

Anxiety and Depression in Chronic Rhinosinusitis

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ABSTRACT

Introduction: Chronic rhinosinusitis (CRS) is a complex disease that affects not only the nose and sinuses but also has broad effects throughout the body. It is associated with a decreased quality of life, affecting the physical and emotional aspects of daily function, the latter of which could manifest as depression and anxiety. Studies reported depression in 9–25% of CRS patients. Given the negative impact of depression and anxiety on the clinical outcomes of CRS, better screening for undiagnosed depression and anxiety, and improved understanding of the complex interplay between CRS-associated depression and anxiety are needed.

Aim: To find the association of anxiety and depression in chronic rhinosinusitis.

Materials and methods: We assessed 36 CRS patients while comparing them with an equal number of chronic otitis media patients using BAI and BDI-II scores.

Results: The CRS group showed high BAI and BDI-II scores as compared with the control group, but only BDI-II was found statistically significant. Twenty-five percent of CRS cases were suffering with anxiety as compared to 11.1% of control groups. Similarly, 11.1% of CRS had depression as compared with 5.6%.

Conclusion: This is the first Indian study that evaluated mental health problems in CRS patients and found higher BAI and BDI-II scores. These observations require further validation through a large sample study.

Keywords: Anxiety, Chronic rhinosinusitis, Depression, Mental health.

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INTRODUCTION

Chronic rhinosinusitis (CRS) is characterized by inflammation of the mucosa of the nose and the paranasal sinuses for more than 12 weeks. Current consensus differentiates subclassified CRS into two subgroups, namely CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRS *sine* NP, CRSsNP). It is one of the most common chronic diseases, affecting about 4–16% of the population.^{1–5} Chronic rhinosinusitis has significant socioeconomic implications in terms of direct and indirect costs to patients and society.

Chronic rhinosinusitis affects mainly the nose and sinuses but it does affect the body in whole. It causes a significant effect on the physical and emotional well-being of the individual and thus could manifest as depression and anxiety. Studies reported depression in 9–25% of CRS patients.^{6–9} On the other hand, anxiety and depression can influence disease progression and treatment of CRS through the hypothalamic–pituitary–adrenal axis, causing cytokine response leading to chronic proinflammatory state.² On this background, it is prudent to state that undiagnosed anxiety and depression need to be evaluated thoroughly to understand the CRS-associated depression and anxiety.^{9–13} Therefore, we conducted this study to find the prevalence of anxiety and depression in CRS and compared it with non-CRS patients. We further tried to investigate whether there was any difference with respect to the nasal polyposis.

MATERIALS AND METHODS

The study was designed as a cross-sectional study in adult CRS patients (18–60 years). All the CRS patients enrolled in the study fulfilled the diagnostic criteria according to the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS2012), with confirmation of disease with nasal endoscopy or computed

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tomography. Patients with cognitive mental disorders (dementia, delirium, or amnesia) who received oral corticosteroids within the preceding 2 weeks, and who had undergone surgery within 6 months were excluded from the study. The control group consisted of patients with similar chronic disease (chronic otitis media in this group) so as to avoid omitted variable bias. The case group consisted of 36 CRS patients with mean age of 35.97 ± 11.25 years, out of which 20 had nasal polyposis (CRSwNP). The control group also had 36 CSOM patients with a mean age of 36.06 ± 12.07 years. Both the groups had equal numbers of male and female subjects.

The patients in both the groups were enrolled after taking an informed written consent. Demographic information was collected from all subjects along with relevant history, clinical examination points, and investigations. Then the patients in both the groups were handed over the Beck Anxiety Inventory (BAI) and Beck Depression Inventory-II (BDI-II) questionnaires in Hindi and English.

Table 1: Beck Anxiety Inventory scores comparison in chronic rhinosinusitis and chronic otitis media subjects

	<i>Chronic rhinosinusitis group</i> (total subjects = 36)	<i>Chronic otitis media group</i> (total subjects = 36)
Total BAI score	6.50 ± 8.87	2.75 ± 3.56
Number and percent with mean BAI score of subjects with anxiety	7 (25%), 19.77 ± 7.98	4 (11.1%), 11 ± 2.3
Total BDI-II score*	5.86 ± 5.38	3.69 ± 8.35
Number/percent with mean BDI-II score of subjects with depression	4 (11.1%), 16.75 ± 2.87	2 (5.6%), 35 ± 00

**p* < 0.05

BDI-II Questionnaire

It is a 21-item, self-reporting questionnaire that quantifies depressive symptoms over past 2 weeks. BDI-II items are rated on a 4-point scale ranging from 0 to 3 based on the severity of each item. The maximum total score is 63. Scores are generally classified as 0–13 (minimal or no depression), 14–19 (mild depression), 20–28 (moderate depression), and 29–63 (severe depression). A score of >14 was taken as significant depression in our study.

