Towards a new epidemiological definition of chronic rhinitis: prevalence of nasal complaints in the general population*

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Abstract

Background: Chronic rhinitis (CR) is currently defined as the presence of at least two nasal symptoms for at least 1 hour per day for more than 12 weeks per year. Such definition lacks evidence-based foundation. CR patients are often divided into 'runners' and 'blockers', although the evidence supporting such subdivision is limited. The aim of the study was to define CR, to estimate its prevalence and the proportion of 'runners' and 'blockers'.

Methods: Cross-sectional, questionnaire-based study in a random sample of participants representing the general population of the Netherlands.

Results: The questionnaire was sent to 5000 residents of the Netherlands; the response rate was 27%. CR was defined as at least 1 nasal complaint present for more than 3 weeks per year. The prevalence of CR in the general population was 40%. Participants who would have been excluded by the former CR definition were shown to have a significantly higher VAS compared to the controls. The larger part of CR group was represented by non-allergic rhinitis (NAR): 70% vs 30%. There were 25% 'Blockers' and 22% 'Runners' in the CR group, whereas more than a half of the CR group could be classified in neither of these subgroups.

Conclusion: Based on our data, we suggest that the current definition of CR should be revised and propose a new definition: at least one nasal complaint present for at least 3 weeks per year; although future studies are needed to further validate the proposed definition.

Key words: allergic rhinitis, non-allergic rhinitis, chronic rhinitis

Introduction

Chronic rhinitis (CR) is one of the most common chronic diseases, affecting 20-40% [1-3] of the adult Western population, significantly decreasing the quality of life [4] and having a substantial financial impact [5]. The symptoms include anterior/posterior rhinorrhea, blocked nose, sneezing and/or itchy nose [6]. The current definition of CR states that the symptoms should be present for at least one hour per day for at least 12 weeks per year [7]. To our knowledge, no epidemiological evidence supports such definition.

There are two major types of CR: allergic (AR) and non-allergic rhinitis (NAR). AR affects 20-30% [8-11] of the Western population, whereas NAR affects 10-19% [10, 12].

Depending on the most troublesome symptom, chronic (allergic) rhinitis patients are often divided into '(sneezers and) runners' and 'blockers' [13], although the evidence of such subdivision is limited and somewhat contradictory. Some studies demonstrated that among AR patients there are significantly more 'sneezers and runners' than 'blockers' [14, 15], with the proportion around 2:1 [16]. However, another study reported the prevalence of 'blockers' to be significantly higher than that of 'runners', with the reversed proportion [17]. A South Korean study showed that the distribution of 'blockers' vs. 'runners' depends on disease duration and that about a third of AR patients cannot be classified

Table 1. Characteristics of the respondents.

	Chronic Rhinitis group	Control group	Statistics
N (%)	560 (42% of full study population)	774 (58% of full study population)	
Age: Mean ± SD (Min-max)	57±18 (18-94)	60±16 (18-95)	P=0.02 (t-test)
Gender: Female N (%)	277 (50% of CR group)	417 (54% of control group)	
Current smoker	51 (9% of CR group)	37 (5% of control group)	Chi-Square: p=0.03 OR=1.9 (95% CI 1.2-3.0) RR=1.4 (95% CI 1.14-1.67)
Former smoker	250 (45% of CR group)	326 (42% of control group)	Not significant
Self-reported asthma	51 (9% of CR group)	25 (3% of control group)	Chi-square: p<0.01 OR=2.9 (95% CI 1.8-4.7) RR=1.6 (95% CI 1.4-1.9)
Other pulmonary complaints (cough, dyspnea, shortness of breath, wheezing)	197 (35% of CR group)	87 (11% of control group)	Chi-square: p<0.01 OR=4.1 (95% CI 3.1-5.5) RR=2.0 (95% CI 1.7-2.2)
Regular use of nasal decongestants	116 (21% of CR group)	41 (5% of control group)	Chi-square: p<0.01 OR=4.3 (95% CI 3.0-6.3) RR=1.9 (95% CI 1.7-2.1)
Nasal medication use	149 (27% of CR group)	25 (3% of control group)	Chi-square P<0.01 OR 10.3 (95% CI 6.6-16.1) RR 2.3 (2.1-2.6)

into either subtype [18].

