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Prevalence study of nasal septal deformities in Korea: Results of a nation-wide survey*

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SUMMARY

A nation-wide survey investigating the prevalence and risks of nasal septal deformity (NSD) was conducted by a group of otolaryngologists from July through October 1991. The total number of subjects surveyed was 9,284, and these were drawn from 2,899 households residing in 60 different areas throughout the country. The overall prevalence of NSD was 22.38%, and NSD tended to predominate in males and to increase with age. According to Mladina's classification, the most common type was type 1, followed by types 2, 3, 5, 7, 4, and 6. A positive correlation between nasal trauma history (NTH) and NSD was statistically confirmed ($p < 0.01$).

Key words: prevalence, nasal septal deformity, nasal trauma

INTRODUCTION

Nasal septal deformity (NSD) is one of the most common disorders in humans. Symptoms such as nasal obstruction and postnasal drip are associated with NSD. Although numerous methods exist for the correction of NSD, the pathogenesis and its prevalence is still poorly understood. Trauma, both during the neonatal period and adulthood, has been strongly implicated as the causative factor of NSD. To analyze the prevalence of NSD in Korea and to assess its relationship with a nasal trauma history (NTH), a team of otolaryngologists have conducted a nation-wide survey from July through October, 1991. History taking and physical examination in a representative sample of the Korean population were performed and the results were analyzed.

MATERIAL AND METHODS

The study population were drawn from a representative panel of the Korean population (Figure 1). Sampling was done by a multi-stage clustered-stratified random method based on the Population and Housing Census Report (National Bureau of Statistics, 1990). Of the population studied, 48.3% were selected from the six big cities and 51.7% were selected from the remaining districts. The population of the six big cities represented 48.4% of the entire Korean population in 1991 (Department of Local Planning, 1992). The actual number of subjects surveyed was 9,284, and these were taken from 2,899 households in 60 enumeration districts throughout the country (Table 1). Subjects with previous septal surgery were excluded from this survey. The survey team consisting of otolaryngologists equipped with portable suction units and battery-supplied headlights, visited every household targetted for this nation-wide survey to obtain medical information by direct physical examination and history taking.

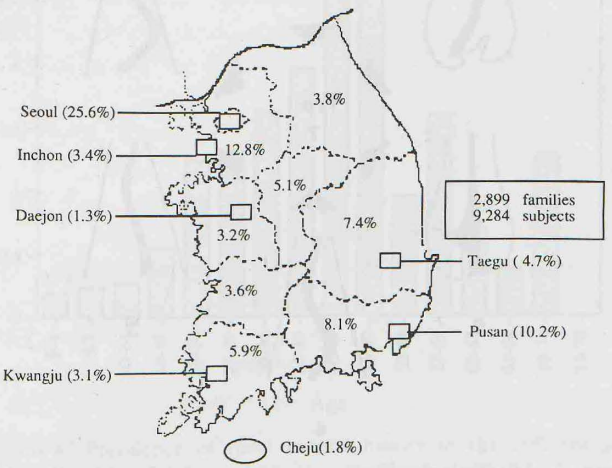

Figure 1. Geographical areas and percentages of the population selected in this nation-wide survey in Korea.

Table 1. Eligible and surveyed population for this nation-wide survey on nasal septal deformity in Korea.

	eligible number	surveyed number	completeness (%)
subjects	10,054	9,284	92.3
households	3,274	2,899	88.5
districts	60	60	100.0

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As for NSD, we have adopted the classification suggested by Mladina (1987; see Figure 2). This classification includes seven types of NSD. NSD types 1, 2, and 3 are unilateral vertical deformities. NSD type 1 is a vertical ridge in the valve area which does not reach the nasal dorsum. In NSD type 2, a more definite vertical ridge in the valve area reaches the nasal dorsum. NSD type 3 has a vertical ridge in the deeper areas. NSD type 4 is an "S"-shaped deformity reaching the nasal dorsum. NSD types 5 and 6 are presented from the antero-posterior view. In NSD type 5, beginning from the part of the intermaxillary wings, a horizontal ridge rises toward the lateral nasal wall and backward with unilateral sharp edge. NSD type 6 consists of two horizontal ridges, one medial and the other lateral. NSD type 7 is a combination of all the previous types. NTH was divided into fall-down injury, sports injury, traffic accident, and injury at work. Individual correlation between NTH and NSD was analysed.

