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ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Frequency and intensity of symptoms in patients with chronic rhinosinusitis

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SUMMARY

Introduction/Objective Chronic rhinosinusitis is one of the most frequent chronic disorders which significantly influences the patients' quality of life. The objective of this paper was to examine which are the most frequent and intensive symptoms in patients with chronic rhinosinusitis, and also to determine whether there is a correlation between a subjective assessment of the disease as a whole and individual symptoms.

Methods The study encircled 90 patients with clinical diagnosis of chronic rhinosinusitis that was endoscopically proven and computer tomography of the nose and paranasal sinuses. Every possible symptom was recorded in every patient (nasal congestion, nasal discharge, facial pain/pressure, reduction or loss of smell, headache, fatigue, cough, halitosis and ear pain/fullness), the intensity of every possible symptom as well as the disorder as a whole. The patients assessed the intensity of their symptoms on the visual analogue scale.

Results Nose congestion is the most frequent symptom. It occured in 82 patients (91.1%), followed by nasal discharge in 81 patients (90%) and there was no difference in frequency of these two symptoms. Nasal discharge has been recorded as the most intensive symptom ($\bar{x} = 5.4$) and it is significantly more intensive in comparison to nasal congestion which was the second on the intesity list ($\bar{x} = 4.1$, $p = 0.002$). All other symptoms were significantly less frequently and less intensive. The average intensity value of the disease as a whole is the same as the average intensity value of the nasal discharge ($\bar{x} = 5.4$) while the average intensity values of all other symptoms are statistically significantly lower than the average intensity value of the disease as a whole; in all comparisons $p < 0.001$.

Conclusion Nasal congestion and nasal discharge are the most common symptoms in the patients with chronic rhinosinusitis. Nasal discharge is the most intensive symptom in patients with chronic rhinosinusitis while its intensity determines the sensation of the intesity of the disorder as a whole.

Keywords: chronic rhinosinusitis; visual analogue scale; nasal obstruction; nasal discharge; facial pain/pressure; smell abnormalities

INTRODUCTION

Chronic rhinosinusitis (CRS) is an inflammatory condition of nasal and paranasal sinuses that lasts at least twelve weeks during which the symptoms do not remit entirely. Two or several symptoms are clinically diagnosed, one of which has to be nasal obstruction, or nasal discharge, while the remaining symptoms are facial pain/pressure and reduction or loss of smell; in children cough is recorded instead of reduction or loss of smell [1]. Along with the mentioned symptoms, these patients can experience fatigue, headache, cough in adults, earache and toothache, halitosis and other [2]. The final diagnosis of CRS is done endoscopically and/or by computer tomography (CT) [3].

Considering that most of these patients are the patients of general practitioners who do not have enough experience nor equipment to perform nasal endoscopy, the diagnosis of this disorder is frequently overrated [4]. It is a disorder that can be well-managed in most patients if adequate surgical or medicament treatment is provided. However, in a small number of patients, in spite of surgical and adequate medicament treatments (intranasal corticosteroids and up to two short antibiotic therapies or systemic corticosteroids in the course of the last year), satisfying control of the disorder is not attained and then we deal with a difficult-to-treat CRS [1]

CRS significantly disturbs the quality of life of its patients [5] i.e. the severity of their condition is similar to the conditions of asthma, cancer or arthritis [6]. By using the SF-36 test, it is shown that CRS has numerous negative effects on the quality of life and it has a greater effect on social interacting than chronic cardiac insuffiency, angina and backache [7]. A great number of lost and unproductive working hours and days due to CRS significantly influence a country's economy [8]. It is estimated that total costs (both direct and indirect) of 22 billion dollars were made due to CRS in the USA in 2014 [9].

Considering that numerous symptoms which characterize CRS can occur in multiple interactive combinations and of different degrees of severities. The aim of this paper was to examine which are the most common and intensive symptoms in patients with chronic rhinosinusitis. Also, we wanted to determine if there is a

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correlation between a subjective assessment of the severity of the disorder as a whole and as individual symptoms.

