

Evaluation of the Quality of Life of Patients Suffering from Chronic Rhinosinusitis in a Hospital Setting in Kinshasa

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Abstract

Background and objective: Chronic rhinosinusitis (CRS), a common disease worldwide, has a major impact on patients' quality of life (QoL). In recent years, the measurement of health-related QoL has made it possible to assess the patient's state of health, the severity of the CRS and the treatment. The aim of this study was to assess the QoL of patients with CRS in a hospital setting in Kinshasa. **Methods:** This was a cross-sectional analytical study conducted from June 2020 to May 2021 in the ENT service of the Kinshasa University Hospital and the Monkole Hospital Center. The study involved 113 patients aged at least 18 years, whose QoL was compared with that of a control group consisting of 100 non-patients. QoL was assessed using the Sino-Nasal Outcome Test (SNOT-22) Questionnaire. **Results:** The mean age of the patients was 41.0 years (18 - 74 years) and that of the controls was 39.1 years (19 - 77 years). More than half of the participants were university graduates. The median SNOT-22 score was 44 (14 - 78) in patients and 7 (1 - 40) in controls. Compared with subjects without CRS, patients with CRS had significantly higher scores in all four domains of the SNOT-22. Around 9 out of 10 patients had a severely impaired QoL compared with 2 out of 10 controls. Considering mildly impaired QoL, we found that in the otological and sleep domains, scores were not significantly different between patients and controls. In the case of severely impaired QoL, however, only the otological domain showed a non-significant difference in scores between the two groups. **Conclusion:** CRS is a real public health problem in our environment and significantly alters the QoL of patients suffering from it, with repercussions on their professional productivity; hence the need for better management.

Keywords

Chronic Rhinosinusitis, Quality of Life, SNOT-22, ENT, Kinshasa

1. Introduction

Chronic Rhinosinusitis (CRS) is an inflammatory disease of the naso-sinusal mucosa characterised by the persistence of at least two major symptoms such as nasal obstruction, anterior and/or posterior nasal discharge, facial pain and loss of smell for at least 12 weeks [1] [2] [3]. This common condition affects around 5% - 12% of the world's population [2] [4]. The prevalence of CRS varies from region to region, affecting 5.2% of the population in Canada [3] [5], 11.9% in the United States of America (USA) [6], 10.9% in Europe [7], 7% in South Korea [8], 8% in China [9] and 5.5% in Sao Paulo (Brazil) [10]. In Africa, there are very few studies on the prevalence of CRS, with an estimated rate of 25.3% in Egypt [11], 1.6% in north-west Nigeria [12] and 1.1% in Tanzania [13]. In the Democratic Republic of Congo (DRC), data on the prevalence of CRS in the general population are not available. However, a study carried out at the Kinshasa University Hospital revealed an estimated in-hospital incidence of Rhinosinusitis of 13.2% [14].

Moreover, CRS remains a disabling condition with a negative impact on patients' quality of life (QoL) and a heavy economic burden [3] [4] [15]. To date, a number of studies on QoL have assessed the patient's state of health, the severity of the disease, therapeutic methods and the socio-economic consequences of CRS [2] [16] [17]. The World Health Organisation (WHO) defines quality of life as "the individual's perception of his or her place in life, in the context of the culture and value system in which he or she lives, and in relation to his or her goals, expectations, norms and concerns" [18] [19]. The direct impact of CRS on QoL is currently measured by several instruments, including the Sino-Nasal Outcome Test 22 (SNOT-22), the Rhinosinusitis Disability Index (RSDI) and the Rhinosinusitis Quality of Life survey (RhinoQoL) [1] [2] [16] [20].

Numerous studies have shown that the deterioration in QoL is more significant in patients suffering from CRS, with a higher mean SNOT-22 score than in subjects without CRS [21] [22] [23] [24]. Indeed, Kosugi *et al.* in Brazil [25], Hopkins *et al.* in the United Kingdom [26] and Idugboe *et al.* in Nigeria [27] respectively revealed a mean SNOT-22 score of 62.4, 41.7 and 38.7. However, in the DRC, to our knowledge, there is no work on the QoL associated with CRS; hence the interest of our study aimed at evaluating the QoL of patients suffering from CRS in a hospital setting in Kinshasa.