Chi-square tests were used when comparing categorical variables (Schlesselman, 1982; Holford, 1984). The PC-SAS programme (SAS Institute, USA) was employed for statistical analysis.

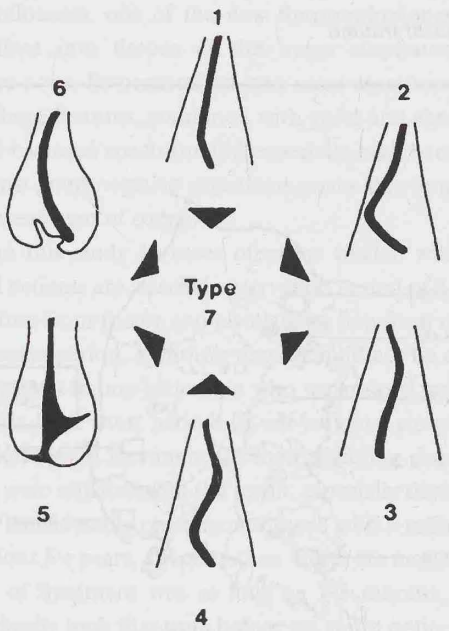

Figure 2. Mladina's classification of nasal septal deformities. The first four types are presented from the cranio-caudal view. Types 5 and 6 are presented from the antero-posterior view. Type 7 presents a combination of the previous six types.

RESULTS

The overall prevalence of NSD was 22.38%. Of the surveyed population, 24.24% of the males and 19.80% of the females were diagnosed as NSD (Table 2). There was a tendency to increase with age, and the presence of NTH was significantly higher in males than in females ($p < 0.01$; see Figure 3 and Table 3).

As for the shape of NSD, left-sided deformities occupied 56.0% of NSD, right-sided deformities 39.0%, and "S"-shaped deformities 5.0% (Figure 4). According to Mladina's classification, the most common type of NSD was type 1, followed by types 2, 3, 5, 7, 4, and 6, in order of frequency (Figure 5). Nasal obstruction was noted most commonly in the "S"-shaped type-4 deformity (Figure 6). The NSD group complained more frequently of nasal obstruction (2.78%) than the NSD-free group (1.30%; see Figure 7).

Table 2. Prevalence of nasal septal deformity by sex.

	male	female	total
prevalence	24.24%	19.80%	22.38%

$p < 0.01$

Table 3. Presence of nasal trauma history by sex.

	male	female	total
nasal trauma history	1.87%	0.45%	1.13%

$p < 0.01$

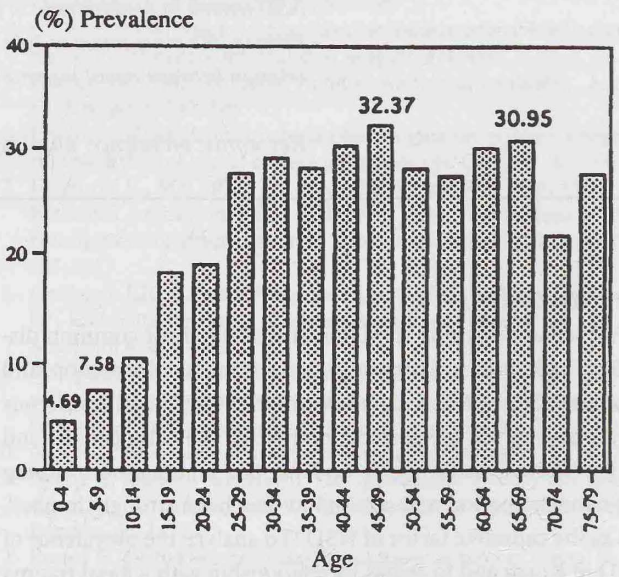

Figure 3. Prevalence of nasal septal deformity in the different age groups.

