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Prevalence of parosmia: the Skövde population-based studies*

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SUMMARY

Aim: *Parosmia can be defined as a qualitative odor distortion. Despite the consequences of this condition for quality of life, the scientific literature lacks information about the prevalence of parosmia in the general population, which was the objective of the present study.*

Methods: *Random samples of 1,900 adult and 401 teenage inhabitants, stratified for age and gender, were drawn from the municipal population register of Skövde, Sweden. In total, 1,713 individuals (74% of the samples) agreed to participate, of which 1,387 (73%) were adults and 326 (81%) were teenagers. They responded to a question about parosmia by means of either a structured interview (adults) or a questionnaire (teenagers).*

Results: *The overall prevalence of parosmia was 3.9% (4.0% in adults and 3.4% in teenagers), which was stable across gender, but differed somewhat between age groups, with highest prevalence in the age group 20-29 years.*

Conclusions: *The rather high overall prevalence, 3.9%, does indeed suggest that parosmia deserves attention when attempting to better understand olfactory dysfunction in clinical settings and in the general population of both adults and teenagers.*

Key words: aging, children, clinical, distortion, olfaction

INTRODUCTION

Parosmia can be defined as a qualitative odor distortion, and is often described by the patient as a foul, rotton or burnt birhinal sensation and typically unpleasant [1,2]. Phantosmia, which together with parosmia constitutes the more general term dysosmia, differs from parosmia in that it is an odor sensation in the absence of an external stimulus. There is yet limited knowledge about the pathogenesis of parosmia, but partial olfactory receptor- and bulb-nerve loss and pathology in integrative or interpretive CNS areas have been suggested [3,4]. Consequences of parosmia include poorer general quality of life, mild depression, altered food perception and weight loss [1,4-6].

Parosmia can occur simultaneously with or recently after the loss in olfactory sensitivity [6], but may also by present among individuals with normal sensitivity [7,8]. Parosmia may aid in a differential diagnosis [9] and indicate a potentially serious medical problem such as tumors [8,10]. Conditions in which parosmia most commonly are found include upper respiratory infection, head truma, toxic exposure, allergic rhinitis, and idiopathic conditions [11], but is also fairly common during pregnancy [12]. In studies of consecutive ENT-patients, the prevalence of parosmia has been found to range between 12 and 24% [11,13,14].

Despite its consequences for life quality, to our knowledge, the literature lacks information about the prevalence of parosmia in the general population. The objective of the present investigation was therefore to determine the prevalence of parosmia in a general Swedish population aged 13 years and older. This was conducted by means of the Skövde Population-Based Studies of Adults and Teenagers.

MATERIAL AND METHODS

Participants

Adult sample. The Skövde Population-Based Study is an all-embracing name of different investigations in the same general population regarding rhinologic disorders in Sweden. The community of Skövde has about 50,000 inhabitants (22,000 children). Of these, 67% live in the city, 19% in villages and 14% on the countryside. The demographic profile of the community of Skövde is very similar to that of Sweden in general [15].

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To obtain a sample that very well represented the community of Skövde with respect to age and gender, a random sample of 1,900 adult individuals was drawn from the municipal roster. The sample was stratified in proportion to gender and seven age groups: 20-29 (n = 332), 30-39 (n = 364), 40-49 (n = 324), 50-59 (n = 339), 60-69 (n = 220), 70-79 (n = 192), and 80+ (n = 129) years. An invitation to participate was sent by mail. The recipients were requested to phone the ENT clinic for a study appointment. Non-responders received up to two reminders and, when possible, were also approached by telephone. Of the randomly selected 1,900 individuals, 1,387 (73%) agreed to participate.

Teenage sample. A random sample of 401 teenagers, aged 13 to 19 years, was also drawn from the municipal roster. The sample was stratified in proportion to gender and three age groups: 13-14 (n = 119), 15-16 (n = 117), and 17-19 (n = 165) years. An invitation to participate was sent by mail, together with questionnaires. Non-responders received up to two reminders and, when possible, were also approached by telephone. Of the randomly selected 401 individuals, 326 (81%) agreed to participate. Age and gender distributions are given in Table 1 for those who agreed and did not agree to participate among both the adult and teenage samples. Reasons for not participating among the adult sample have been described by Brämerson et al. [16]. The age and gender strata are further described in Table 2, in terms of prevalences of conditions that may affect olfaction.

Procedure

By means of a structured interview with the adult population and a questionnaire for the teenage population, the participants were given the question: *"Do you ever have the occasion to smell something, for example, a rose or an orange, that should have a smell that you know, but instead, you smell an off odor, a bad odor, or a burning odor?"* The reason for asking about parosmia in a time-wise more general respect, rather than referring to a specific moment, is because parosmia is a condition that tends to fluctuate [17]. The study was carried out in accordance with the Helsinki Declaration, and approved by the Ethics Committee on human experimentation at Göteborg University. A signed informed consent form was obtained from each participant or his/hers parents.

RESULTS

In total, 3.9% (95% CI, 3.0-4.9%) of the studied individuals aged 13 years and older reported having had parosmia. The overall prevalence of parosmia in teenagers (13-19 years) was 3.4% (95% CI, 1.9-5.9%). This prevalence was almost identical for girls (3.4%; 95% CI, 1.6-7.3%) and boys (3.3%; 1.4-7.5%). In adults, the overall parosmia prevalence was 4.0% (95% CI, 3.1-5.1%), which was almost identical for women (4.0%; 95% CI, 2.8-5.7%) and men (3.9%; 2.7-5.6%). Prevalences of parosmia for specific combinations of age group and gender are presented in Table 3. Chi-square analyses show significant differences in parosmia prevalence across age groups [$\chi^2(7) = 14.4$, $p < 0.05$; the age groups of 13-14 and 15-16 years were collapsed as were 70-79 and 80+ years in the analysis to avoid cell frequencies smaller than five], but not across gender [$\chi^2(1) = 0.02$, n.s.]. The significant difference between age groups is likely to be referred to the higher prevalence for the age group 20-29 years (7.3%).