2. Methodology

2.1. Patients

A cross-sectional analytical study was conducted in Kinshasa in the ENT servic-

es of two medical institutions, namely the Kinshasa University Hospital and the Monkole Hospital Center, over a period from June 2020 to May 2021. These two hospitals were chosen for the study because their ENT services are well used in Kinshasa.

Based on a sample of convenience, our sample consisted of all patients suffering from CRS with or without nasal polyposis who attended the above-mentioned services during the study period. Patients at least 18 years of age with CRS diagnosed according to the clinical criteria of the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) [1] [2] [4] were included in this study. Patients had to present two or more major symptoms for at least 12 weeks, including nasal obstruction, anterior and/or posterior rhinorrhoea (seromucous or purulent), facial pain and loss of smell. In addition, signs of inflammation of the nasal mucosa had to be demonstrated by anterior rhinoscopy or nasal endoscopy and/or CT scan. All patients gave written or verbal consent.

Patients suffering from CRS associated with a tumour, granulomatous disease, uncontrolled cardiovascular or endocrine pathology and pregnancy were excluded from our study.

The control group consisted of subjects who accompanied patients to consultations, were at least 18 years old, had no ENT pathology and had given their informed consent.

Our study was registered by the Ethics Committee of the School of Public Health of the University of Kinshasa under number ESP/CE/192/2020.

2.2. Measuring Quality of Life

The QoL of patients and healthy subjects was assessed using the SNOT-22 questionnaire. It comprises a total of 22 items rated from 0 (no problem) to 5 (very severe problem). They represent health problems that have occurred in the last two weeks and are grouped into four domains [16] [28] [29]. These are the rhinological domain, comprising 8 items corresponding to the main rhinosinus symptoms (need to blow the nose, sneezing, anterior rhinorrhoea, coughing, posterior rhinorrhoea, thick nasal discharge, disturbance of smell and/or taste and nasal obstruction), the otological and facial domain, comprising 4 items corresponding to the complementary rhinosinus symptoms (sensation of blocked ears, dizziness, pressure in the ear and facial pain), the sleep domain, comprising 4 items corresponding to signs of repercussions on sleep (difficulty falling asleep, waking up in the middle of the night, poor quality of sleep and tiredness on waking) and the psychological domain, comprising 6 items corresponding to repercussions on the psychological aspect (tiredness during the day, reduced productivity, reduced concentration, frustration or agitation, reduced morale or sadness and discomfort).

The summation of item scores gives a score for each domain as well as a total or maximum score for the questionnaire ranging from 0 to 110.

The SNOT-22 questionnaire also enabled us to classify participants according to the degree of impairment of their QoL. Thus, QoL was slightly impaired if

SNOT-22 score < 20 and severely impaired if SNOT-22 score \geq 20 [30].

2.3. Data Analysis

The data were analysed in SPSS version 26.0. Qualitative variables were summarised as frequency and percentage, while quantitative variables were summarised as median, mean and standard deviation. The information was presented in the form of tables and graphs. Student's t-test and Mann-Whitney U-test were used to compare means and medians respectively. The relationship between two categorical variables was assessed using the Chi-square test. The significance level was $p < 0.05$.

3. Results

3.1. Socio-Demographic and Clinical Characteristics of Participants

We included 113 patients with CRS and 100 healthy subjects or controls in the control group. The socio-demographic characteristics and comorbidities of the participants are shown in **Table 1**. The mean age was 41.0 ± 14.7 years in the patients and 39.1 ± 12.6 years in the controls. More than half of the participants were university graduates. Among comorbidities, arterial hypertension and controlled diabetes mellitus were more common in patients than in controls.

Table 1. Socio-demographic characteristics and co-morbidities of participants.