BAI Questionnaire

It is a 21-item self-reporting questionnaire for evaluating the severity of anxiety. Each answer is scored on a scale of 0–3. The maximum total score is 63. A total score of 0–7 is interpreted as “minimal or no anxiety”; 8–15 as “mild” level of anxiety; 16–25 as “Moderate”; and 26–63 as “Severe”. A score of >8 was taken as significant anxiety in our study.

RESULTS

This cross-section study had equal number of age-matched subjects of either sex. There was no statistically significant difference in the educational and economical status of both the groups. The mean LM score was 20.75, while mean endoscopy score was 5.86. The rhinosinusitis group had more subjects with anxiety and depression than the control group. The mean BAI and BDI-II scores in the CRS group were higher than the control group, but only BDI-II showed a statistically significant difference. We also found that the BDI-II scores were positively correlated with the endoscopy scores. The intragroup analysis found that the number of patients with anxiety and depressions and mean BDI-II scores was higher in CRS without polyps cases as compared with CRS with polyps, however, none of these showed statistical significance (Tables 1 and 2).

DISCUSSION

Chronic rhinosinusitis is the most common chronic condition characterized by mucosal inflammation of the nose and paranasal sinuses for more than 3 months. It is a complex disease with varied clinical features although generally classified into two categories: CRSsNP and CRSwNP. Chronic rhinosinusitis without nasal polyp is characterized by a predominant helper T1 inflammatory response, while CRSwNP has TH2 inflammation and increased eosinophil infiltration.^{14–16}

Table 2: Intragroup comparison showing Beck Anxiety Inventory (BAI) and Beck Depression Inventory-II (BDI-II) scores in chronic rhinosinusitis with (CRSsNP) and without polyps (CRSwNP)

	<i>CRSsNP</i> (total subjects = 16)	<i>CRSwNP</i> (total subjects = 20)
Mean BAI score	8.81 ± 9.97	4.65 ± 7.64
Number, percent and mean BAI score of subjects with anxiety	37.5% (19.33 ± 8.6)	15% (20.6 ± 8.14)
Mean BDI-II score	6.69 ± 6.37	5.20 ± 4.50
Number, percent, and mean BDI-II score of subjects with depression	18.7% (17.3 ± 3.21)	5% (15 ± 00)

Chronic rhinosinusitis substantially affects mental health and health-related quality of life.^{8,9,17,18} However, the cause of anxiety and depression in CRS is still unclear. It could be nasal obstruction associated with CRS resulting in hypoxia, which causes cerebral hypoperfusion, endothelial dysfunction, and neuroinflammation, and hence gray- and white matter damage and integrity abnormalities. This vicious cycle of neural inflammation further leads to altered synaptic plasticity, neuronal damage, and cerebral vessel damage.¹⁹ However, this hypothesis is also debatable as Adams et al.¹¹ did not find significant improvement in anxiety and depression in CRS patients after endoscopic sinus surgery, despite improvement in nasal patency.

A number of studies^{9–13} have advocated screening of CRS patients for the associated mental health diseases as they impact the treatment outcome, but it is unlikely to be found in clinical practice of an ENT specialist. Gill et al.¹⁰ conducted a question-based survey of 1206 members of the American Rhinologic Society to know the practice patterns in screening and diagnosis of comorbid major depressive disorder among CRS patients. They received replies from 80 members out of which 95% believed that depression impacts the surgical outcome, while 76% of total respondents neither screen nor feel comfortable to diagnose comorbid depression.

A recent large sample cohort study consisting of 14,762 patients of CRS and 29,524 patients without CRS by Kim et al.⁹ in Korea found an increased incidence of anxiety, depression, asthma, acute myocardial infarction, and stroke in chronic rhinosinusitis. Similarly, another Korean study found the association of anxiety and depression in chronic rhinosinusitis cases, which were more in cases with nasal polyposis.⁸ Similar studies in other countries have also found an increased incidence of anxiety and depression in chronic rhinosinusitis patients.^{18,20–23}

We did a literature search (PubMed, Google Scholar) to find mental health problems in CRS patients in India, but we did not find any such study, making it the first Indian study.