METHODS

The study included 90 patients (51 men and 39 women), aged between 18 and 81. They were all diagnosed with CRS on the basis of clinical symptoms according to the guidelines of 2012 European Position Paper on Rhinosinusitis and Nasal Polyps, and their diagnoses were confirmed endoscopically as well as by nose and paranasal sinuses CT scanning. The symptoms in all patients lasted more than 12 weeks. All the patients underwent a previous medical treatment by general practitioners or otorhinolaryngologists at the primary and secondary health care level. Considering the outcome of the treatment was not satisfying, the patients were directed to otorhinolaryngologists of tertiary health care level. The existing symptoms of every patient were recorded (nasal congestion, nasal discharge, facial pain/pressure, reduction or loss of smell, headache, fatigue, cough, halitosis, ear pain/fullness), as well as the intensity of every symptom and the disorder as a whole.

The patients assessed their symptom intensity on the VAS (visual analogue scale) from 0 to 10 cm, with 0 indicating no trouble and 10 indicating the maximum intensity of symptoms. The study excluded patients with allergic rhinitis, nasal polyposis, nose tumor or some other acute ailments in the upper respiratory region, as well as the ones who had undergone any surgery in the nasal or paranasal sinusal region. The study also excluded patients suffering from some acute or chronic diseases of the lower respiratory region, the ones with chronic headaches and pregnant women. The study was carried out according to the principles of the Helsinki Declaration and it was approved by a local ethical committee. All patients were fully informed of the study itself and they signed their consent to participate in it after discussing it entirely.

Numerical data are presented as measures of central tendency (mean, median), the measures of variability (standard deviation, minimum, maximum), and categorical data are presented as frequencies and percentages. Non-parametrical tests were implemented for the paired samples: the McNemar test for testing the frequency difference of dichotomous variables, the Wilcoxon test for numerical data which are not normally distributed. The connection testing between two properties was done by using Spearman of the correlation coefficient. Statistical analysis was performed using IBM SPSS Statistics 21. All values $p < 0.05$ were considered statistically significant.

Table 1. Frequency and intensity of the symptoms in patients with chronic rhinosinusitis

Symptoms	n	%	Mean	SD	Med	Min	Max
Nasal congestion	82	91.1	4.1	2.5	4.0	0	10
Nasal discharge	81	90.0	5.4	2.8	6.0	0	10
Facial pain/pressure	52	57.8	2.2	2.5	1.5	0	9
Reduction or loss of smell	28	31.1	1.0	1.8	0.0	0	8
Headache	41	45.6	1.6	2.3	0.0	0	9
Fatigue	28	31.1	1.1	1.9	0.0	0	7
Cough	16	17.8	0.6	1.6	0.0	0	8
Halitosis	11	12.2	0.3	0.9	0.0	0	4
Ear pain/fullness	12	13.3	0.4	1.0	0.0	0	5
Disease as a whole	90	100.0	5.4	2.1	5.0	1	10

n – the number of patients with this symptom; % – the percentage of patients with this symptom; Mean – the mean value; SD – standard deviation; Med – median; Min – minimum; Max – maximum

RESULTS

Out of 90 patients with chronic rhinosinusitis, there were 51 men (56.7%) and 39 women (43.3%) – the ratio 1.31:1. The average age was 48 years (18 to 81).

The data on the frequency of certain symptoms in CRS patients (in absolute numbers and percentage), on their intensity (mean value, SD, median, minimum and maximum values) are given in Table 1.

Nasal congestion is the most frequent symptom, and it occurred in 82 patients (91.1%), followed by nasal discharge in 81 patients (90%), while there was not significant difference in the frequency of the two symptoms. Both symptoms were significantly more frequent than all other recorded symptoms, in all comparisons ($p < 0.001$). Facial pain/pressure was recorded in 52 patients (57.8%) and headache in 41 patients (45.6%). No statistically significant difference was found between the frequency of these two symptoms. Other symptoms were much less frequent in the patients involved in the study, Table 2.