Variable	CRS	Control group	p-value
	n = 113	n = 100	
Average age (ans)	41.0 \pm 14.7	39.1 \pm 12.6	0.325
Gender (%)			
Male	51 (45.1)	41 (41.0)	0.543
Female	62 (54.9)	59 (59.0)	
Occupation (%)			
Employees	62 (54.9)	50 (50.0)	0.243
Self-employed	26 (23.0)	33 (33.0)	
Students/Pupils	25 (22.1)	17 (17.0)	
Level of education (%)			
Non-university	49 (43.4)	38 (38.0)	0.427
University	64 (56.6)	62 (62.0)	
Allergy (%)	24 (21.2)	16 (16.0)	0.329
Asthma (%)	12 (10.6)	12 (12.0)	0.750
Controlled diabetes mellitus (%)	12 (10.6)	2 (2.0)	0.011
Controlled hypertension (%)	20 (17.7)	6 (6.0)	0.009

3.2. Assessment of Quality of Life

Compare the total SNOT-22 scores between the patient and control groups, **Figure 1** shows that the distribution of scores in the patient group was symmetrical with a median SNOT-22 score of 44 and extremes of 14 and 78. In the control group, the distribution was asymmetrical, with a median SNOT-22 score of 7 and extremes of 1 and 40. The difference in scores between the two groups was statistically more significant ($p < 0.001$).

In addition, patients with CRS had significantly higher scores in all four SNOT-22 symptom domains compared with controls; especially in the rhinological domain (**Figure 2**).

Considering the degree of impairment, **Table 2** shows that QoL was severely impaired in almost all patients with CRS compared with subjects without CRS (20.0%). This difference was statistically more significant.

Table 3 shows that patients with CRS had a statistically significant higher score than controls in the rhinological and psychological domains, regardless of the degree of QoL impairment. However, the otological and facial domains showed a non-significant difference between the two groups with slightly impaired ($p = 0.129$) or severely impaired ($p = 0.090$) QoL. Furthermore, the difference in sleep scores between the two groups was not significant in the case of mildly impaired QoL ($p = 0.093$).

Table 2. Degree of impairment of participants' quality of life.

Quality of life	CRS	Control group	p-value
	n = 113	n = 100	
Slightly impaired	5 (4.4)	80 (80.0)	<0.001
Severely impaired	108 (95.6)	20 (20.0)	

Table 3. SNOT-22 symptom domains according to degree of QoL impairment.

SNOT-22	Slightly impaired QoL			Severely impaired QoL		
	CRS	Controls	p-value	CRS	Controls	p-value
Total score	16.6 ± 2.4	6.7 ± 4.9	<0.001	45.3 ± 13.1	26.3 ± 5.8	<0.001
Rhinological domain	7.6 ± 2.5	3.1 ± 3.4	0.012	19.6 ± 5.2	11.3 ± 3.3	<0.001
Otological and facial domain	2.4 ± 1.3	1.3 ± 1.6	0.129	5.8 ± 3.1	4.4 ± 3.3	0.090
Sleep domain	2.4 ± 1.3	1.1 ± 1.4	0.093	7.6 ± 4.1	4.1 ± 2.7	<0.001
Psychological domain	4.2 ± 1.6	1.3 ± 2.1	0.015	12.2 ± 4.8	6.5 ± 3.5	<0.001

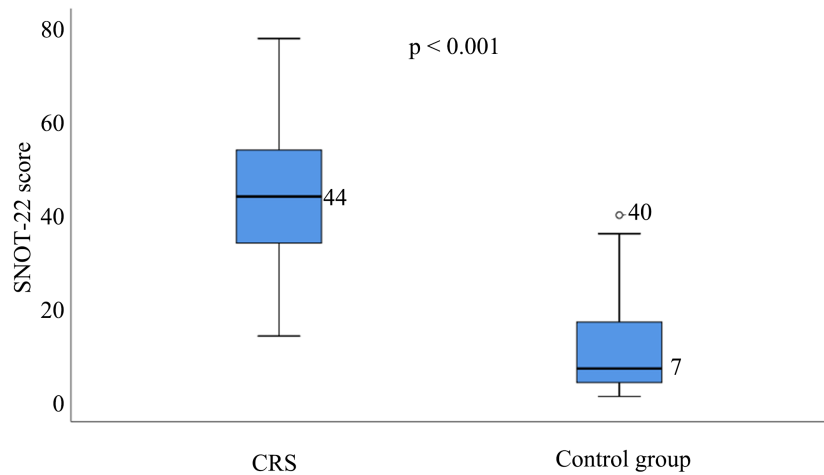


Figure 1. Changes in quality of life as a function of SNOT-22 total scores.

