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An international comparison of characteristics of the sensation of nasal obstruction between Canadian and Japanese patients

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SUMMARY

To determine differences in perception of nasal obstruction in Canadians and Japanese, we assessed subjective and objective nasal patency of 48 patients in Canada and 43 patients in Japan. Mean severity of the sensation of nasal obstruction in Canadian patients was significantly higher than in Japanese patients, while no significant differences in nasal resistances were found. Complaints of nasal obstruction in Canadian patients were directly concerned with nasal breathing, while Japanese patients complained of indirect matters, such as "unable to concentrate on job or study" or "nasal obstruction or nasal speech pointed out by other persons." The differences might be due to national characteristics.

Key words: subjective nasal obstruction, rhinomanometry, nasal resistance, anthropological differences

INTRODUCTION

Rhinomanometry is well established for objective assessment of nasal patency and has contributed to our understanding of nasal respiratory physiology. However, there remain some questions to be answered. The discrepancy between nasal resistance to airflow and the sensation of nasal stuffiness of which the patient complains is one of these problems (Naito et al., 1988; Jones et al., 1989; Eccles et al., 1990; Naito et al., 1991a). In an attempt to resolve the matter, we have made measurements of acceleration of nasal airflow as an alternative to nasal resistance to airflow in Canadian and Japanese subjects (Naito et al., 1989a; Naito et al., 1995). Measurement of acceleration seems useful as an objective indicator of the sensation of nasal stuffiness. Furthermore, we have found differences in the relationship between subjective and objective nasal blockage in Canadian and Japanese individuals. To determine the background of the differences, we have investigated characteristics of the sensation of nasal stuffiness in Canadian and Japanese patients in their respective countries, during the period from April 1994 to May 1995.

MATERIAL AND METHODS

Subjects

Forty-eight consecutive Canadian patients with nasal disease referred to the Nasal Airflow Laboratory of the ENT Department at the University of Toronto (aged 15–74 years, with a mean age of 39.3 years; 31 men and 17 women), and 43 consecutive Japanese patients with nasal problems visiting the Department of Otolaryngology at Fujita Health University (aged 12-75 years, with a mean age of 42.0 years; 33 men and 10 women) were investigated in the respective countries, whether they complained of apparent nasal obstruction or not.

Assessment of subjective nasal obstruction

A table was constructed with nine categories of the sensation of nasal obstruction as shown in Table 1. Examinees selected the number that they felt appropriate. The sensation of nasal stuffiness was characterized by symptoms according to Tables 2–3.

Table 1. Degree of nasal obstruction.

1.	free air passage
2.	between 1 and 3
3.	slight obstruction
4.	between 3 and 5
5.	moderate obstruction
6.	between 5 and 7
7.	considerable obstruction
8.	between 7 and 9
9.	complete obstruction

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Table 2. Occasions of nasal obstruction.

1. all day long
2. during sleep or recumbency
3. during work
4. during study
5. during conversation
6. during cooking
7. others
8. not concerned with specific circumstance, but only occasionally

Table 3. Reasons why the subject is aware of nasal obstruction.

1. nasal speech
2. frequent nose blowing
3. no clear feeling after blowing the nose
4. snoring
5. uncomfortable feeling in the nose
6. mouth breathing
7. requires an effort to breathe through the nose
8. dysosmia or anosmia
9. unable to concentrate on job or study
10. nasal obstruction or nasal speech pointed out by another person
11. whistling sound during nasal breathing
12. others

Measurement of nasal resistance

In Canadian patients, respiratory airflow through the nose was detected by a head-out volume-displacement-type body plethysmograph. Transnasal differential pressure was obtained by a fine catheter (No. 8F infant feeding tube) inserted through one nasal cavity to the nasopharynx. Pressure and airflow signals were sensed by reluctance transducers (Validyne MP45 and CD103), and their electrical analogues were digitized at 50 Hz by the A/D convertor of a programmed IBM personal computer. Bilateral and unilateral nasal resistances were measured by active posterior rhinomanometry (Cole et al., 1980, 1987, 1988; Naito et al., 1989b).