The aim of the current study was to give an epidemiological definition of CR that covers both AR and NAR; to describe the prevalence, duration and severity of nasal complaints in the general (adult) population; and to estimate the prevalence of CR and the proportion of the 'runners' and 'blockers' subtypes.

Materials and methods

We performed a cross-sectional, questionnaire-based study in a random sample (chosen by Ouder-Amstel municipality) of participants representing the general population of the Netherlands. The questionnaire (Attachment 1) covered general information, nasal complaints; pulmonary complaints, medication use, smoking and allergy status. Questionnaire-based studies in the Netherlands generally do not fall under the scope of the Medical Research Involving Human Subjects Act [19]. Local Ethical Committee reviewed the questionnaire and concluded that their official permission is not required for the execution of the study.

Regular nasal complaints

We collected information regarding the following complaints: blocked nose, runny nose, post-nasal drip, sneezing, itchy nose/throat, facial pain/pressure, reduced sense of smell/taste, and itchy/teary eyes. We asked participants which of these complaints they had for at least one hour per day on most days of the week (hereinafter "regular nasal complaints") and which were they experiencing at the time of filling in the questionnaire ("current nasal complaints"). We asked them if they had these complaints for at least one hour per day or less than one hour per day, and for how many days per year in total. We asked the participants to choose the most bothering complaint. According to ARIA guidelines (20), we have classified symptoms based on duration (intermittent or persistent) and severity (mild or moderate/severe). Although ARIA classification is intended for use in AR, we applied it to the whole CR group. Participants noted the total burden of (all) nasal complaints at the moment of filling the survey on a Visual Analogue Scale (VAS), from 0 to 100 mm.

Definitions used

Chronic rhinitis

Chronic rhinitis (CR group) was defined as the presence of nasal complaints for at least 3 weeks per year or a history of a positive allergy test and nasal medication use, irrespective of duration of the complaints.

Allergic rhinitis

When the participants fulfilled the CR criteria and answered affirmatively on the question whether they had allergic rhinitis or hay fever, they were considered as having (self-reported) allergic rhinitis (AR group). When the answer was negative, they were considered as having non-allergic rhinitis (NAR). Within the AR group, we defined the confirmed AR subgroup when participants reported having had a positive allergy test.

'Blockers' and 'Runners'

'Blockers' were defined as participants with CR who indicated

that they suffer the most from blocked nose, and 'Runners' were defined as participants with CR who suffered the most from anterior rhinorrhea.

Control group

The control group was defined as participants who did not report the duration of their nasal complaints (or had complaints for less than 21 days per year) and did not use nasal medications in the presence of confirmed allergies. The question regarding the duration was posed after asking if the participants had any regular or current nasal complaints. We expected that participants who did not have any complaints, would leave this question blank.

Statistical analysis

We used SPSS version 26 for Windows (IBM) for statistical analysis. Data are summarized as frequencies, means and standard deviations, medians and interquartile ranges. To detect the differences between groups, we used an unpaired samples t-test for normally distributed numerical variables (such as age), and an independent samples Mann-Whitney U-test for non-normally distributed numerical variables (VAS score). For categorical variables (e.g. smoking status), we used a chi-squared test, odds ratio and/or relative risk.

Results

We have sent a survey to 5000 subjects older than 15 years of age (full study population; representing the general adult population), registered in the same municipality in the Netherlands. The questionnaires were sent out once, in December 2019. From December 2019 to April 2020, 1334 participants (response rate 27%) filled in the questionnaire.

Roughly 40% of the full study population had CR (Table 1). There was no gender difference. Participants with CR were somewhat younger than the control group and significantly more likely to smoke, have asthma or other pulmonary complaints, and to regularly use nasal decongestants or other nasal medications.

Prevalence of nasal complaints in chronic rhinitis group

The median number of regular and current complaints in the CR group was two (IQR 1; 3 for both) (Table 2, Figure 1). Nasal obstruction, post-nasal drip and runny nose were the most prevalent complaints (Figure 1). Fifteen percent of participants fulfilling the criteria for CR have not reported any regular complaints (of those, 76% reported at least one current complaint) and 9% reported no current complaints. Twenty participants in the CR group reported no regular and no current complaints. Of those, 11 were found to be allergic and use nasal medications (well-controlled AR).