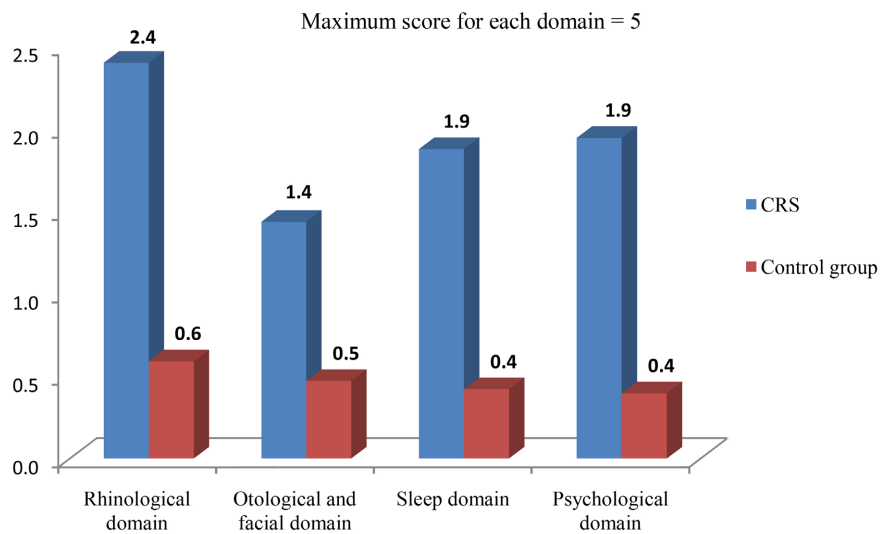


Figure 2. Average scores for SNOT-22 symptom domains.

4. Discussion

In our study, the mean age of our patients was 41.0 ± 14.7 years. This result is similar to those found by Marambaia *et al.* in 2013 in Brazil (40.7 ± 13.5 years) [22] and Njifou *et al.* in 2018 in Cameroon (37.1 ± 17.2 years) [31]. Younger adults were more affected than older subjects. More than half of the CRS patients and controls were university graduates, which shows that our patients had an acceptable intellectual level to understand the QoL questionnaire and answer it correctly.

We found that the median SNOT-22 score of patients with CRS (score = 44) was significantly higher than that of subjects without CRS (score = 7). This difference between the two groups was statistically more significant, confirming the negative impact of CRS on the QoL of these patients. Indeed, the median score of our patients was superposable to the mean scores observed by Bewick *et al.* [32] in 2018 (43.8 ± 22.4), and Philpott *et al.* [33] in 2016 (45.0 ± 21.4) in the

UK. However, it was well above the mean scores found by Lange *et al.* [21] in Denmark in 2013 (28.1), Hoehle *et al.* [34] in the USA in 2016 (36.2 ± 23.1), and Nyaiteera *et al.* [24] in Uganda in 2018 (31.4). This disparity in results is thought to be linked to the culture and lifestyle of each population, as well as to differences in methodology.

The median score of the control group was in line with those found in several studies assessing QoL in adult subjects with or without CRS [22] [35] [36] [37]. Among others, we cite the work published by Lange *et al.* in Denmark in 2016 [35], Yeolekar *et al.* in India in 2013 [36], Gillett *et al.* in the United Kingdom in 2009 [37], who each found a median score of 7, and Marambaia *et al.* in Brazil in 2013 [22], who reported a score of 8. This observation proves that the SNOT-22 questionnaire is also suitable for use in our setting as an instrument for assessing quality of life in our patients, despite the differences linked to socio-cultural characteristics. The score of 7 can therefore be considered as an indicator of good QoL in our population, and can thus be used to evaluate the management of the disease.