In Japanese patients, unilateral nasal airflow and differential transnasal pressures were detected by active anterior rhinomanometry with a Rhinorheograph MPR-2100 (Nihon Kohden Co., Ltd., Japan) using a nasal nozzle. Airflow and differential pressure signals were sensed and their electrical analogues were digitized at 30 Hz by a microcomputer (NI-101 software; Naito et al., 1993) connected to the Rhinorheograph.

Values obtained from active posterior rhinomanometry by the head-out body plethysmograph and active anterior rhinomanometry by the Rhinorheograph were calculated using the equation:

$$N = 0.95H + 0.058$$

where N is the resistance from nozzle active anterior rhinomanometry, and H is the resistance from active posterior rhinomanometry with head-out body plethysmograph (Naito et al., 1991b).

Variations of nasal resistance associated with racial differences of nostril dimensions between Canadians and Japanese were adjusted by normal ranges of nasal resistance in Caucasians and Orientals according to our previous study (Ohki et al., 1991). All patients participating in this study were assessed after physical examination by ENT doctors in the respective countries. Subjective and objective nasal obstructions were compared between Canadians and Japanese, and $p<0.05$ was considered to be statistical significant in this investigation.

RESULTS

The mean score of the perceptive nasal obstruction in the Canadian patients of 6.17±1.58 was significantly higher than the Japanese score of 3.84±2.37 as shown in Figure 1 (t-test: $p<0.001$).

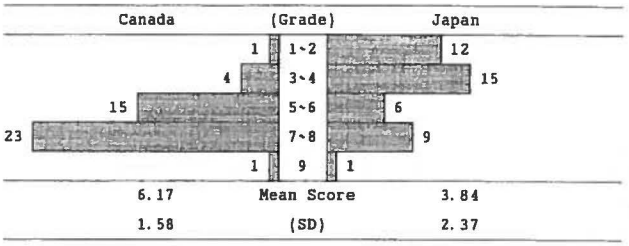

Figure 1. Grade of subjective nasal obstruction (1: free air passage; 2: between 1 and 3; 3: slight obstruction; 4: between 3 and 5; 5: moderate obstruction; 6: between 5 and 7; 7: considerable obstruction; 8: between 7 and 9; 9: complete obstruction).

The mean averaged nasal resistance in Canadians was 0.517±0.369 Pa/cm^3/s on the right side and 0.674±0.597 Pa/cm^3/s on the left side. The mean averaged nasal resistance in Japanese was 0.469±0.794 Pa/cm^3/s on the right side and 0.641±1.249 Pa/cm^3/s on the left side. No significant differences in the nasal resistances between Canadian and the Japanese were found either on the right side or the left side (t-test: $p>0.50$).

The majority of the Canadian patients complained of nasal obstruction throughout the day. Recumbency was a major cause of nasal obstruction in the patients of both countries (Figure 2). Reasons for nasal obstruction in Canadian patients were concerned directly with nasal breathing (e.g., "requires an effort to breath through the nose"; "no clear feeling after blowing the nose"; and "mouth breathing"), but in Japanese patients complaints concerned indirect matters (e.g., "unable to concentrate on job or study" and "nasal obstruction or nasal speech pointed out from another persons") as shown in Figure 3.

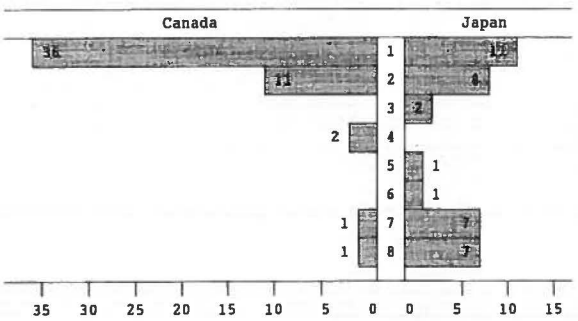

Figure 2. Occasions of nasal obstruction (1: all day long; 2: during sleep or recumbency; 3: during work; 4: during study; 5: during conversation; 6: during cooking; 7: others; 8: not concerned with specific circumstance, but only occasionally).