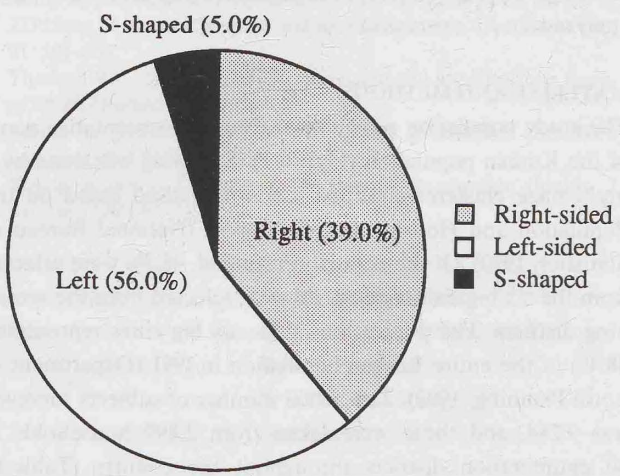

Figure 4. Percentage of the shape of deformity in the entire nasal septal deformity in the entire population of subjects.

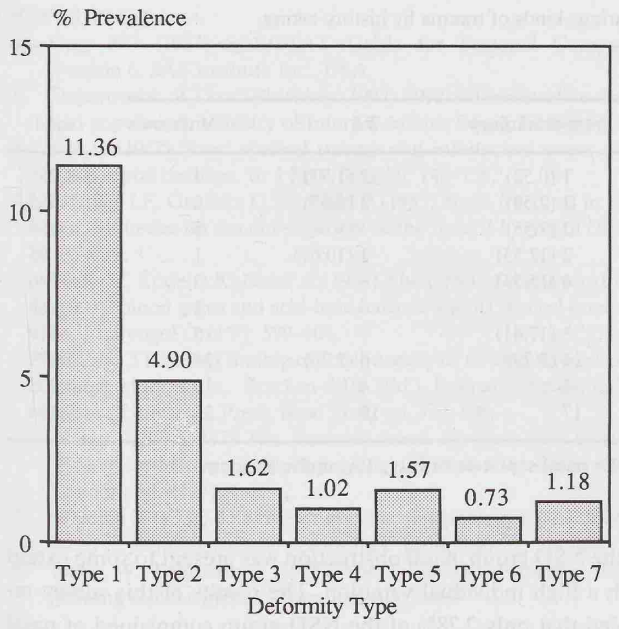

Figure 5. Prevalence of the various types of nasal septal deformity.

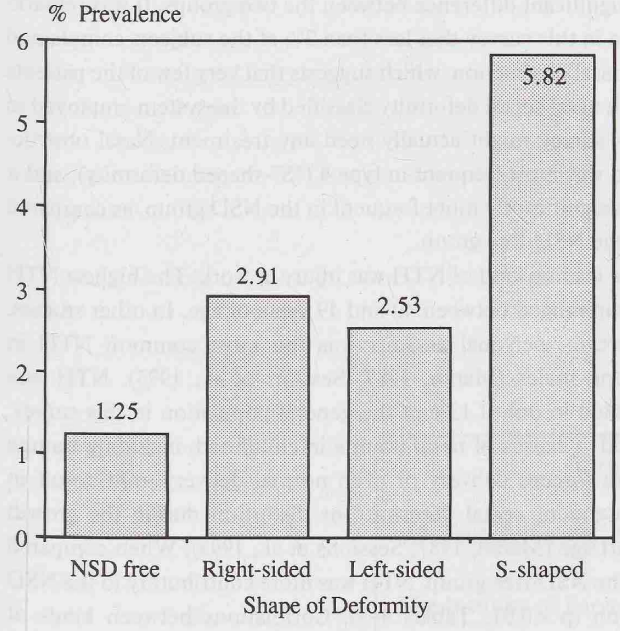

Figure 6. Prevalence of nasal obstruction with regard to the shape of deformity.