Twenty-seven percent (N=152) of CR group reported having one regular complaint, and 58% (N=326) two or more. Participants with two or more complaints had a higher VAS (45 mm (24; 65) vs. 30 mm (14; 61), p=0.04) and had significantly more moderate/severe cases (79% vs. 65%, p<0.05). Participants with one complaint had a significantly higher VAS compared to controls (30 mm (14; 61) vs. 2 mm (0; 11), p<0.01).

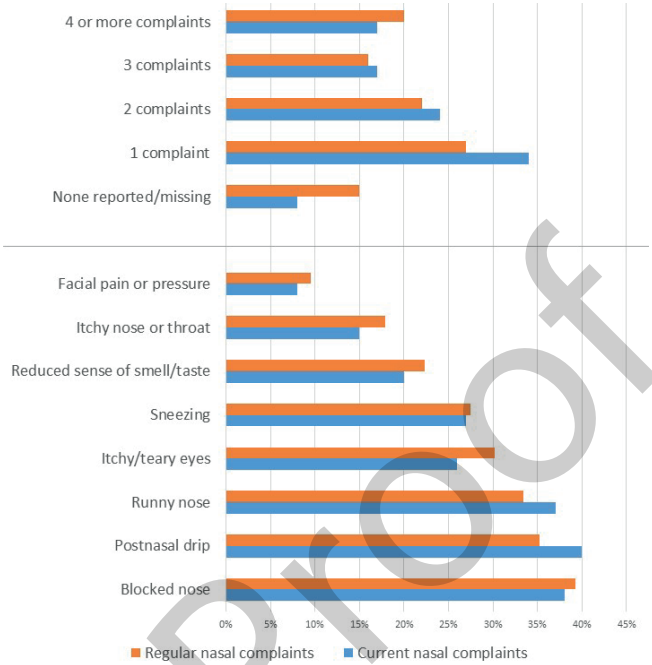

Figure 1. Chronic rhinitis group (N=560). A: number of reported nasal complaints (%); B: prevalence (%) of nasal complaints.

Nasal obstruction was not only the most prevalent, but also the most bothering complaint (25%), followed by runny nose (22%) and post-nasal drip (18%) (Figure 2A). Seventy participants with CR failed to answer the question on the most bothering complaint.

Duration of nasal complaints in chronic rhinitis group

Twenty participants with nasal complaints present for less than 21 days per year (or unknown duration) were included to the CR group based on a positive allergy test and nasal medication use. This subgroup most likely consists of participants with well-controlled AR. Regarding the daily duration, 310 (55%) reported having nasal complaints for 1 or more hours per day and 204 (36%) for less than 1 hour per day. In 46 participants (9%), adequate data was missing. Participants with complaints present for more than 1 hour per day had a significantly higher VAS compared to the participants with complaints present for less than 1 hour per day (48 mm (25; 68) vs. 22 (10; 45), p<0.01). There were significantly more moderate/severe cases in the former group compared to the latter (82% vs 61%, p<0.01). Participants with nasal complaints present for less than 1 hour per day had a higher VAS compared to controls (22 mm (10; 45) vs. 2 mm (0; 11), p<0.01).

Table 2. Characteristics of the chronic rhinitis group (N=560).