In assessing the SNOT-22 symptom domains, we found that patients with CRS were significantly affected in all four symptom domains (rhinological, otological, sleep and psychological) compared with controls. Moreover, the rhinological domain had a higher score than the other three domains because of nasal obstruction, rhinorrhoea and the need to blow the nose, which had an impact on the psychological and sleep domains. These results are in line with those of Lange *et al.* in Denmark in 2013 [21], Nyaiteera *et al.* in Uganda in 2018 [24], and Idugboe *et al.* in Nigeria in 2019 [27]. The literature also informs us that rhinological symptoms constitute the major problem for patients with CRS, as they are the direct expression of inflammation of the naso-sinusal mucosa and are responsible for alterations in other aspects of QoL [1] [2] [3] [4].

Our study reveals that almost all our patients had a severely impaired QoL, unlike the controls, in whom QoL was severely impaired in only 20% of cases. However, it should be noted that the deterioration in QoL observed in the controls in our study could be due to factors such as a naso-sinus inflammatory state that is clinically neglected, certain comorbidities that are ignored, the subject's psychological state giving less interest to the questioning, as well as poor comprehension of the questionnaire for some.

By comparing the scores of the domains of the SNOT-22 as a function of impairment of QoL, we found that CRS patients had a significantly higher score than controls in the rhinological domain and the psychological domain, whether the QoL was slightly impaired or severely impaired. On the other hand, the scores observed in the otological and facial domains, although high in the patients, did not show a statistically significant difference in the two categories of QoL impairment. This observation would thus indicate a weak influence of the otological domain in the variation of the SNOT-22 score in patients suffering from CRS in our setting. However, Levy *et al.* unexpectedly found significantly better scores in the psychological and sleep domains in patients with CRS with

low SNOT-22 scores compared with subjects without CRS [30].

5. Strengths and Limitations of the Study

The results thus obtained could make our study a reference for future research on the evaluation of QoL, the treatment of CRS, and the economic burden in our environment. However, a number of limitations should be noted, in particular the small sample size, which only included patients seen in hospital setting, with the risk of selection bias. In addition, the measurement of quality of life depends on the subjective responses of the participant, which could expose the study to certain biases such as social desirability or simulation bias.

6. Conclusion

CRS significantly affected the QoL of our patients in all four domains of the SNOT-22, the instrument used in our study. Patients with CRS generally had poorer SNOT-22 scores than subjects without CRS. Almost all patients had a severely impaired QoL, with significant impairment in the rhinological and psychological domains. This indicates the need for better management of the disease in our setting.

Authors' Contributions

All the authors contributed to this article from conception to submission. Hilaire Kalala Kabala: designed the study, conducted it and wrote it up. Patricia Kakobo Kitombole: contributed to the design of the study protocol and revised the manuscript. Honoré N. Yalombe: collected the study data. Lievin Mvita Kayipu: collected and interpreted the CT data. Léon Mwamba Nkashama: analysed the statistical data and revised the manuscript. Dieudonné Nyembue Tshipukane: designed the study, analysed the statistical data and revised the manuscript.

Statement on Data Availability

The raw data for this study are available and made available to the authors without reservation.

Conflicts of Interest

No conflicts of interest are reported for this study.

References

- [1] Fokkens, W., Lund, V., Mullol, J., Bachert, C., *et al.* (2012) European Position Paper on Rhinosinusitis and Nasal Polyps 2012. *Rhinology Supplement*, **23**, 1-298.
- [2] Fokkens, W., Lund, V., Hopkins, C., Hellings, P.W., *et al.* (2020) European Position Paper on Rhinosinusitis and Nasal Polyps 2020. *Rhinology*, **29**, 1-464.
- [3] Desrosiers, M., Evans, G., Keith, P., Wright, D., *et al.* (2011) Les lignes directrices canadiennes sur la prise en charge de la rhinosinusite: Rhinosinusite chronique. *Journal d'oto-rhino-laryngologie et de chirurgie cervico-faciale*, **40**, 168-188.

