Smell Disorders: A Study of 132 Patients from the First Smell and Taste Clinic of Thailand

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Objective: *To investigate types and possible causes of smell disorders in patients who attended the Smell and Taste Clinic, Siriraj Hospital.*

Material and Method: *Medical records of patients with smell disorders who attended the Smell and Taste Clinic, Siriraj Hospital between July 2002 and August 2005 were reviewed for gender, age, duration of complaint, severity (hyposmia or anosmia), and previous medical illnesses (e.g. upper respiratory tract infection (URI), head injury, sinonasal problems, etc). All patients had complete physical examination, nasal endoscopy, and phenyl ethyl alcohol (PEA) olfactory threshold test.*

Results: *One hundred and eighty eight patients' medical records were reviewed. Smell disorders were confirmed in 132 cases (male = 58, female = 74). Nearly an equal number of anosmia and hyposmia cases were found (50.8% and 49.2% respectively). Possible causes of smell disorders were categorized as follows: sinonasal disease (SND) (66.7%), head injury (12.1%), idiopathic cause (10.6%), URI (6.8%), congenital cause (3%), and others (0.8%). SND was the most common cause of smell disorders despite different age groups and duration of smell disorders. PEA test scores were higher in head injury and idiopathic groups compared with those in SND and post URI groups.*

Conclusion: *The present data showed that SND was the major cause of smell disorders in every age group and in each duration group followed by head injury, idiopathic cause, and URI respectively. Therefore, nasal endoscopy is highly recommended for every patient with smell disorders.*

Keywords: *Anosmia, Nasal endoscopy, Hyposmia, Olfaction disorders, Phenylethyl alcohol, Smell disorders*

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Smell disorders or olfactory dysfunction can arise from a variety of causes and profoundly influence patients' quality of life. The incidence of smell disorders in the general population is a matter of debate. However, most authors reported frequencies of 1% to 3% of chemosensory disorders within the groups studied[1]. The sense of smell determines the flavor of foods and beverages and is an early warning sign for the detection of environmental hazards. The loss or distortion of smell sensation can adversely influence food preference, food intake, and appetite. When this input is decreased or distorted, disability and decreased quality of life are reported[2].

Smell disorders are usually described by the following terms as spectrum of loss of smell ability: anosmia (absence of smell), hyposmia (diminished sensitivity of smell), and dysosmia (distortion of normal smell). There are also various suborders of dysosmia such as phantosmia, cacosmia, and parosmia[3]. Smell disorders can be classified according to the pathogenesis into three general classes, 1) conductive or transport impairments from obstruction of nasal passages (*e.g.* chronic rhinosinusitis, allergic rhinitis, nasal polyp, tumors), 2) sensorineural impairments from damage to olfactory neuroepithelium (*e.g.* upper respiratory infection (URI), head trauma, toxins,

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congenital disorders), and 3) central olfactory neural impairment from central nervous system damage (*e.g.* dementia, Alzheimer's disease, multiple sclerosis)[3].

Smell and Taste Clinic, Siriraj Hospital was established since July 2002 for either referral or direct help seeking in smell disorders.

Material and Method

The authors retrospectively reviewed the medical records of 188 patients who attended the Smell and Taste Clinic, Department of Otorhinolaryngology, Siriraj Hospital between July 2002 and August 2005. One hundred and thirty-two patients were confirmed to have smell disorders. All patients had complete history taking and ENT examination, including nasal endoscopy especially at olfactory cleft.

Chemosensory testing

Phenyl ethyl alcohol (PEA) olfactory threshold test[4] was used to evaluate the smell disorders in every subject by one well-trained technician. Results of PEA test was presented in log scale number and the severity was then differentiated into normosmia, hyposmia, and anosmia as followed:

PEA test score	> (-2)	Anosmia
	(-2) to (-6)	Hyposmia
	< (-6.5)	Normosmia

Statistical analysis

Descriptive statistical analysis was performed using SPSS version 11.5. The data are presented in mean $\pm$ standard deviation.