The number of regular nasal complaints	Mean ± SD	2.2 ± 1.7
	Median (IQR)	2 (1; 3)
The number of current nasal complaints	Mean ± SD	2.1 ± 1.5
	Median (IQR)	2 (1; 3)
Duration of nasal complaints per day	<1 hour per day	204 (36%)
	≥1 hour per day	310 (55%)
	Unknown	46 (9%)
Duration of nasal complaints per year (days per year)	Mean ± SD	206 ± 129
	Median (IQR)	200 (90; 365)
	Unknown	8
ARIA classification	Intermittent	247 (44%)
	Persistent	278 (50%)
	Unknown duration	35 (6%)
	Mild	128 (23%)
	Moderate/severe	396 (71%)
	Unknown severity	36 (6%)
VAS nasal complaints (0-100, mm)	Mean ± SD	39 ± 27
	Median (IQR)	34 (15; 61)
Type of nasal medication used		
Systemic antihistamines	43 (29% of nasal medication users)	
Topical steroids and/or antihistamines	74 (50% of nasal medication users)	
Saline nasal spray/rinse	25 (17% of nasal medication users)	
Other/unknown	37 (25% of nasal medication users)	
Self-reported allergic rhinitis	160 (30%)	
Blockers vs Runners		
	Blockers	Runners
N	121	109
Age (Mean±SD)	53 ± 17	60 ± 20
Self-reported allergic rhinitis	42 (35%)	20 (18%)
Confirmed allergic rhinitis (cAR)	24	9
Positive allergy test for HDM	17 (71% of cAR)	3 (33% of cAR)
Positive allergy test for pollen	17 (71% of cAR)	5 (56% of cAR)
Positive allergy test for pets	6 (25% of cAR)	3 (33% of cAR)
Positive allergy test for other allergens	4 (17% of cAR)	1 (11% of cAR)
ARIA classification: Intermittent	55 (46%)	37 (34%)
ARIA classification: Persistent	64 (53%)	68 (62%)
ARIA classification: Unknown duration	2 (2%)	4 (4%)
ARIA classification: Mild	15 (12%)	31 (28%)
ARIA classification: Moderate/severe	103 (85%) *	64 (59%) *
ARIA classification: Unknown severity	3 (3%)	14 (13%)
VAS nasal complaints (0-100 mm): Mean ± SD	43 ± 27	40 ± 26
VAS nasal complaints (0-100 mm): Median (IQR)	39 (17; 69)	32 (19; 62)

*p<0.05

ARIA classification of chronic rhinitis group

All participants with CR were classified according to the ARIA guidelines (20) (Table 2): 50% suffered from persistent and 44% from intermittent rhinitis; 23% had mild rhinitis, while 71% had moderate/severe. There was no significant difference between AR and NAR.

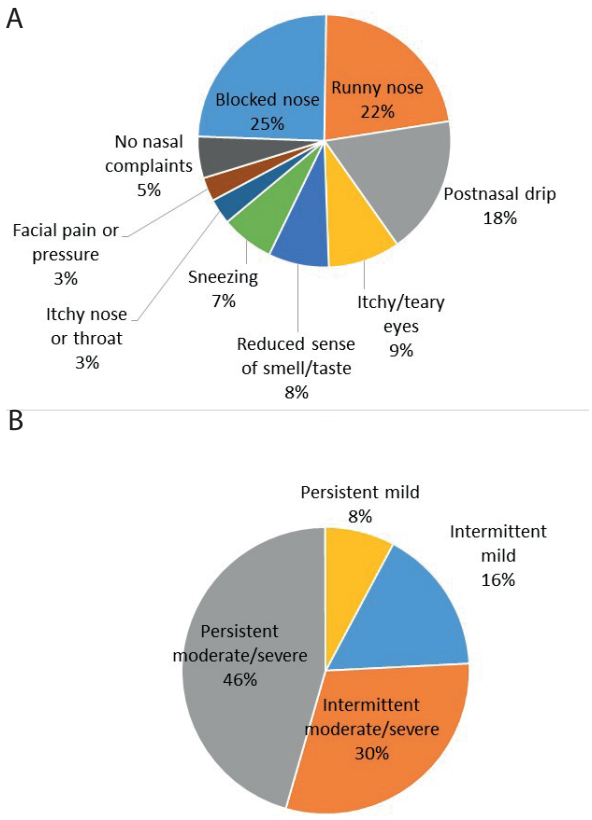

Figure 2. Chronic rhinitis group (N=560). A: The most bothering nasal complaint, % of respondents with chronic rhinitis who filled in this question (N=490). B: ARIA severity and duration.

Allergic rhinitis

In the full study population, 19% (N=249) participants reported having allergic rhinitis or hay fever. Of those, 89 participants did not fulfill criteria to be included in the CR group due to short duration of their complaints (i.e. less than 21 days per year) or missing data on duration and no medication use. In this subgroup, 80% (N=70) did not report having any regular and 70% (N=62) any current complaints.

Seventy-nine participants in the full study population had a history of a positive allergy test and missing data or short duration of their complaints. Of those, 20 were using nasal medication and were included in the CR group. Of the 59 excluded (no nasal medication use), 35 had no nasal symptoms and 24 had very limited symptoms.

