or as better than normal. Twenty-four rated themselves as worse than normal and 2 rated themselves as having a complete loss of olfactory function (Table 1). There was no statistically significant difference in the IdS between those who rated themselves as normal and those who rated themselves as worse than normal (*t* test, $p > 0.05$).

The 2 participants who rated themselves as having a complete loss of olfactory function scored 5 and 11 on the identification test. The participant who scored 5 was a 53-year-old man, and the other who scored 11 was a 47-year-old man with parosmia and phantosmia. Of the 24 people who rated themselves as worse than normal, 21 had scored 12 or above on the identification test. That is, 87.5% (21/24) of the participants who had adversely rated their olfactory function actually had normal olfactory function. Among those who rated themselves as normal or better than normal, 88.6% (164/185) had normal olfactory

Table 1. Distribution of self-ratings and identification test scores

Self-rating	n	Score		
		≤8	9–11	≥12
Complete loss	2	1	1	0
Worse	24	0	3	21
Normal or better	185	2	19	164
Total	211	3	23	185

Table 2. Impact of olfactory dysfunction on quality of life*

	No impact (n=145)	Mild (n=45)	Moderate (n=14)	Severe (n=7)
Anosmia	2	1	0	0
Hyposmia	14	7	1	1
Normal	129	37	13	6

*Data presented as n.

function, 10.3% (19/185) were hyposmic, and 2 were anosmic.

From the view of the identification test, 2 of the 3 (66.7%) participants with an IdS < 8 rated their olfactory function as normal. Nineteen of the 23 (82.6%) participants with hyposmia rated their olfactory function as normal. In summary, most of the subjects did not rate their olfactory function well when they had olfactory dysfunction. Furthermore, the correlation between IdS and ratings of olfactory function by visual analog scale was not high ($r=0.208$, $R^2=0.043$).

Olfactory function and quality of life

One hundred and forty-five (68.7%) and 45 (21.3%) participants considered that olfactory function had no or only a slight impact on quality of life, respectively (Table 2). In other words, 90% of participants did not sense the importance of olfactory function. Even the 3 anosmic subjects considered olfactory function to have no or only a slight impact on quality of life. Only 14 (6.6%) and 7 (3.3%) considered olfactory function to have an obvious or strong impact on quality of life, respectively. There were no significant differences in IdS among the no impact, slight impact, obvious impact and strong impact groups. There was no correlation between diagnosis and self-ratings of impact of olfactory function on quality of life (Fisher's exact test, $p>0.1$).

Parosmia and phantosmia

The frequencies of parosmia and phantosmia were 10% and 30.8%, respectively, in the 211 participants.

Thirteen (6.2% of 211) subjects had both parosmia and phantosmia. The IdS of parosmia, phantosmia, and parosmia with phantosmia were 13.6 ± 0.7 , 13.8 ± 1.4 and 13.6 ± 1.7 , respectively. There was no statistically significant difference between normal subjects whose IdS was 13.4 ± 1.8 and subjects with parosmia or phantosmia.

Discussion

The incidence of olfactory dysfunction in the general population is a matter of debate.^{1–3} According to the literature, the incidence of self-reported olfactory dysfunction is 1–15.3%.⁴ If it is measured in ENT outpatients with an olfactory test, the incidence is around 5–16%,⁵ while in a population-based survey with an olfactory test, an incidence of 24.5% was reported.³ However, most studies used questionnaires to assess olfactory function. In addition, no stratification and sampling were used in previous reports. In our series, we found a 12.3% incidence of olfactory dysfunction in the Taichung area. Although our sampling method may not fully represent the population, we were trying to gain some experience and to avoid sampling error as much as possible. This is the first olfactory dysfunction incidence pilot study in Taiwan, and future study could excerpt this series and our experience. Some investigations identified aging as an important factor in terms of the occurrence of olfactory dysfunction.^{2,3,10} Our series supports this idea as we found that the group with olfactory dysfunction was older than the group with normal olfactory function.

In our series, we found that the sensitivity of self-evaluation of olfactory function was quite low. This phenomenon has also been reported by previous researchers.^{5,11} Ratings of olfactory function have been shown to poorly reflect measured olfactory function; rather, it reflects the perception of nasal patency.¹² Subjects were unable to estimate their olfactory function accurately, and an evaluation of olfactory function was more precisely estimated by using an olfactory test.

There was no correlation between olfactory function and self-rating regarding impact of olfactory function on quality of life in our series. Some factors may have contributed to these results. The first is that subjects with poorer olfactory function do not really have poorer quality of life. According to previous studies, participants with better olfactory function rated potential loss of quality of life as higher.⁵ This could perhaps be due to subjects with better olfactory function being likely to

attach more importance to the sense of smell and enjoying daily olfactory impressions more consciously. In our series, we see a small trend showing this phenomenon. The second point is the lack of a specific measurement of the quality of life influenced by olfactory dysfunction. People did not know how quality of life is related to olfactory function. For example, the flavor of food is sensed by a combination of taste, olfaction and general sensation. People are usually unable to differentiate taste from olfaction. The solution for this is to use thorough questionnaires to measure the impact of olfactory dysfunction on quality of life. Further study is needed. Parosmia and phantosmia are qualitative. They cannot be defined by quantitative olfactory measurements. Therefore, the IdS between normal subjects and patients with parosmia and phantosmia were not significantly different. The respective frequencies of parosmia and phantosmia were 10% and 30.8% in our series. These problems should be included in an olfactory dysfunction survey in future studies.

In conclusion, the current series was a pilot study of the frequency of olfactory dysfunction in Taiwan. Most subjects did not rate their olfactory function accurately. Age was related to having olfactory dysfunction. Further evaluation of the correlation between olfactory dysfunction and quality of life is needed.

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