Results

One hundred and thirty two patients had smell disorders. Their ages ranged from 12 to 78 years with the mean age of 45 years. Fifty-eight men (mean age, 45.3 $\pm$ 16.3 years) and 74 women (mean age, 44.8 $\pm$ 14.3 years) were examined. Nearly an equal number of anosmia and hyposmia cases were found (50.8% and 49.2% respectively). Anosmia was found more frequently than hyposmia in female patients (58.1% vs. 41.9%) whereas hyposmia was found more frequently than anosmia in male patients (58.6% vs. 41.4%). Dysosmia was found in two patients (one had URI and the other had head injury)

In the present study, about 2/3 of causes of smell disorders were sinonasal disease (SND) followed by head injury, idiopathic causes, URI, congenital, and others (Fig. 1). The authors categorized the patients into three age-groups since the common causes of smell disorders were different in each age group[5]. Group 1 was younger than 41 years (34.8%), group 2 was between 41 and 60 years (47%), and group 3 was older than 60 years (18.2%). SND was the most common cause of smell disorders in each age group. Head injury was the second most common cause of smell disorders in group 1 whereas idiopathic cause was the second most common cause of smell disorders in group 3 (Fig. 2).

The authors also categorized patients into three groups according to the duration of smell disorders, group A (< 24 months), group B (24-48 months), and group C (> 48 months). The majority of patients with smell disorders were classified in group A. SND was the most common cause of smell disorders in each duration group. Head injury was the second most common cause of smell disorders in group A followed by post URI whereas idiopathic cause was the second most common cause of smell disorders in group B and C (Fig. 3).

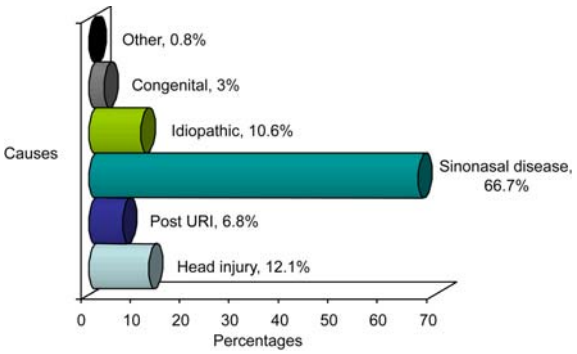

Fig. 1 Graph shows possible causes of smell disorders in 132 patients (URI = upper respiratory tract infection)

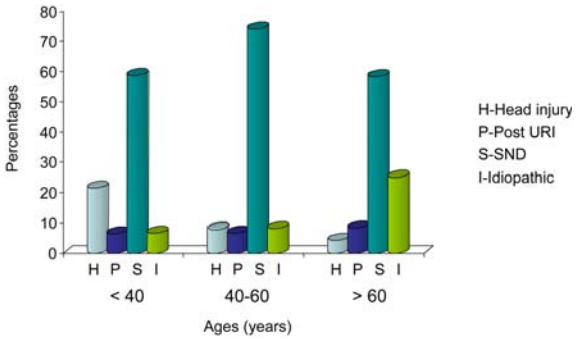

Fig. 2 Graph shows possible causes of smell disorders in each age group (n = 132) (URI = upper respiratory tract infection, SND = sinonasal disease)

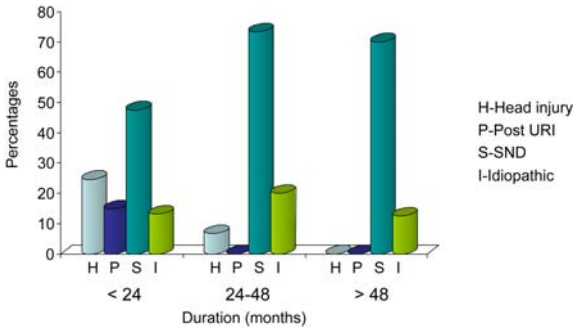

Fig. 3 Graph shows possible causes of smell disorders in each duration group (n = 132) (URI = upper respiratory tract infection, SND = sinonasal disease)