We observed a higher number of subjects with anxiety and depression in the CRS group (25% and 11%, respectively) as compared with the control group (11% and 5.6%). However, the difference seen was not statistically significant with a *p*-value of 0.08 and 0.10, respectively. These values suggest a positive trend toward significance (*p* < 0.05), which could have been achieved with a large sample size. The BDI-II showed statistically significant differences in the study and were positively correlated with the LM scores. The intragroup analysis found a higher number of CRSsNP subjects with anxiety and depression (37.5% and 18.7%,

respectively) as compared with the CRSwNP group (15% and 5%, respectively). Our observations are consistent with Schlosser et al.,²⁴ who studied 42 CRS subjects and 88 non-CRS subjects as controls. They found statistically significant BDI-detected depression in CRS patients as compared with controls. There was significantly more depression in CRSsNP than CRSwNP. They also found highly significant BDI somatic subscale scores in CRS. Erskine et al.²² also reported in their cross-sectional study that emotional well-being was worse in patients with CRSsNP than in those with CRSwNP. Kim et al.⁸ found that individuals with CRSsNP have more tendency for anxiety and depression than CRSwNP. Therefore, the variability in the severity of cardinal symptoms between the polyp groups could result in variability in somatic symptoms and overall BAI and BDI scores. Vogt et al.²⁵ performed a study on 23 subjects to find the effect of omalizumab on improvement in anxiety and depression along with CRS and asthma improvement. They found improvement in anxiety score in subjects rather than depression score. They concluded that a separate mental health care pathway is required for depression in CRS with asthma.

This pilot study done in Indian patients had few limitations. First, addition of other anxiety and depression assessment scales like Hospital Anxiety and Depression Score, Patient Health Questionnaire-9, and Rhinosinusitis Disability Index could have increased the detection in the study. Second, subjects diagnosed with anxiety and depression based on BAI and BDI-II questionnaires should have been evaluated further by a psychiatrist to validate the diagnosis. Third, wide spread COVID-19 lockdown could also be the confounding factor for anxiety and depression. Therefore, further research with validated sample size and robust methodology would enable us to better understand the development of CRS-associated anxiety and depression in Indian population.

ETHICAL APPROVAL

The research was approved by the Institutional Ethical Committee, and all subjects gave consent for participation in the study.