NTH was noted in 1.13% of the general population, occurring four times as frequently in males as in females (Table 3). NTH was most common in the age group between 40 and 49 years (Figure 8), and the most common cause was injury at work. NTH was more prevalent in the NSD group, as compared to the NSD-free group ($p < 0.01$; see Table 4). Correlations between kinds of NTH and types of NSD were observed by a relative-risk analysis. Fall-down injury was closely correlated to NSD types 7, 4, and 6 ($p < 0.01$). Injury at work was closely correlated to NSD types 4, 7, 2, and 6 ($p < 0.01$), whereas sports injury was closely correlated to NSD types 7, 5, 4, and 3 ($p < 0.01$). There was also a statistically significant correlation between traffic accident and NSD type 4 ($p < 0.01$; Table 5).

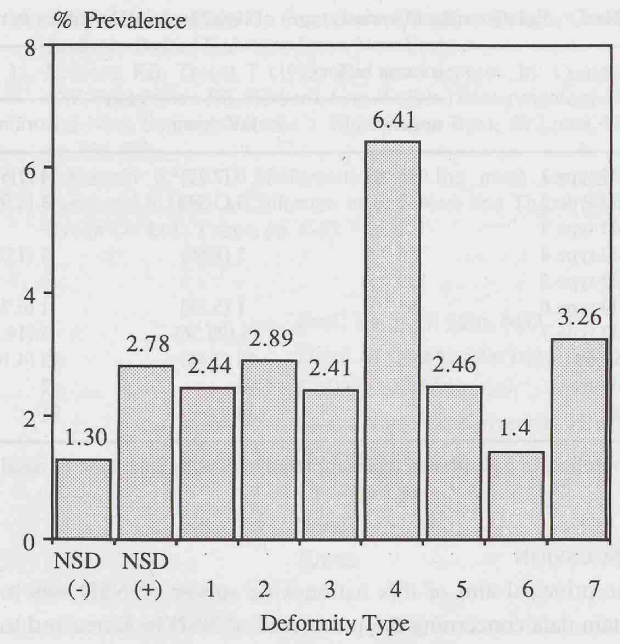

Figure 7. Prevalence of nasal obstruction in the various types of nasal septal deformity.

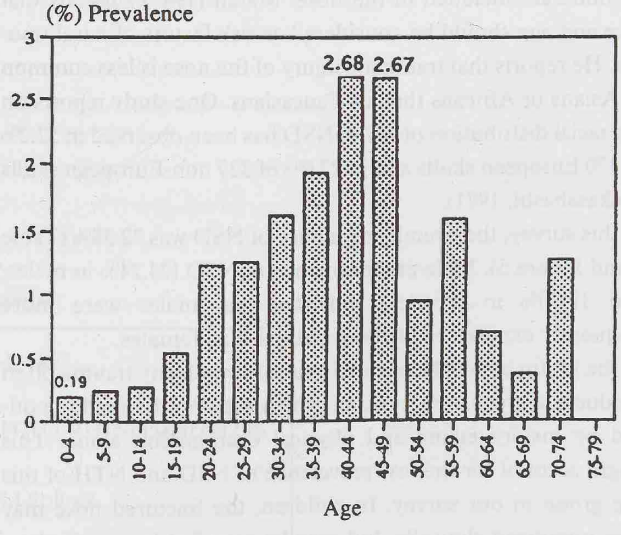

Figure 8. Prevalence of nasal trauma history in the different age groups.

Table 4. Relative risk of nasal septal deformity in relation to nasal trauma history.

	nasal trauma history		
	negative	positive	total
NSD free	7,181	24	7,205
NSD positive	1,996	83 (3.57)*	2,079
total	9,177	107	9,284

*: relative risk; NSD: nasal septal deformity; $p < 0.01$

Table 5. Relative risks of various types of nasal septal deformities in relation to various kinds of trauma by history taking.

	trauma history						
	negative	fall-down	work injury	sports injury	TA	unknown	total
NSD type 1	1,038	6 (2.21)*	4 (1.68)	1 (0.52)	2 (1.77)	4	1,055
NSD type 2	432	4 (3.54)	8 (8.09)	2 (2.50)	3 (6.37)	6	455
NSD type 3	143	–	–	2 (7.55)	–	5	150
NSD type 4	86	2 (8.89)	3 (15.24)	2 (12.55)	1 (10.67)	1	95
NSD type 5	139	–	–	4 (15.53)	–	3	146
NSD type 6	65	1 (5.88)	1 (6.72)	–	–	1	68
NSD type 7	93	5 (20.56)	3 (14.10)	3 (17.41)	–	6	110
subtotal	1,996	18 (3.44)	19 (4.16)	14 (3.79)	6 (2.76)	26	2,079
NSD-free	7,181	6	2	3	4	9	7,205
total	9,177	24	21	17	10	35	9,284