In the CR group, 30% (N=160) participants reported that they had allergic rhinitis or hay fever and were defined as AR group. Of those, 57% (N=91) have had a positive allergy test (confirmed AR). Of the remaining participants in the CR group, 378 (68%) indicated to have no allergic rhinitis (NAR group) and 22 did not provide an answer.

'Blockers' and 'Runners'

There were 121 'Blockers' (25%) and 109 'Runners' (22%) in the CR group. In the AR group, as well as in the confirmed AR group, there were twice more 'Blockers' (N=42, 26%) than 'Runners' (N=20, 13%) (p=0.05). In the NAR group, 'Blockers' (N=73) and 'Runners' (N=84) were approximately equally distributed: 19% vs 22%.

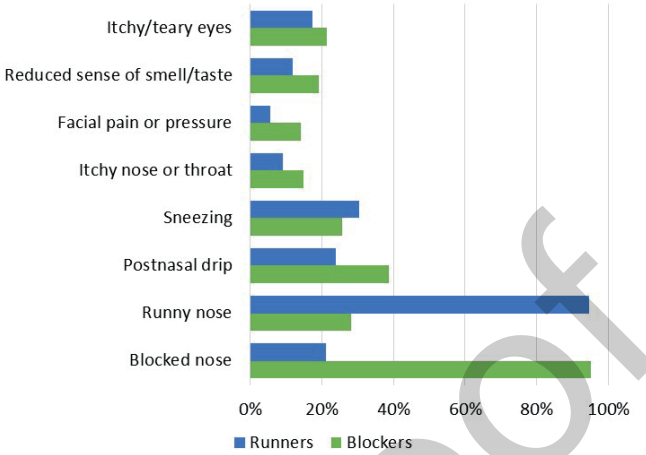

Figure 3. 'Blockers' and 'Runners': prevalence (%) of regular nasal complaints.

The distribution of nasal complaints was indeed significantly different between 'Runners' and 'Blockers' (Figure 3). The majority of 'Blockers' reported having nasal blockage compared with just a fraction of 'Runners' (p<0.05) both as a regular and a current complaint. The same was observed regarding rhinorrhoea: the majority of 'Runners' compared with the minority of 'Blockers' reported having a runny nose (p<0.05). The prevalence of other complaints, including sneezing, was not significantly different between the groups. There was no significant difference in daily and yearly duration of complaints, intermittent/persistent disease (ARIA), and VAS. Yet, there were significantly more moderate/severe cases among 'Blockers' (Figure 4).

Discussion

We have performed a study describing the prevalence of CR complaints in the general population of the Netherlands. About 40% of general population have CR complaints.

Definition of chronic rhinitis

Defining CR and its classification are long-known challenges, especially in epidemiological studies. CR is defined as a symptomatic inflammation of the nasal mucosa, leading to nasal obstruction, rhinorrhea (anteriorly or posteriorly), sneezing, or nasal/ocular itch [7]. In 1994, the International Rhinitis Management Working Group defined rhinitis by presence of at least two symptoms present for more than one hour per day on most days [21]. There are two major types of CR: allergic and non-allergic. AR is a symptomatic disorder of the nose induced by an IgE-mediated inflammation after allergen exposure of the nasal

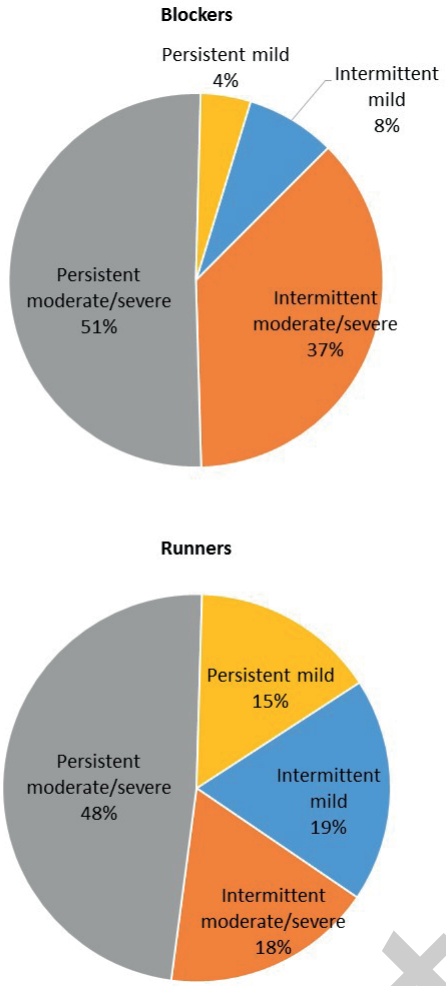

Figure 4. 'Blockers' and 'Runners': ARIA severity& duration.

mucosa[13], whereas NAR is diagnosed in patients suffering of rhinitis without signs of infection or allergy[7].