- [4] Akdis, C., Hellings, P. and Agache, I. (2015) Global Atlas of Allergic Rhinitis and Chronic Rhinosinusitis: Chronic Rhinosinusitis. *European Academy of Allergy and Clinical Immunology*, 283-365.
- [5] DeConde, A.S. and Soler, Z.M. (2016) Chronic Rhinosinusitis: Epidemiology and Burden of Disease. *American Journal of Rhinology and Allergy*, **30**, 134-139. <https://doi.org/10.2500/ajra.2016.30.4297>
- [6] Hirsch, A., Stewart, W., Sundaresan, A., Young, A., et al. (2017) Nasal and Sinus Symptoms and Chronic Rhinosinusitis in a Population-Based Sample. *Allergy*, **72**, 274-281. <https://doi.org/10.1111/all.13042>
- [7] Hastan, D., Fokkens, W.J., Bachert, C., Newson, R.B., et al. (2011) Chronic Rhinosinusitis in Europe—An Underestimated Disease. A GA²LEN Study. *Allergy*, **66**, 1216-1223. <https://doi.org/10.1111/j.1398-9995.2011.02646.x>
- [8] Kim, Y., Kim, N., Seong, S., Kim, K.R., Lee, G. and Kim, K.S. (2011) Prevalence and Risk Factors of Chronic Rhinosinusitis in Korea. *American Journal of Rhinology and Allergy*, **25**, 117-121. <https://doi.org/10.2500/ajra.2011.25.3630>
- [9] Shi, J.B., Fu, Q.L., Zhang, H., Cheng, L., et al. (2015) Epidemiology of Chronic Rhinosinusitis: Results from a Cross-Sectional Survey in Seven Chinese Cities. *Allergy*, **70**, 533-539. <https://doi.org/10.1111/all.12577>
- [10] Pilan, R., Pinna, F., Bezerra, T.F., Mori, R.L., et al. (2012) Prevalence of Chronic Rhinosinusitis in Sao Paulo. *Rhinology*, **50**, 129-138. <https://doi.org/10.4193/Rhino11.256>
- [11] Homood, M.A., Alkhayrat, S.M., Kulaybi, K.M., Mohajer, A.A., et al. (2017) Prevalence and Risk Factors of Chronic Sinusitis among People in Jazan Region' KSA. *The Egyptian Journal of Hospital Medicine*, **69**, 2463-2468. <https://doi.org/10.12816/0041695>
- [12] Mainasara, M.G., Labaran, A.S., Kirfi, A.M., Fufore, M.B., et al. (2015) Clinical Profile and Management of Chronic Rhinosinusitis among Adults in North-Western Nigeria. *The American Journal of Innovative Research and Applied Sciences*, **1**, 133-136.
- [13] Abrahama, Z.S., Gabriel, R., Kahinga, A.A., Ntunaguzi, D., et al. (2019) Prevalence of Chronic Rhinosinusitis at Muhimbili National Hospital, Dar es Salaam. *South Sudan Medical Journal*, **12**, 97-100.
- [14] Sabwe, M., Lungungu, K. and Ndungi, M. (1999) Les sinusites: Evaluation de la fréquence et des moyens de prise en charge thérapeutique. *Congo Médical*, **2**, 869-874.
- [15] Campbell, A.P., Hoehle, L.P., Phillips, K.M., Caradonna, D.S., et al. (2018) Le contrôle des symptômes dans la rhinosinusite chronique est un facteur prédictif indépendant de la baisse de productivité. *Annales françaises d'oto-rhino-laryngologie et de pathologie cervico-faciale*, **135**, 230-234. <https://doi.org/10.1016/j.aforl.2018.04.002>
- [16] Schalek, P. (2011) Rhinosinusitis—Its Impact on Quality of Life. In: Marseglia, G.L. and Caimmi, D.P., Eds., *Peculiar Aspects of Rhinosinusitis*, IntechOpen, London, 112. <https://doi.org/10.5772/25349>
- [17] Pham, L.D., Vo, T.Q., Nguyen, H.B., Pham, A.T., et al. (2019) Assessment of Cost of Illness and Quality of Life in Chronic Rhinosinusitis Patients with Surgical Treatment. *Health Economics and Community-Oriented Practice in Vietnam*, **69**, 10-19.
- [18] Charafeddine, R. (2014) Qualité de vie liée à la santé. Enquête de santé 2013. Rapport 1: Santé et Bien-être. WIV-ISP, Bruxelles, 1019-1049.