REFERENCES

- Passali D, Passali GC, Piemonte M, et al. The management of chronic rhinosinusitis in clinical practice: An international survey. *J Biol Regul Homeost Agents* 2021;35(1 Suppl 2):45–50. DOI: 10.23812/21-1suppl2-9.
- Passali D, Cingi C, Cambi J, et al. A survey on chronic rhinosinusitis: Opinions from experts of 50 countries. *Eur Arch Otorhinolaryngol* 2016;273(8):2097–2109. DOI: 10.1007/s00405-015-3880-6.
- Sundaresan AS, Hirsch AG, Young AJ, et al. Longitudinal evaluation of chronic rhinosinusitis symptoms in a population-based sample. *J Allergy Clin Immunol Pract* 2018;6(4):1327–1335.e3. DOI: 10.1016/j.jaip.2017.10.012.
- Hirsch AG, Stewart WF, Sundaresan AS, et al. Nasal and sinus symptoms and chronic rhinosinusitis in a population-based sample. *Allergy* 2017;72(2):274–281. DOI: 10.1111/all.13042.
- Hastan D, Fokkens WJ, Bachert C, et al. Chronic rhinosinusitis in Europe – An underestimated disease. A GALEN study. *Allergy* 2011;66(9):1216–1223. DOI: 10.1111/j.1398-9995.2011.02646.x.
- Smith KA, Alt JA. The relationship of chronic rhinosinusitis and depression. *Curr Opin Otolaryngol Head Neck Surg* 2020;28(1):1–5. DOI: 10.1097/MOO.0000000000000595.
- Vandelaar LJ, Jiang ZY, Saini A, et al. PHQ-9 and SNOT-22: Elucidating the prevalence of depression in chronic rhinosinusitis. *Otolaryngol Head Neck Surg* 2020;162(1):142–147. DOI: 10.1177/0194599819886852.
- Kim J, Ko I, Kim MS, et al. Association of Chronic Rhinosinusitis With Depression and Anxiety in a Nationwide Insurance Population. *JAMA Otolaryngol Head Neck Surg* 2019;145(4):313–319. DOI: 10.1001/jamaoto.2018.4103.
- Kim JY, Ko I, Kim MS, et al. Relationship of chronic rhinosinusitis with asthma, myocardial infarction, stroke, anxiety, and depression. *J Allergy Clin Immunol Pract* 2020;8(2):721–727.e3. DOI: 10.1016/j.jaip.2019.09.001.
- Gill AS, Levy JM, Wilson M, et al. Diagnosis and management of depression in CRS: A knowledge, attitudes and practices survey. *Int Arch Otorhinolaryngol* 2021;25(1):e48–e53. DOI: 10.1055/s-0040-1701268.
- Adams KN, Schuman TA, Ebert CS, et al. Self-reported anxiety and depression unchanged after endoscopic sinus surgery for chronic rhinosinusitis. *Rhinology* 2018;56(3):234–240. DOI: 10.4193/Rhin17.238.
- Kazi A, West E, Rahman S, et al. Pain catastrophizing and quality of life in adults with chronic rhinosinusitis. *Laryngoscope* 2021;131(9):1939–1945. DOI: 10.1002/lary.29405.
- Wasan A, Fernandez E, Jamison RN, et al. Association of anxiety and depression with reported disease severity in patients undergoing evaluation for chronic rhinosinusitis. *Ann Otol Rhinol Laryngol* 2007;116(7):491–497. DOI: 10.1177/000348940711600703.
- Van Zele T, Claeys S, Gevaert P, et al. Differentiation of chronic sinus diseases by measurement of inflammatory mediators. *Allergy* 2006;61(11):1280–1289. DOI: 10.1111/j.1398-9995.2006.01225.x.
- Polzehl D, Moeller P, Riechelmann H, et al. Distinct features of chronic rhinosinusitis with and without nasal polyps. *Allergy* 2006;61(11):1275–1279. DOI: 10.1111/j.1398-9995.2006.01132.x.
- Van Bruaene N, Pérez-Novo CA, Basinski TM, et al. T-cell regulation in chronic paranasal sinus disease. *J Allergy Clin Immunol* 2008;121(6):1435–1441.e1–1441.e3. DOI: 10.1016/j.jaci.2008.02.018.
- Nanayakkara JP, Igwe C, Roberts D, et al. The impact of mental health on chronic rhinosinusitis symptom scores. *Eur Arch Otorhinolaryngol* 2013;270(4):1361–1364. DOI: 10.1007/s00405-012-2230-1.
- Tomoum MO, Klattcromwell C, DelSignore A, et al. Depression and anxiety in chronic rhinosinusitis. *Int Forum Allergy Rhinol* 2015;5(8):674–681. DOI: 10.1002/alr.21528.
- Kerner NA, Roose SP. Obstructive sleep apnea is linked to depression and cognitive impairment: Evidence and potential mechanisms. *Am J Geriatr Psychiatry* 2016;24(6):496–508.
- Ranford D, Tornari C, Takhar A, et al. Co-morbid anxiety and depression impacts on the correlation between symptom and radiological severity in patients with chronic rhinosinusitis. *Rhinology* 2020;58(6):568–573. DOI: 10.4193/Rhin20.075.
- Hanna BM, Crump RT, Liu G, et al. Incidence and burden of comorbid pain and depression in patients with chronic rhinosinusitis awaiting endoscopic sinus surgery in Canada. *J Otolaryngol Head Neck Surg* 2017;46(1):23. DOI: 10.1186/s40463-017-0205-3.
- Erskine SE, Hopkins C, Clark A, et al. Chronic rhinosinusitis and mood disturbance. *Rhinology* 2017;55(2):113–119. DOI: 10.4193/Rhin16.111.
- Kara N, Yao AC, Newton J, et al. General illness and psychological factors in patients with chronic nasal symptoms. *Clin Otolaryngol* 2018;43(2):609–616. DOI: 10.1111/coa.13032.
- Schlosser RJ, Storck K, Cortese BM, et al. Depression in chronic rhinosinusitis: A controlled cohort study. *Am J Rhinol Allergy* 2016;30(2):128–133. DOI: 10.2500/ajra.2016.30.4290.
- Vogt F, Sahota J, Bidder T, et al. Chronic rhinosinusitis with and without nasal polyps and asthma: Omalizumab improves residual anxiety but not depression. *Clin Transl Allergy* 2021;11(1):e12002. DOI: 10.1002/ctt2.12002.