In large epidemiological studies the tools to objectively confirm sensitizations or exclude sinus involvement are mostly inaccessible. Though some epidemiological studies have attempted to get objective measurements [22], most relied on symptoms reported by the participants. First, studies, including GA2LEN [9] and ECHRS surveys [23] evaluated the prevalence of CR by asking the participants whether they have allergic rhinitis or hay fever [3, 24]. Most likely this type of question leads to underestimation of the prevalence of CR, since it excludes participants with NAR, participants having AR but being unaware and possibly also those with perennial AR not realizing that their perennial AR is considered "hay fever". Later, studies evaluating CR prevalence used questions such as: 'Do you suffer from nasal complaints that were not related to a common cold?' [2, 8, 12, 25], which covers a wider spectrum of CR but does not allow for differentiation from chronic rhinosinusitis (CRS).

What number of nasal complaints is relevant?

It was previously stated that at least two nasal complaints should be present to be defined as rhinitis (21). Our data show that participants with one complaint have significantly higher VAS than controls, therefore we think that already one nasal complaint can be relevant. As expected, compared to the group with two or more complaints, participants with one complaint had a lower VAS and significantly less moderate/severe cases. Thus, by defining rhinitis as at least two nasal complaints, the diagnosis is narrowed down to more severe cases.

Daily duration of nasal complaints

It was proposed that nasal complaints should be present for at least one hour per day to be regarded as rhinitis (21). About a third of the CR group from our study had complaints present for less than an hour per day, and 65% of this subgroup had a moderate/severe form. This group had significantly milder cases (in terms of moderate/severe disease and VAS) compared with the group with complaints present for more than one hour per day, but a significantly higher VAS compared to the controls. Hence, we think that if only the participants with at least one hour per day of complaints are regarded as CR, then a large proportion of patients with milder (but potentially clinically relevant) rhinitis is being left out.

Duration of nasal complaints per year

In order to define the chronicity of nasal complaints, the borderline of days with complaints should be established. In case of AR this is probably not entirely necessary (since allergic complaints are always relevant to exposure to theallergen), whereas in NAR such a cutoff is of utmost importance in order to be distinguished from 'normal' (common cold-related) complaints. Hellings et al. suggested that nasal complaints should be present for at least 12 weeks per year for rhinitis to be considered 'chronic' [7]. However, there is no data to support such definition. Since short-term nasal complaints are probably most often caused by common cold, the borderline should lie on the upper border of average number of days with upper respiratory tract infections (URTI). Seeing that adults have 2-4 episodes of URTIs per year [26], each lasting for about a week, we have chosen a cut-off of 3 weeks instead of 12. We have chosen a cut-off of three weeks instead of four due to the fact that the subgroup of participants with 3-4 weeks of complaints (N=23) was largely represented by well-controlled AR: about a half of this subgroup had self-reported AR (N=12) and regularly used nasal medication (N=14). We think that in order to adequately describe the prevalence of both AR and NAR in general population, well-controlled AR cases should also be included in the CR group. The group with complaints present for three to twelve weeks (data not shown) was represented by a bigger proportion of mild rhinitis (41% versus 19% in group with complaints present for more than 12 weeks per year). Therefore, we think that the margin of 12 weeks selects only severe cases and leaves milder cases out.

Other conditions causing (sino-)nasal complaints

Seeing that it is hard to differentiate CR from chronic rhinosinusitis (CRS) and other sinonasal conditions based on a questionnaire solely [27], we expect that a certain proportion of CR group is represented by participants with CRS, post-URTI nasal complaints (including olfactory loss), midfacial pain and/or migraine. On the other hand, the prevalence of migraine (1-2%) [28, 29] and CRS (3-6%) [30, 31] is considerably low. Moreover, a lot of people who report CRS symptoms in a questionnaire, do not have any clinical signs of CRS [30]. In our study, symptoms characteristic for CRS (reduced sense of smell and facial pain), were one of the least prevalent complaints (Figure 1). Therefore, probably only a minority of the CR group is represented by the aforementioned conditions.