- [19] Segrestan, C. (2005) Score de qualité de vie: Indicateurs. https://www.afidtn.com>909_template
- [20] Klonaris, D., Doulaptsi, M., Karatzanis, A., Velegarakis, S., et al. (2019) Assessing Quality of Life and Burden of Disease in Chronic Rhinosinusitis: A Review. *Rhinology Online*, **2**, 6-13. <https://doi.org/10.4193/RHINOL/18.067>
- [21] Lange, B., Holst, R., Thilsing, T., Baelum, J. and Kjeldsen, A. (2013) Quality of Life and Associated Factors in Persons with Chronic Rhinosinusitis in the General Population. *Clinical Otolaryngology*, **38**, 474-480. <https://doi.org/10.1111/coa.12189>
- [22] Marambaia, P., Lima, M., Santos, K., Gomes, A., et al. (2013) Evaluation of the Quality of Life of Patients with Chronic Rhinosinusitis by Means of the SNOT-22 Questionnaire. *Brazilian Journal of Otorhinolaryngology*, **79**, 54-58. <https://doi.org/10.5935/1808-8694.20130010>
- [23] Kim, D.H., Han, K. and Kim, S.W. (2016) Effect of Chronic Rhinosinusitis with or without Nasal Polyp on Quality of Life in South Korea: 5th Korea National Health and Nutrition Examination Survey Korean. *Clinical and Experimental Otorhinolaryngology*, **9**, 150-156. <https://doi.org/10.21053/ceo.2015.01053>
- [24] Nyateera, V., Nakku, D., Nakasagga, E., Llovet, E., et al. (2018) The Burden of Chronic Rhinosinusitis and Its Effect on Quality of Life among Patients Re-Attending an Otolaryngology Clinic in South Western Uganda. *BMC Ear, Nose and Throat Disorders*, **18**, Article No. 10. <https://doi.org/10.1186/s12901-018-0058-z>
- [25] Kosugi, E.M., Chen, V.G., Fonseca, V.M.G., Cursino, M.M.P., Mendes Neto, J.A. and Gregório, L.C. (2011) Translation, Cross-Cultural Adaptation and Validation of SinoNasal Outcome Test (SNOT): 22 to Brazilian Portuguese. *Brazilian Journal of Otorhinolaryngology*, **77**, 663-669. <https://doi.org/10.1590/S1808-86942011000500021>
- [26] Hopkins, C., Gillett, S., Slack, R., Lund, V.J. and Browne, J.P. (2009) Psychometric Validity of the 22-Item Sinonasal Outcome Test. *Clinical Otolaryngology*, **34**, 447-454. <https://doi.org/10.1111/j.1749-4486.2009.01995.x>
- [27] Idugboe, O.J., Adeyemo, A. and Totyen, L.E. (2019) The Correlation between SNOT-22 and Visual Analogue Scale in the Assessment of Symptom Severity in Chronic Rhinosinusitis. *International Journal of Otorhinolaryngology*, **5**, 24-30. <https://doi.org/10.11648/j.ijo.20190501.16>
- [28] Alobod, I., Bernal-Sprekelsen, M. and Mullol, J. (2008) Chronic Rhinosinusitis and Nasal Polyps: The Role of Generic and Specific Questionnaires on Assessing Its Impact on Patient's Quality of Life. *Allergy*, **63**, 1267-1279. <https://doi.org/10.1111/j.1398-9995.2008.01828.x>
- [29] Dorlodot, C., Horoi, M., Lefebvre, P., Collet, S., et al. (2015) French Adaptation and Validation of the Sino-Nasal Outcome Test-22: A Prospective Cohort Study on Quality of Life among 422 Subjects. *Clinical Otolaryngology*, **40**, 29-35. <https://doi.org/10.1111/coa.12315>
- [30] Levy, J.M., Mace, J.C., Rudmik, L., Soler, Z.M. and Smith, T.L. (2017) Low SNOT-22 Scores in Chronic Rhinosinusitis: Why Do Patients Seek Treatment? *Laryngoscope*, **127**, 22-28. <https://doi.org/10.1002/lary.26157>
- [31] Njifou, N.A., Mfe Ndongo, B.L., Kuiffo, C. and Mpressa, E.M. (2018) Les Rhinosinusites Chroniques à l'Hôpital Laquintinie de Douala. *Health Sciences and Diseases*, **19**, 99-103.
- [32] Bewick, J., Morris, S., Hopkins, C., Erskine, S. and Philpott, C.M. (2018) Health