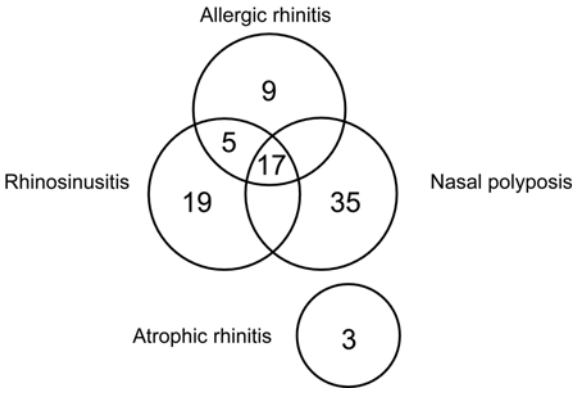

Fig. 4 Graph shows etiologies of SND which caused smell disorders (n = 88). The figure inside the circle indicates the number of patients

In the SND group, nasal polyposis was the most frequent condition found, followed by rhinosinusitis, allergic rhinitis, and atrophic rhinitis (Fig. 4). Some patients had multiple diseases such as allergic rhinitis and rhinosinusitis and nasal polyposis.

As mentioned earlier, patients with head injury were found frequently in the younger age group and had a short duration of smell disorders. Severity of smell disorders depended on severity of head injury (Glasgow coma score: severe = 3-8, moderate = 9-12, mild = 13-15). Patients with lower Glasgow coma score had more severe smell disorders (data not shown). Sixteen patients with smell disorders in the present study had head injury. Two patients were classified to have mild injury and 11 patients had moderate to severe injury. Three patients had maxillofacial injuries (two had fracture of nasal bone and one had nasoethmoidal fracture).

The authors found four patients from three families with congenital smell disorder *i.e.* Kallman's syndrome (hypoganadotrophic hypogonadism). All of them were referred from Pediatric Department and needed smell test and magnetic resonance imaging for diagnosis.

Table 1 shows PEA test score. All possible causes of smell disorders had much higher scores than normal[5]. The scores were higher in post head injury and idiopathic groups compared with those in SND and post URI groups.

Discussion

The principal findings of the present study can be divided into 1) data reflecting frequencies of type and possible etiologies of smell disorders and 2) chemosensory olfactory threshold of each etiology of smell disorders.

Type and possible etiologies of smell disorders

It is well known that, in the general population, women have greater olfactory sensitivity than men do. Similar to previous data[1], the proportion of patients with smell disorders in the present study were higher in women than men. It is possible that women have better detective and discriminative abilities of smell than men. In addition, nearly an equal number of anosmia and hyposmia cases were found

In each age group, sinonasal disease was the leading cause (Fig. 2). Head injury had a higher proportion in the younger age group (< 40 yrs) while idiopathic cause was found in higher proportion in older age group (> 60 yrs). This is not surprising because the incidence of head injury is greater in the

Table 1. Phenyl ethyl alcohol (PEA) olfactory threshold test score of possible causes of smell disorder and normals. The data are presented in mean ± standard deviation. (132 cases)

	Head Injury	Post URI	SND	Idiopathic	Normals[5]
Log PEA threshold values	-2.4 ± 0.9	-3.9 ± 2.6	-4.0 ± 2.7	-2.6 ± 1.1	-12.3 ± 0.9

younger age group and degenerative changes may play a role for smell disorders in elderly patients.

There are some differences about the etiologies of smell disorders among other reports and the present study. The studies from Temmel et al[6], Deems et al[7], and Seiden et al[8] found that the most common cause of smell disorders is URI followed by idiopathic cause and head injury respectively. In contrast, the present study found that the most common cause of smell disorders was SND followed by head injury and idiopathic cause respectively (Fig. 1). The authors hypothesized that the incidence of SND is higher than that of Europe and America probably due to the difference in the prevalence of infection, race, socioeconomic status, life style, and culture, which may play a role in smell disorders.