Prevalence of self-reported AR and NAR

It was previously reported that about 19-30% [2, 8, 12] of the European population had AR and 10% - NAR [12]. In our data, 19% (N=249) of participants in full study group indicated having allergic rhinitis or hay fever. On the other hand, 35% (N=89) of them were not included in the CR group due to short duration of their nasal symptoms (or missing data) and the fact that they did not report using any nasal medication. Since the vast majority of them did not report any regular (80%) or current (70%) nasal complaints, we think that this subgroup is represented by participants with clinically irrelevant sensitizations or very mild complaints.

Among the CR group, 30% (N=160) participants were classified as AR (thus, 70% NAR). Similarly to the findings of Bauchau et al. [8], sensitizations were confirmed in 57% of the AR group. This subgroup, that represents 16% of the CR group and 7% of the whole study group, may be considered as having confirmed AR. Possibly, of the remaining 43%, some participants are allergic and some think that they are, but have nasal complaints due to other reasons. Seeing that generally self-reported AR has been found to be unreliable for the AR diagnosis [8, 32], the proportion of non-allergy-related complaints within the CR group may be even higher. As such, the 'real prevalence' of AR across the general population is probably somewhere between 7-10%.

Even though, as described above, a part the NAR subgroup is probably represented by other sinonasal conditions (including participants who are not aware of their allergies), our data suggests a higher prevalence of NAR than previously reported [10, 12]. Our findings are in line with Jessen and Janzon, who estimated the prevalence of AR of 5% and 20% of NAR [33].

'Runners' vs 'Blockers'

Based on the most important nasal complaint, 'Runners' and 'Blockers' subgroups were defined (Figure 3). Instead of 'Runners and sneezers' [14, 16], we used the term 'Runners' due to the fact that sneezing was equally prevalent among both subgroups. Moreover, in the subgroup of the participants who reported 'Sneezing' as the most bothering complaint, the prevalence of runny nose was not higher than in 'Blockers' (data not shown). The vast majority of 'Blockers' reported nasal obstruction as the regular and the current complaint compared to a fraction of 'Runners', and vice versa for rhinorrhea. Yet, about a third of both groups reported to have the other defining symptom, (i.e. rhinorrhea for 'Blockers' and nasal obstruction for 'Runners'). The rest of the symptomswas not significantly different between the subgroups. There were significantly more participants with moderate/severe rhinitis among 'Blockers' (85%) compared to 'Runners' (59%). Probably, nasal obstruction is experienced as a more bothering complaint compared to rhinorrhea.

More than a half of the CR group (and AR subgroup) reported another complaint as being the most important. Hence, more than a half of CR (and AR) are neither 'Blockers' nor 'Runners'. It is therefore debatable whether this division is helpful.

Study limitations

One of the limitations is that possibly the respondents are older than the general population. According to the Statistics Netherlands (CBS), the average age of adult Dutch citizens is 49 years [34]. On the other hand, the median age of the adult residents of municipality where the study took place lies between 45 and 60 years old [35].

Another limitation is a low response rate (27%), hence nothing is known about the prevalence of nasal complaints among the non-responders. The low response rate could be explained by the fact that the municipality gave us permission to send out the questionnaire only once.

Regarding AR/NAR subdivision, it is possible that participants with self-reported NAR are actually having their complaints due to undiagnosed allergies, though the same is possible for the opposite situation (participants with irrelevant sensitizations). Moreover, the design of the questionnaire does not allow to estimate the prevalence of mixed rhinitis, though up to 50% of CR participants might belong to this subtype [36].

The questionnaire was not previously validated, and, by the nature of the study, all outcomes and definitions are self-reported. Therefore, our data are not directly clinically applicable.

We did not collect any information on the ethnicity, language, education and income level of the respondents, though the information available from open sources suggests that the population of the Municipality where the study took place [37] is representative of the general population of the Netherlands [38]. Nevertheless, the study results offer a valid overview of the CR complaints across the general population and are valuable in understanding of the epidemiology of the disease.