Nasal discharge is the most intensive symptom ($\bar{x} = 5.4$) in our patients and it is significantly more intensive than

Table 2. Differences in the symptom frequency in patients with chronic rhinosinusitis

Sympt.	NC	ND	FPP	RLS	HE	FA	CE	HA	EPF
NC									
ND	ns								
FPP	< 0.001	< 0.001							
RLS	< 0.001	< 0.001	0.001						
HE	< 0.001	< 0.001	ns	0.026					
FA	< 0.001	< 0.001	< 0.001	ns	0.007				
CE	< 0.001	< 0.001	< 0.001	0.023	< 0.001	0.017			
HA	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	ns		
EPF	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.001	ns	ns	

Data presented as p values for McNemar test; ns – not significant p value; NC – nasal congestion; ND – nasal discharge; FPP – facial pain/pressure; RLS – reduction/loss of smell; HE – headache; FA – fatigue; CE – cephalea; HA – halitosis; EPF – ear pain/fullness

Table 3. Differences in the symptom intensity in patients with chronic rhinosinusitis

Sympt.	NC	ND	FPP	RLS	HE	FA	CE	HA	EPF	DW
NC										
ND	0.002									
FPP	< 0.001	< 0.001								
RLS	< 0.001	< 0.001	< 0.001							
HE	< 0.001	< 0.001	ns	0.014						
FA	< 0.001	< 0.001	< 0.001	ns	< 0.001					
CE	< 0.001	< 0.001	< 0.001	0.018	< 0.001	0.015				
HA	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.034			
EPF	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	ns	ns		
DW	< 0.001	ns	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	

Data presented as p-values for Wilcoxon test; ns – not significant p value; Sympt. – symptoms; NC – nasal congestion; ND – nasal discharge; FPP – facial pain/pressure; RLS – reduction/loss of smell; HE – headache; FA – fatigue; CE – cephalea; HA – halitosis; EPF – ear pain/fullness; DW – disease as a whole

nasal congestion ($\bar{x} = 4.1$) as the second following symptom ($Z = 3.077$, $p = 0.002$). Both of these symptoms are statistically significanlty more intensive comparing to all other symptoms in CRS patients, in all comparisons ($p < 0.001$). The average value of the intensity of the disease as a whole is the same as the average value of the most intensive symptom, which is nasal discharge ($\bar{x} = 5.4$). The average values of the intensity of all other symptoms, regardless of the their frequency are statistically significantly lower than the average values of the intensity of the disease as a whole (starting from $\bar{x} = 0.3$ for halitosis to $\bar{x} = 4.1$ for nasal congestion), for all comparisons $p < 0.001$, Table 3.

Regardless of its higher or lesser frequency in CRS patients, as well as its higher or lesser intensity, all of the examined symptoms have a statistically significantly positive correlation with the disorder assessment as a whole, in all correlations $p < 0.001$.

DISCUSSION

Chronic rhinosinusitis is an ailment that occurs in numerous clinical forms, from a relatively harmless condition to the risk of extra and intracranial complications which can put the patients' lives at risk (in case of acute exacerbation of the inflammation). First general practitioners and pediatricians treat the patients, and when the disorder is diagnosed on the basis of the symptoms, otorhinolaryngologists, pulmonologists and allergologists take over. However, in case of complications ophtalmologists, neuro surgeons and intensive care unit doctors treat the condition [10].

Considering that there are many predisposing factors that can lead to CRS and influence its course, and that there are many physicians that use diverse diagnostic procedures, it is difficult to give a precise estimation of the prevalence of this disorder. However, it is estimated that the incidence of CRS is 15.5% of the whole USA population, and this disorder takes the second place among all chronic disorders [11]. In European countries its prevalence is between 5 and 15% [12], while in Canada, it is around 5% [13]. In this study, there were more male patients, and the ratio between men and women was 1.31 : 1. In the examined literature, we found diverse data where gender prevails when it comes to this disorder. We and other authors have found similar data on the prevalence in male patients [14, 15, 16]. On the other hand, the results of some studies state a significanlty higher number of women among the CRS patients [11, 13]. The average age of our examinees was 48, our patients being a little older than the patients of other studies [15, 16, 17].

