

# Excessive obesity is related to daily symptoms of nasal blockage: the Skövde population-based study\*

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## SUMMARY

*This study has as its focus on obesity as a factor of importance for nasal blockage. A random sample of 1.900 adults stratified according to age and gender were recruited from the general population. The study included a structured interview about symptoms of nasal blockage and asthma, and a clinical examination with nasal endoscopy. Smoking habits were evaluated by a questionnaire on current and previous smoking. A response rate of 73% was achieved. There was a statistically significant relationship between subjectively experienced daily nasal blockage and registered heavy overweight, but no relationship was found between nasal blockage and age, gender, diabetes or asthma. The odds ratio (OR) for individuals with excessive obesity to have daily symptoms of nasal blockage was 3.7 [95% CI 1.6–7.6]. In patients with nasal blockage, obesity as a cause should be taken into consideration.*

*Key words: epidemiology, nasal blockage, obesity, body mass index (BMI)*

## INTRODUCTION

Patients often complain of nasal blockage and sometimes when no other obvious reason can be found a connection with obesity is suspected. This is logical, since the relationship between snoring and overweight, and also, between snoring and nasal blockage, is well known<sup>(1-3)</sup>. Epidemiology of common symptoms is basic information in health care and is essential to confirming clinical experiences. A few years ago we performed a population-based study concerning rhinologic symptoms<sup>(4-8)</sup>. By returning to the original data of that study, and focusing on a possible relationship between obesity and nasal blockage, it has been possible to study this relationship.

## MATERIALS AND METHODS

### *Participant selection*

The present study forms part of the Skövde population-based study, a larger cross-sectional investigation of a random adult sample regarding rhinological disorders in Sweden. Epidemiological data from the study have been presented elsewhere regarding nasal polyps, septal perforations, smell dysfunctions and airway symptoms<sup>(4-8)</sup>. For the present study, a random sample of 1.900 individuals aged 20 years or older was drawn from the municipal directory in December 2000. The sample was stratified by gender and age into seven groups, aged 20–29, 30–39, 40–49, 50–59, 60–69, 70–79, and 80+ years. An invitation to participate in the study was sent by mail, and

recipients were asked to phone the clinic for a study appointment. Non-responders received up to two reminders and, where possible, were also approached by telephone. A signed informed consent form was obtained from each participant in the study. The study was carried out in accordance with the Helsinki Declaration and was approved by the Ethics Committee of the University of Gothenburg.

### *Examination*

All participants were examined using nasal rhinoscopy with a rigid endoscope to identify nasal pathology, such as signs of inflammation, polyps, septal perforations, and smell disorders, as previously reported<sup>(4-8)</sup>. Height and weight were measured and body mass index (BMI) was calculated. Medical history was gathered in a standardised manner by means of a structured interview, and nasal blockage was identified by the question: "Are you bothered by nasal blockage?" If the answer was "yes", the respondent was asked to indicate whether symptoms were experienced daily, frequently, or occasionally. Other questions were designed to obtain information regarding relevant medical conditions, such as asthma and diabetes, and smoking habits<sup>(4)</sup>. With few exceptions the study was conducted during the non-pollen season. The examinations were performed by six trained ear, nose and throat (ENT) physicians assisted by three nurses.

### Statistics

The significance of differences between variables was calculated with the unpaired t-test for continuously distributed variables, and the  $\chi^2$ -test for categorical variables. P-values  $< 0.05$  were considered statistically significant and the 95% confidence interval (CI) is presented within brackets. To identify factors related to daily symptoms of nasal blockage, a multiple logistic regression was fitted to the data. The following variables were selected in the model: age, gender, BMI, diabetes, smoking (expressed as pack-year) and meaningful interactions between these variables. To keep this model as parsimonious and plausible as possible, stepwise selection (forward and backward) procedures were used. The significance level for entry and removal of a variable was set to 5%.

### RESULTS

Of the 1.900 randomly selected individuals, 1.387 (73%) presented for the clinical investigation and interview<sup>(4)</sup>. Daily symptoms of nasal blockage were reported by 132 (9.5%) of these individuals, while 109 (7.9%) reported frequent and 213 (15%) reported occasional nasal blockage. Altogether 933 (67.3%) reported no nasal blockage at all. The total prevalence of daily nasal blockage in this adult population was therefore 9.5% [95% CI 7.9–11.1%], as previously reported<sup>(8)</sup>.

Obesity (defined as BMI  $\geq 30$ ) was found in 177 individuals (101 women and 76 men, mean age 51 years), which represents a prevalence of 12.8% [95% CI 11.1–14.6%]. Excessive obesity (defined as BMI  $\geq 35$ ) was found in 37 individuals (27 women and 10 men, mean age 51 years), a prevalence of 2.7% [95% CI 1.9–3.7%]. The female dominance was statistically significant ( $p < 0.01$ ) both for participants with obesity and for participants with excessive obesity. Obesity was fairly equally distributed among the age strata, and there were no significant differences in age between individuals with and individuals without obesity.