- Utility Reporting in Chronic Rhinosinusitis Patients. *Clinical Otolaryngology*, **43**, 90-95. <https://doi.org/10.1111/coa.12903>
- [33] Philpott, C., Erskine, S., Hopkins, C., Coombes, E., et al. (2016) A Case-Control Study of Medical, Psychological and Socioeconomic Factors Influencing the Severity of Chronic Rhinosinusitis. *Rhinology*, **54**, 134-140. <https://doi.org/10.4193/Rhino15.272>
- [34] Hoehle, L.P., Phillips, K.M., Bergmark, R.W., Caradonna, D.S., et al. (2016) Symptoms of Chronic Rhinosinusitis Differentially Impact General Health-Related Quality of Life. *Rhinology*, **54**, 316-322. <https://doi.org/10.4193/Rhino16.211>
- [35] Lange, B., Thilsing, T., Baelum, J. and Kjeldsen, A.D. (2016) The Sinonasal Outcome Test 22 Score in Persons without Chronic Rhinosinusitis. *Clinical Otolaryngology*, **41**, 127-130. <https://doi.org/10.1111/coa.12481>
- [36] Yeolekar, A.M., Dasgupta, K.S., Khode, S., Joshi, D. and Gosrani, N. (2013) A Study of SNOT 22 Scores in Adults with No Sinonasal Disease. *Journal of Rhinology-Otology*, **1**, 6-10. <https://doi.org/10.12970/2308-7978.2013.01.01.2>
- [37] Gillett, S., Hopkins, C., Slack, R. and Browne, J.P. (2009) A Pilot Study of the SNOT 22 Score in Adults with No Sinonasal Disease. *Clinical Otolaryngology*, **34**, 467-469. <https://doi.org/10.1111/j.1749-4486.2009.01975.x>

Annex

Sino-Nasal Outcome Test (SNOT-22) Questionnaire

Below you will find a list of symptoms and social/emotional consequences of your nasal disorder. We would like to know more about these problems and would appreciate your answering the following questions to the best of your ability. Please assess your health problems over the last two weeks, considering the severity and frequency of the problem when it occurs. Thank you for your participation. Do not hesitate to ask for assistance if necessary.

Please rate each item below by circling the number that corresponds to how you feel, using the following scale:	No Problem	Very Mild Problem	Mild Problem	Moderate Problem	Severe Problem	Very severe problem
1. Need to blow nose	0	1	2	3	4	5
2. Sneezing	0	1	2	3	4	5
3. Runny nose	0	1	2	3	4	5
4. Nasal obstruction	0	1	2	3	4	5
5. Loss of smell or taste	0	1	2	3	4	5
6. Cough	0	1	2	3	4	5
7. Post-nasal discharge	0	1	2	3	4	5
8. Thick nasal discharge	0	1	2	3	4	5
9. Ear fullness	0	1	2	3	4	5
10. Dizziness	0	1	2	3	4	5
11. Ear pain	0	1	2	3	4	5
12. Facial pain/pressure	0	1	2	3	4	5
13. Difficulty falling asleep	0	1	2	3	4	5
14. Waking up at night	0	1	2	3	4	5
15. Lack of a good night's sleep	0	1	2	3	4	5
16. Waking up tired	0	1	2	3	4	5
17. Fatigue	0	1	2	3	4	5
18. Reduced productivity	0	1	2	3	4	5
19. Reduced concentration	0	1	2	3	4	5
20. Frustrated/restless/irritable	0	1	2	3	4	5
21. Sad	0	1	2	3	4	5
22. Embarrassed	0	1	2	3	4	5