Conclusion

Based on our data, we suggest that the current definition of CR

should be revised and propose a new epidemiological definition: at least one nasal symptom present for more than 3 weeks per year. This definition is a better indicator of CR than the question 'Do you have hay fever/allergic rhinitis?' or the previously used definition (at least two nasal symptoms present for more than one hour per day), although future studies are needed to further validate the proposed definition. Although 'Runners' and 'Blockers' are distinguishable subgroups, about a half of CR patients falls into neither of the groups.

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Authorship contribution

KA: design of the questionnaire, data collection and analysis, writing the manuscript; WF: design of the questionnaire and writing the manuscript, SR: design of the questionnaire and writing the manuscript.

Conflict of interest

No conflict of interest.

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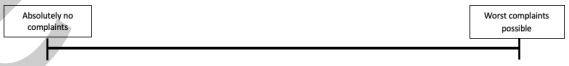
SUPPLEMENTARY INFORMATION

Attachment 1. The questionnaire on nasal and pulmonary complaints (Translated from Dutch).

1. What is your age? ___ years
2. What is your gender? Male/Female/I do not want to answer this question
3. Do you have any of the following complaints present on the most days of the week for more than 1 hour per day:
   a. Runny nose: Yes/No
   b. Mucus in the throat: Yes/No
   c. Blocked nose: Yes/No
   d. Sneezing: Yes/No
   e. Itchy nose or throat: Yes/No
   f. Facial pain/pressure: Yes/No
   g. Reduced smell/taste: Yes/No
   h. Itchy/teary eyes: Yes/No
4. Which nasal complaints do you have at the moment? (Please tick all applicable answers):
   a. Blocked nose
   b. Runny nose
   c. Mucus in the throat
   d. Sneezing
   e. Itchy nose or throat
   f. Facial pain or pressure
   g. Reduced smell/taste
   h. Itchy or teary eyes
   i. I do not have any nasal complaints
5. From which nasal complaints do you suffer the most?
   _____
6. How long do you have these complaints per day: *<1 hour per day / ≥1 hour per day / I do not have nasal complaints*
7. Altogether, on how many days per year do you have these complaints? ___ *days per year*
8. When did your complaints begin? *In ____ (year)*
9. We ask you to indicate whether the following statements are correct:
   a. My nasal complaints (and eye complaints) have an influence on my sleep:
   Yes/No/I do not know
   b. My nasal complaints (and eye complaints) have an influence on my daily activities:
   Yes/No/I do not know
   c. My nasal complaints (and eye complaints) impair me at work or school:
   Yes/No/I do not know
   d. My nasal complaints (and eye complaints) are troublesome:
   Yes/No/I do not know
10. On how many days per week do you suffer from your nasal complaints? *Less than 4 days per week/more than 4 days per week*
11. If you have nasal complaints, is this a period of: *Less than 4 weeks in a row/4 or more weeks in a row*
12. How much do you suffer today from your nasal complaints altogether? The line is 0-100 mm: 0 for absolutely no complaints and 100 is for the worst complaints possible. Please indicate with a vertical line:



13. What do you think is the reason for your nasal complaints?
    _____
14. Are there any factors that worsen your nasal complaints?
    _____
15. How often did you have a cold last year? __ *times*
16. On how many days in total have you had a cold last year?
    ___ *days*
17. Do you regularly use otrivin nasal spray or nasal drops (xylomethasoline)? *Yes/No*
18. Do you use any medications for your nose, such as nasal spray (other than otrivin) or tablets? *Yes/No*
19. If yes, which medications do you use?
    _____
20. Do you have hay fever/allergic rhinitis? *Yes/No*
21. Have you ever had a test (skin-prick test or blood test) for inhalational allergens (think about tree pollen, grass pollen, cat, dog, house dust mite, etc.)? *Yes/No*
22. If yes, were you found to be allergic by this test? *Yes/No*
23. If yes, for which allergens?_____
24. Do you have asthma? *Yes/No*
25. If yes, since when? (year) _____
26. Do you have any other lung complaints, such as cough, dyspnea, shortness of breath, or wheezing? *Yes/No*
27. If yes, which lung complaints do you have? *Cough/Dyspnea/Shortness of breath/Wheezing*
28. Do you smoke? *Yes/No*
29. Have you ever smoked? *Yes/No*