*: numbers in parentheses represent relative risks by each kind of nasal trauma; NSD: nasal septal deformity; TA: traffic accident

DISCUSSION

The principal aim of this nation-wide survey of NSD was to obtain data concerning the prevalence of NSD in Korea and to assess the correlation between NSD and NTH. It is reported that NSD occurs in 25% of the Japanese population (age range: 2 months to 74 years; Takahashi, 1971). According to Fry (1967) and Maran (1987), fracture of the nose is the most common fracture in humans when the quadrilateral cartilage and the septal bone are included in the nose. Maran (1987) suggests that race and age should be considered as risk factors of nasal trauma. He reports that traumatic injury of the nose is less common in Asians or Africans than in Caucasians. One study reports on the racial distribution of NSD; NSD has been observed in 52.2% of 370 European skulls and in 27.9% of 329 non-European skulls (Takasahashi, 1971).

In this survey, the overall prevalence of NSD was 22.38% (Table 2 and Figure 5). Male predominance of NSD (24.24% in males, and 19.80% in females) indicates that males were more frequently exposed to physical trauma than females.

In the group below the age of 5 years, low-velocity trauma often produces a greenstick fracture, which may not be readily noticed by history taking and physical examination alone. This might account for the low prevalence of NSD and NTH of this age group in our survey. In children, the fractured nose may pass unnoticed clinically, but may be manifest later as it alters the growth pattern of the nose (Pirsig et al., 1975; Grymer et al., 1985). Takahashi (1971) reports that NSD remains at an almost constant level after 20 years of age. In this survey, the prevalence of NSD increased until the age of 49, and remained relatively constant thereafter (Figure 3). On the other hand, the percentage of NTH increased until the age group of 40–49 years, and decreased with age. This discrepancy could be attributed to delayed effects of injury to the nose.

As for the shape of NSD, left-sided deformities (56.0%) were more common than right-sided ones (39.0%), which remains to be studied. According to Mladina's classification, NSD types 1 and 2 occupied 50.7% and 21.9% of the entire population with NSD, respectively. These two types constituted the majority of NSD in this survey, occupying 72.6% of all subjects with NSD.

In the NSD group, nasal obstruction was present to some extent with a high individual variation. The results of this survey revealed that only 2.78% of the NSD group complained of nasal obstruction, whereas 1.30% of the NSD-free group complained of nasal obstruction (Figure 7). However, there was a statistically significant difference between the two groups. It was remarkable in this survey that less than 3% of the subjects complained of nasal obstruction, which suggests that very few of the patients with nasal septal deformity classified by the system employed in this survey might actually need any treatment. Nasal obstruction was most frequent in type 4 ("S"-shaped deformity), and it was significantly more frequent in the NSD group, as compared to the NSD-free group.

The leading kind of NTH was injury at work. The highest NTH group ranged between 40 and 49 years of age. In other studies, however, personal assaults was the most common NTH in young males (Maran, 1987; Session et al., 1993). NTH was elicited in only 1.13% of the general population in this survey. Hidden causes of nasal trauma in childhood, including trauma from forceps delivery or even normal delivery, may result in subsequent septal deformity or distortion during the growth spurt age (Maran, 1987; Sessions et al., 1993). When compared to the NSD-free group, NTH was more contributory to the NSD group ($p < 0.01$; Tables 4–5). Correlations between kinds of NTH and types of NSD could be drawn by relative-risk analysis, such as fall-down injury and type-7, type-4, and type-6 deformities, sports injury and type-7, type-5, type-4, and type-3 deformities, traffic accident and type-4 deformity, injury at work and type-4, type-7, type-2, and type-6 deformities (Table 5). However, the causality of NTH and NSD needs further evaluation by analysing a larger data pool.

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