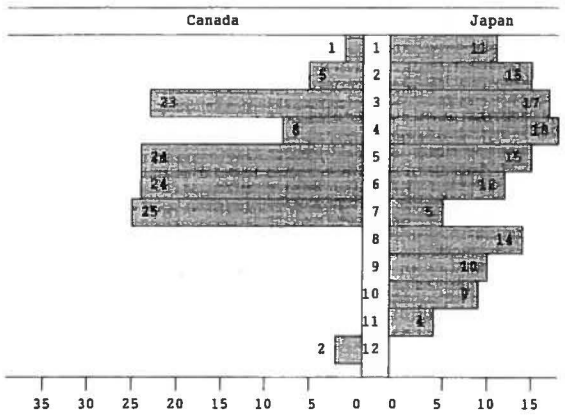

Figure 3. Reasons why the subject is aware of nasal obstruction (1: nasal speech; 2: frequent nose blowing; 3: no clear feeling after blowing the nose; 4: snoring; 5: uncomfortable feeling in the nose; 6: mouth breathing; 7: requires an effort to breathe through the nose; 8: dysosmia or anosmia; 9: unable to concentrate on job or study; 10: nasal obstruction or nasal speech pointed out by another person; 11: whistling sound during nasal breathing; 12: others).

DISCUSSION

In recent years, rhinomanometry has been established as a clinically useful method for objective assessment of nasal patency and management of patients' complaints of nasal obstruction.

McCaffrey and Kern (1979), in their 1,000-patient study, felt that nasal resistance could be correlated closely with the severity of the obstructive symptoms, but they did not present a grading of rhinoscopic findings. By contrast, Naito et al. (1988) in their 101-patient investigation reported that nasal resistances were consistent with rhinoscopic findings, but not with severity of perception of chronic nasal stuffiness. On the other hand, Bachmann and Nieder (1978) compared nasal resistance with inspection and anamnesis in 117 cases, and all three parameters agreed well (75%). As shown by the above papers, the relationship between objective and subjective nasal patency is still an unresolved question.

Eccles and Jones (1983) who investigated nasal resistance and sensation of nasal patency before and after 5-min exposures to menthol vapour, found no consistent effect on nasal resistance to airflow, while the majority of subjects reported an increased sensation of nasal patency. Oral L-menthol stimulation of the greater palatine nerve also increased the sensation of nasal patency, but not nasal resistance to airflow (Naito et al., 1991c). Urch (1986) has commented that passive exposure of young non-smoking adults to high concentrations of cigarette smoke was accompanied by the sensation of nasal blockage, but this was not confirmed by rhinomanometry. Naito et al. (1991a) compared nasal resistances with degrees of subjective sensation of nasal obstruction before and after decongestion of the nasal mucosa and found appropriate consistency between objective and subjective findings in only half the subjects. Moreover, in these subjects the degree of subjective change after decongestion poorly correlated with the degree of reduction of nasal resistance.

It has also been noted that exercise causes a marked reduction in nasal resistance, although relatively few subjects were aware of a sensation of increased nasal patency (Burrow et al., 1983). Indeed, it is not difficult to find a patient in whom the perception of nasal stuffiness is inconsistent with resistance measurements and subjects are seldom aware of the nasal cycle. Explanations for this anomaly remain speculative and the discrepancy puzzles not only the clinician but also the patient.

In an attempt to resolve the problem, we previously assessed acceleration of nasal airflow during breathing at rest, and found this indicator more applicable to subjective nasal patency than nasal resistance (Naito et al., 1989a, 1995). However, in this investigation we noted that the relationship between subjective and objective nasal patency in Canadian patients differed from Japanese. Racial, cultural, educational and traditional factors might explain the differences since no significant differences between Canadian and Japanese rhinomanometric values were detected (Naito et al., 1991b). To determine the background of the differences, we investigated characteristics of the sensation of nasal stuffiness in Canadian and Japanese patients in the present study. Mean severity of the sensation of nasal obstruction in Canadian patients was significantly higher than in Japanese patients, while no significant differences of nasal resistances were found. Furthermore, Canadian patients tended to complain of nasal obstruction throughout the day. Symptoms in Canadian patients were directly concerned with nasal breathing, while Japanese patients were less direct, for instance "unable to concentrate on job or study" or "nasal obstruction or nasal speech pointed out from another persons."

In conclusion, the perception of nasal stuffiness in Canadians seems more marked and self-assertive than in Japanese, whose symptoms are more temperate and dependent on others. These differences might be related to national characteristics and should be taken into account when clinical comparisons are made between patients with different racial or national backgrounds.

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