Besides nasal endoscopy and CT of the nose and paranasal sinuses, a subjective assessment of the symptoms which are characteristic of CRS by using the VAS scale is still the main part of the procedure that is used, especially in the primary care. Although, a little less precise in relation to the implentation of the tests on the quality of life, the implementation of the VAS scale is widespread, for in everyday routine work it is less time-consuming, and, at the same time, it provides good data on the implemented therapies success of these patients [18]. However, the assessment of the severity of CRS on the basis of the subjective assessment of the symptoms has certain limitations. This assessment sometimes depends on the gender, age, social and economic status, ethnicity with certain cultural specifications, presence of co-morbidities and other [19, 20]. Also, patients often cannot clearly distinguish one symptom from another, so an unprecise assessment of the symptom intensity may occur (nasal congestion, facial pain/pressure and headache often overlap) [21].

Most symptoms in CRS patients are the consequence of remodelling in the nasal and paranasal sinus region. Although, the term remodelling is more frequently used and better-studied in the lower respiratory tract, it is undoubtedly present in the upper respiratory region. In the course of this process in CRS patients, metaplasia and dysplasia of epithelial cells occurs, as well as thickening of the basal membrane, hyperplasia of the gland cells, oedema of sub-ephitelial structures, multiplication of the inlammed cells and finally fibrosis [22, 23].

Nasal congestion is the most common symptom found in our patients suffering from CRS and it occurred in 91.1% of the cases. A similar presence of the symptom was found by other autors ranging from 83.7% [24], 84% [25], 85.1% [17], 92% [26], 95% [27] up to 100% [16]. Kamami et al. [28] state that nasal obstruction is the most frequent symptom making the patients see ENT doctors. In our study, nasal discharge was found in 90% patients and we found no stastistically significant difference in its frequency in relation to nasal congestion. Other authors, came to similar results on nasal discharge in CRS patients [25, 26, 27].

Amodu et al. [16], concluded that this symptom was present in all CRS patients while Hastan et al. [24], on the contrary, found this symptom in fewer CRS patients, 63%, and Pokharel et al. [17] in mere 52.9%. Nasal discharge can be anterior or posterior, greater or lesser, ranging from transparent to very thick and difficult to eliminate. Facial pain/pressure is a symptom that patients and most doctors quite frequently link it to rhinosinusitis, although, West and Jones's study [29] showed that only one in eight patients whose facial pain/pressure was primarily diagnosed as CRS, actually suffer from this disorder. Also, 80% of the patients who were endoscopically diagnosed with pustular nasal discharge, did not have facial pain/pressure, and the ones who had this symptom, they basically had it in the acute exacerbation of the disorder [30]. This can be explained as a reason why frequency of this symptom is stated in a wide ratio, from 13.3% [16], 18% [29], 64.7% [24], 77.9% [25] to 92% [27]. Facial pain/pressure was found in 57.8% patients in our study. Reduction or loss of smell in CRS patients is a consequence of mucosa membrane swelling (conductive loss), or of degenerative origin in olfactive ephitel as a consequence of a disease, or repetitive surgical procedures in this region. This symptom is differently widespread according to different authors depending if the examined patients had nasal polyposis or not, and it ranged from 8% [17], 20% [16], 48.5% [24] to 84% [27]. The results of our study show that the reduction or loss of smell was present in 31.1% CRS patients. Most of the patients and doctors link every headache to sinusal problems, but, basically, most headaches are of neurological nature. Symmetric frontal, temporal headaches with occipital component most frequently belong to tension headaches, and sometimes one-sided headaches which can be very intense are mostly vascular [1]. This unprecise differential diagnosis of headaches is the reason studies state a wide range of the frequency of this symptom. While Amodu et al. [16], found headaches in 10% CRS patients, Pokharel et al. [17], found it in 80.5%, and Soler et al. [27] found it in 83% of these patients. In this paper headaches are recorded in 45.6% CRS patients, and it takes the fourth place of all symptoms that occurred in our patients. Other "minor" symptoms in our patients were much less frequent, which is in accordance with other authors' findings [16, 17]. On the other hand, Soler et al. [27] found that fatigue is present in 92%, and toothache in 67% in CRS patients.