There were significantly more individuals with excessive obesity in the group with daily symptoms of nasal blockage (7.6%) compared with those without blockage (2.2%,  $p < 0.01$ ) (Table I). Multiple logistic regression analysis showed that excessive obesity and heavy smoking, defined as pack-year  $\geq 5$ , were significantly related to daily symptoms of nasal blockage ( $p < 0.001$ ). The odds ratio (OR) for daily symptoms of nasal blockage in individuals with excessive obesity was 3.7 [95% CI 1.6–7.6] and the OR for heavy smoking 1.9 [95% CI 1.3–2.7].

Table 1. Individuals with excessive obesity (BMI  $\geq 35$ ) in relation to individuals reporting daily symptoms of nasal blockage.

	Symptoms of daily nasal blockage		Total
	Yes	No	
BMI $\geq 35$	10	27	37
BMI $< 35$	122	1.228	1.350
Total	132	1.255	1.387

### DISCUSSION

Dropouts are to be expected in any population-based study, and in this study the dropout rate was 27%. An important question is whether the sample can be considered random, and whether dropouts may have affected the external validity of the study. The dropouts constituted a mixed group, approximately half of whom were unwilling to participate. Nasal blockage is mostly of relatively low severity or morbidity and there is no reason to believe that the symptom *per se* comprised the major reason for subjects electing not to participate in the study. Excessive obesity, on the other hand, may well be a reason for individuals not wanting to or not being able to attend a clinical visit. The dropouts were mostly among the youngest (34% of those aged 20–29 years) and oldest (58% of those aged 80+ years) age strata, with the dropout rate being lower in the other age strata (23% of those aged 30–79 years).

The community of Skövde has approximately 49.000 inhabitants (37.000 adults), 67% of whom live in the city, 18% in villages and 14% in the countryside. Based on the demographic profile of Skövde as compared with that of Sweden as a whole, the sample used in the Skövde population-based study can, with the possible exception of the oldest age strata, be considered representative of the Swedish population and consequently the results of this study can be generalised to Sweden as a whole<sup>(4)</sup>.

There are no universally agreed-upon criteria for defining the symptom “nasal blockage”, and the design of the questionnaires used in existing studies varies considerably. This makes it difficult to compare the prevalence rates determined by different investigations. In the present study the question regarding this symptom was two-pronged, asking firstly whether respondents had experienced any such problems, and secondly, how often the problems occurred. To avoid uncertainty in determining prevalence, it was important to make the question specific. Even given that the structured interview format used offered the possibility of further explaining the question, more difficulties arose in exactly clarifying the alternatives “often” and “sometimes” than in clarifying “always”. In a recently presented population-based study of the prevalence of allergic rhinitis and other nasal symptoms, Jones and co-workers sent questionnaires to 1.200 randomly selected households in Nottingham in the UK. They obtained a response rate of 69%, with a total of 2.114 respondents aged 14 years and up<sup>(9)</sup>. Although the questions were not identical to those used in the present study, it is of interest to compare the results. The prevalence of “nasal congestion” every day for more than 14 consecutive days in the previous 12 months was 16.9%, with no obvious difference in prevalence by gender.

In a large epidemiological study in a general adult population of 2.187 subjects in Tucson, AZ, USA, smoking, obesity, male gender and middle age were reported to be the risk factors for snoring<sup>(2)</sup>. Previously, a strong relationship had been found

between BMI, nasal airflow resistance and snoring<sup>(1)</sup>. Obesity and increased nasal airflow resistance were found to be important determinants of the frequency of snoring. The authors suggested that reduction in weight as well as measures to improve nasal patency may be beneficial in reducing snoring. However, while reduction in weight is one of the most important ways to treat snoring, treatment of nasal obstruction with decongestants or surgery does not appear to be successful<sup>(3)</sup>. It may be that there is a causal relationship between obesity and snoring and also, between nasal blockage and obesity, but there is only an indirect relationship between snoring and daily problems of nasal blockage. If this is so, treatment of snoring should focus on weight rather than on nasal patency.

In conclusion, the Skövde population-based study seems to be representative of the Swedish population as a whole and illustrates that an epidemiological relationship exists between excessive obesity and nasal blockage, with an almost four-fold risk.

#### ACKNOWLEDGEMENT

The authors would like to thank Annika Ahlberg, Christel Larsson and Carina Thorold for their skilful technical assistance and Karin Kullberg for help with the statistical analysis.

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