In SND group, nasal polyposis, rhinosinusitis, and allergic rhinitis were the leading etiologies. Blockage of airflow to olfactory receptors presumably underlies most cases of allergic rhinitis or polyposis or sinusitis-related olfactory alterations, although edema within the olfactory neuroepithelium or changes in the mucus overlying neuroepithelium may also play a role[9,10]. From these reasons, smell disorders in SND are improved after administration of intranasal or systemic corticosteroids or after nasal operative procedures. Since SND had proportion about 2/3 of etiologies of smell disorders in the present study, the useful diagnostic clues besides history taking is careful inspection of nasal cavities especially at olfactory cleft via nasal endoscopy. Anterior rhinoscopy alone could miss 51% of obstruction of olfactory cleft whereas 9% could be missed when using nasal endoscopy[8]. When nasal endoscopy is performed, attention should be paid to the patency of the olfactory cleft and middle meatus for presence of mucosal swelling, discharge, polyps, or tumor.

Olfactory dysfunction from head injury is not only caused by a shearing of the olfactory filament at the cribriform plate, which eliminates olfactory input to the olfactory bulb but also caused by brain contusion or hemorrhage in olfactory region and sinonasal tract alteration[4]. Degree of smell disorders depends on severity of head injury and onset of symptoms. Although almost all patients with posttraumatic olfactory dysfunction have permanent anosmia, studies have shown spontaneous improvement in roughly 30% of patients, whereas approximately 20% were worsened[11,12].

In the current study, idiopathic cause was the second most common cause of smell disorders in the elderly group. This could be caused by degeneration of olfactory neuroepithelium and central nervous system. Because of the long duration of smell disorders in this group, most patients could not remember the actual precipitating factors such as previous URI or history of minor head injury.

It is generally believed that viral infection plays the major role in post URI smell disorders. Virus not only destroys the olfactory neuroepithelium but also invades the central nervous system through the olfactory nerves and causes wide spread destruction of the olfactory pathway. The smell loss is mostly partial. Occasionally, patients complain of dysosmia (as in the present study) or phantosmia, but these symptoms usually subside over time[11].

Other interesting causes in the present study were atrophic rhinitis found in three patients who presented with longstanding anosmia and congenital anosmia (hypogonadotrophic hypogonadism or Kallman's syndrome) was found in four patients from three families. Kallman's syndrome has x-linked or autosomal recessive penetrance, thus it is more common in males than females (4.5:1). Incidence is between 1:45,000 (Female) and 1:10,000 (Male). Treatments are reassurance, hormonal supplementation, and assisted-reproduction in infertile cases[13].

Chemosensory olfactory threshold of each etiology of smell disorders

The present data show that olfactory threshold of every etiology of smell disorders was much higher than that of normals. In addition, head injury and idiopathic groups had a higher olfactory threshold level than SND and URI groups, which is consistent with a previous study[6]. Then, the authors can assume that smell disorders of head injury and idiopathic groups were more severe than those of SND and URI groups and reflected the rate of recovery.

Conclusion

Smell disorders were more common in females than males. The proportion of anosmia and hyposmia was nearly equal. Three major causes of smell disorders were SND (66.7%), head injury (12.1%), and idiopathic causes (10.6%). Because of these findings, nasal endoscopy is considered as the essential procedure in every patient with smell disorders. PEA olfactory threshold test can confirm and reveal the severity of smell disorders. PEA test score was greatest in the head injury group followed by the idiopathic, URI, and SND groups respectively.

Since smell disorders can impair the quality of life of patients especially in their appetite, pleasure, and psychological well-being, ENT specialists should always pay attention to this complaint.