The most intensive symptom that occurred in our patients was nasal discharge with the mean value of 5.36 and it is statistically significanlty more intensive than nasal congestion whose mean value is 4.10 which was the second symptom according to its intensity. Nasal obstruction followed by nasal discharge disturbs sleep to a great extent as well as daily rest leading the patients to the state of fatigue and making them less efficient at work and school. Nasal congestion and nasal discharge in our study belong to moderate symptoms according to the European Position Paper on Rhinosinusitis and Nasal Polyps criteria (moderate > 3–7) [1], while nasal discharge with more than 5 mean value does influence the quality of life of the patients [18]. Considering that the average value of the disease intensity as a whole is 5.44, and that there is no statistically significant difference in comparison to nasal discharge as the most intensive symptom, it can be concluded that the patients associate this symptom as the disease itself. All other examined symptoms with the mean values less than 3 belong to mild symptoms and they are of statistically weaker intensity in regard to both nasal discharge and nasal obstruction. Our results are similar to the ones that were obtained by Amodu et al. [16], while they consider nasal obstruction a more intense symptom with the mean value of 6.2, and facial pain/pressure is a much less distinctive symptome with the mean value of 0.8 in regard to our mean values of 2.17. Soler et al. [27] found that facial pain/pressure with mean value of 5.45, smell abnormality 5.54, as well as minor symptoms as headaches 4.13, and fatigue 6.03 are much more intensive symptoms. These values could be explained by the fact that their study included patients with nasal/sinusal polyposis as well.

Regardless of the lesser or greater severity of the symptoms that were more or less frequent in our patiets, a statistically significant positive correlation was found between the severity of the disease as a whole and each of its symptoms.

CONCLUSION

On the basis of the results of this study, it can be concluded that nasal discharge and nasal congestion are the most frequent symptoms that occur in CRS patients without statistical significance of the frequency of these two symptoms. Nasal discharge is statistically significantly the most intensive symptom in CRS patients and its intensity defines the disorder as a whole. Regardless of their severity, all individual symptoms occurring in CRS patients significantly correlate with the assessment of the disorder as a whole.

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Заступљеност и израженост тегоба код болесника са хроничним риносинузитисом

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САЖЕТАК

Увод/Циљ Хронични риносинузитис (ХРС) једно је од најчешћих хроничних обољења које значајно утиче на квалитет живота оболелих.

Циљ овог рада је био да се испита које су најчешће и које су најинтензивније тегобе код болесника са ХРС, као и да утврдимо да ли постоји корелација између субјективне оцене тежине болести у целини и појединачних тегоба.

Методе Истраживањем је обухваћено 90 болесника са постављеном клиничком дијагнозом ХРС која је потврђена ендоскопијом носа и компјутеризованом томографијом носа и параназалних синуса. Код свих болесника су забележене присутне тегобе (осећај запушености носа, секреција из носа, осећај притиска/бола у лицу, ослабљен/изгубљен осећај мириса, главобоља, заморљивост, кашаљ, задах из уста и бол/запушеност у ушима), интензитет сваке присутне тегобе, као и обољења у целости. Болесници су интензитет тегоба оценили на визуелној аналогној скали бола.

Резултати Запушеност носа је најчешћа тегоба и јавља се код 82 (91,1%) болесника, а затим следи секреција из носа код 81 (90%) болесника, при чему није утврђена статистички значајна разлика у учесталости јављања између ове две тегобе. Секреција из носа је најинтензивнија тегоба (просечна вредност интензитета $\bar{x} = 5,4$) и значајно је израженија од следеће по интензитету тегобе, запушености носа ($\bar{x} = 4,1$, $p = 0,002$). Све остале тегобе су биле значајно ређе заступљене и слабијег интензитета. Средња вредност интензитета болести у целости је истоветна средњој вредности интензитета секреције из носа ($\bar{x} = 5,4$), док су средње вредности интензитета свих осталих тегоба статистички значајно ниже од средње вредности интензитета болести у целости, у свим овим поређењима ($p < 0,001$).

Закључак Запушеност носа и секреција из носа су најчешће тегобе које се јављају код болесника са ХРС. Секреција из носа је најинтензивнија тегоба код болесника са ХРС, а њен интензитет одређује и доживљај интензитета болести у целости.

Кључне речи: хронични риносинузитис; визуелна аналогна скала; опструкција носа; секреција из носа; бол/притисак у лицу; поремећаји мириса