DISCUSSION

Structured interview and questionnaire studies were conducted to determine the prevalence of parosmia in a general adults and a teenage population of all ages. The results suggest that, overall, 3.9% of the general population aged 13 years and older report having had parosmia (4.0% of the adults and 3.4% of the teenagers). Whereas the prevalence was stable across gender, it differed somewhat between age groups, with highest prevalence in the age group 20-29 years. Further research is needed to approach the question whether this age-related difference can be referred to a bias in response behavior or to biological conditions.

The dropouts in the present investigation were found mostly among the youngest (34% of those aged 20-29 years) and oldest (58% of those aged 80+ years) adult age groups, whereas this rate was lower in the other adult age groups (23% of those aged 30-79 years), and even lower in the teenage groups (19%). Consequently, the randomly selected individuals aged 13-19 and 30-79 years can be considered a fairly random sample. Based on the demographic profile in Skövde compared to Sweden as a whole, the Skövde Population-Based Studies can, possibly with the exception of the oldest age-group, be considered representative of the Swedish adult population and the estimated prevalence can be generalized [15]. It is possible that the higher parosmia prevalence in the age group 20-29 years to some extent can be referred to the relatively high dropout rate in this group. Thus, individuals without olfactory problems, such as parosmia, might have been less inclined to participate in the study.

When comparing the parosmia prevalences between the adult and teenage samples one should bear in mind that the question used to assess this prevalence was given as a structured interview among the adults and in a questionnaire among the teenagers. As opposed to an interview situation, which enables the interviewer to ensure that the respondent adequately understands the questions and that the interviewer understands the answers, the questionnaire provides far less guarantee of comprehension. Thus, the data from the teenage sample may be somewhat less reliable than the data from the adult sample. Nevertheless, the rather high prevalence of parosmia suggests that this is a condition that deserves attention not only in clinical settings, but also when attempting to better understand olfactory dysfunction in the general population of both adults and teenagers.

Table 1. Number of participants out of number of invited persons, and percentage participants in parenthesis among specific age groups and gender in the teenage and adult samples.

	Age group (years)										
	13-14	**15-16**	**17-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**Total**
Girls/Women	53/60 (88%)	51/59 (86%)	71/80 (89%)	106/162 (65%)	130/174 (75%)	133/162 (82%)	153/171 (89%)	98/113 (87%)	71/108 (66%)	27/81 (33%)	893/1170 (76%)
Boys/Men	45/59 (76%)	43/58 (74%)	63/85 (74%)	112/170 (66%)	131/190 (69%)	116/162 (72%)	127/168 (76%)	89/107 (83%)	67/84 (80%)	27/48 (56%)	820/1131 (73%)
Total	98/119 (82%)	94/117 (80%)	134/165 (81%)	218/332 (66%)	261/364 (72%)	249/324 (77%)	280/339 (83%)	187/220 (85%)	138/192 (72%)	54/129 (42%)	1713/2301 (74%)

Table 2. Percentage of participants who reported daily or often being bothered by nasal discharge and congestion, and presently being a frequent smoker among specific age groups and gender in the teenage and adult samples.

	Age group (years)									
	13-14	**15-16**	**17-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**
Nasal discharge										
Girls/Women	4	2	6	9	4	17	13	14	13	30
Boys/Men	2	9	6	7	6	8	13	9	19	19
Nasal congestion										
Girls/Women	8	8	7	19	12	20	18	24	15	4
Boys/Men	7	12	11	16	20	21	16	16	10	19
Presently a smoker										
Girls/Women	6	0	4	18	21	23	22	19	3	0
Boys/Men	0	5	5	4	8	16	10	9	13	4

Table 3. Prevalences of parosmia in percentage, number of cases in parenthesis, and 95% CI in brackets among specific age groups and gender in the teenage and adult samples.

	Age group (years)										
	13-14	**15-16**	**17-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**Total**
Girls/Women	5.7 (3) [1.9-15.4]	0 (0) [0-7.0]	4.2 (3) [1.4-11.7]	7.5 (8) [3.9-14.2]	3.8 (5) [1.7-8.7]	2.2 (3) [0.8-6.4]	1.3 (2) [0.4-4.6]	8.2 (8) [4.2-15.3]	4.2 (3) [1.4-11.7]	0 (0) [0-12.5]	3.9 (35) [2.8-5.4]
Boys/Men	0 (0) [0-7.9]	4.7 (2) [1.3-15.5]	4.8 (3) [1.6-13.1]	7.1 (8) [3.7-13.5]	3.8 (5) [1.6-8.6]	2.6 (3) [0.9-7.3]	3.1 (4) [1.2-7.8]	3.4 (3) [1.2-9.4]	1.5 (1) [0.3-8.0]	7.4 (2) [2.1-23.4]	3.8 (31) [2.7-5.3]
Total	3.1 (3) [1.0-8.6]	2.1 (2) [0.6-7.4]	4.5 (6) [2.1-9.4]	7.3 (16) [4.6-11.6]	3.8 (10) [2.1-6.9]	2.4 (6) [1.1-5.2]	2.1 (6) [1.0-4.6]	5.9 (11) [3.3-10.2]	2.9 (4) [1.1-7.2]	3.7 (2) [1.0-12.5]	3.9 (66) [3.0-4.9]

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