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การศึกษาผู้ป่วยที่มีการรับกลิ่นผิดปกติรายงานจากคลินิกการรับกลิ่นและรสแห่งแรกในประเทศไทย

อภิชัย เกาลวณิชย์, ปารยะ อาศนะเสน, ประยุทธ ตันสุริยวงศ์, ฉวีวรรณ บุนนาค, พงศกร ตันติลิปิกร

วัตถุประสงค์: *เพื่อศึกษาชนิด และสาเหตุของความผิดปกติในการรับกลิ่นในผู้ป่วยที่มารับการรักษาที่คลินิกการรับกลิ่น และรสภาควิชาโสต นาสิก ลาริงซ์วิทยา คณะแพทยศาสตร์ศิริราชพยาบาล*

วัสดุและวิธีการ: *เป็นการศึกษาแบบย้อนหลังเชิงพรรณนา โดยทบทวนแฟ้มผู้ป่วยที่มารับการรักษาที่คลินิกการรับกลิ่นและรส ระหว่างเดือนกรกฎาคม พ.ศ. 2545 ถึง สิงหาคม พ.ศ. 2548 โดยเก็บข้อมูลต่าง ๆ เช่น เพศ, อายุ, ระยะเวลาของการมีความผิดปกติในการรับกลิ่น, ความรุนแรง (ได้กลิ่นน้อยหรือไม่ได้กลิ่น), ความเจ็บป่วยต่าง ๆ (เช่น การติดเชื้อในระบบทางเดินหายใจส่วนต้น การบาดเจ็บที่ศีรษะ และโรคของจมูกและไซนัส) ผู้ป่วยทุกรายได้รับการซักประวัติ, การตรวจร่างกาย, การส่องกล้องตรวจในโพรงจมูก รวมถึงการตรวจความสามารถในการรับกลิ่นด้วยเฟนนิลเอธิล แอลกอฮอล์*

ผลการศึกษา: *ได้ทบทวนแฟ้มผู้ป่วยทั้งหมด 188 ราย พบผู้ป่วยที่มีความผิดปกติในการรับกลิ่น 132 ราย เป็นชาย 58 ราย และหญิง 74 ราย มีสัดส่วนของการไม่ได้กลิ่น (ร้อยละ 50.8) และการได้กลิ่นน้อย (ร้อยละ 49.2) ใกล้เคียงกัน โดยสาเหตุของความผิดปกติในการรับกลิ่นดังกล่าวเกิดจาก โรคของจมูกและไซนัสร้อยละ 66.7 การบาดเจ็บที่ศีรษะร้อยละ 12.1 ไม่ทราบสาเหตุร้อยละ 10.6 การติดเชื้อในระบบทางเดินหายใจส่วนต้นร้อยละ 6.8 ความผิดปกติแต่กำเนิดร้อยละ 3 และสาเหตุอื่น ๆ ร้อยละ 0.8 โดยโรคของจมูกและไซนัส เป็นสาเหตุที่พบบ่อยที่สุดในทุกกลุ่มอายุและทุกระยะเวลาของการมีความผิดปกติของการรับกลิ่นส่วนการตรวจความสามารถในการรับกลิ่นด้วยเฟนนิลเอธิลแอลกอฮอล์ พบว่ากลุ่มที่ได้รับการบาดเจ็บที่ศีรษะมีระดับการรับกลิ่นแย่ที่สุดรองลงมาคือกลุ่มไม่ทราบสาเหตุ กลุ่มที่มีการติดเชื้อในระบบทางเดินหายใจส่วนต้น และกลุ่มที่มีโรคของจมูกและไซนัสตามลำดับ*

สรุป: *โรคของจมูกและไซนัสเป็นสาเหตุที่พบบ่อยที่สุดของผู้ป่วยที่มีความผิดปกติของการรับกลิ่นในทุกกลุ่มอายุและทุกระยะเวลาของการมีความผิดปกติของการรับกลิ่นรองลงมาคือการบาดเจ็บที่ศีรษะ ไม่ทราบสาเหตุและการติดเชื้อในระบบทางเดินหายใจส่วนต้นตามลำดับ ดังนั้นผู้ป่วยทุกรายที่มีความผิดปกติของการรับกลิ่นควรได้รับการส่องกล้องตรวจในโพรงจมูก*