

Research Article

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Evaluation of Quality of Life in Terms of Sinonasal Symptoms in Children with Cystic Fibrosis

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Abstract: Objective: Sinusitis is a common complaint in children with cystic fibrosis. However, the actual prevalence of chronic rhinosinusitis and its effect on the quality of life of children have not been well considered. Therefore, the objective of this study was to determine the effect of sinonasal quality of life in children with cystic fibrosis.

Materials and methods: This study was a diagnostic study performed on 80 children with cystic fibrosis ranging from 2 to 20 years old, who were referred to the cystic fibrosis clinic of Masih Daneshvari Hospital from 2017–2018. The questionnaires used in this study were chronic rhinosinusitis screening questionnaire based on the European task force and the evaluation of the sinonasal quality of life was based on the SN-5 survey.

Results: Of the 80 patients with fibrosis from 2 to 20 years old who were recruited in the study, 41 patients were female (51.3%) and 39 were male (48.8%). In 61 cases (76.3%), there was no chronic rhinosinusitis and 19 cases

(23.8%) had chronic rhinosinusitis. The mean SN-5 score in 19 patients with chronic rhinosinusitis was 3.4105 and the mean score of patients without rhinosinusitis was 1.8426, with a P-value of 0.000. The mean SN-5 score was significant between the two groups. In patients with nasal congestion, there was a significant difference in quality of life factors such as sinus infection, nasal obstruction, and allergy symptoms ($P < 0.001$). In patients with facial pain, there was a significant difference in quality of life factors such as sinus infection, nasal obstruction, allergic symptoms, and physical activity limitation ($P < 0.001$). There was also a significant difference in the quality of life factors such as sinus infection, nasal obstruction, and allergy symptoms in patients with postnasal drip ($P < 0.001$).

Conclusion: In children with cystic fibrosis, the quality of life of sinonasal has a significant relationship with absence of chronic rhinosinusitis. This study showed that children with chronic rhinosinusitis have significantly lower quality of sinonasal life than children with chronic rhinosinusitis. The results demonstrated that quality of life scores in sinus infections, nasal obstruction, and allergy symptoms were significantly higher in patients with chronic rhinosinusitis than in those without chronic rhinosinusitis. The findings of this study are important for improving children's health related quality of life, as it leads to promoting communication between the patient and the health care provider, identifying overlooked problems, monitoring the progress of the disease and the burden of treatment, and promoting interventions in the daily life of patients.

Keywords: Cystic fibrosis; Sinusitis; Quality of life; Child.

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Introduction

Cystic fibrosis is a multisystemic disorder in children and adolescents. The disease is the most common life-limiting congenital disorder in white people. Disruptions in the function of cystic fibrosis transmembrane conductance

regulator, as a primary defect, leads to a wide range of symptoms and complications [1]. Cystic fibrosis is the most common cause of chronic pulmonary disease in children and is the leading cause of exocrine pancreatic insufficiency in early life. It also affects many cases of pansinusitis, nasal polyps, rectal prolapse, pancreatitis, cholelithiasis, and insulin-related hyperglycemia. It is considered in the differential diagnosis of many childhood diseases [2, 3].

In a study by Chan et al., sinonasal quality of life was evaluated in children with cystic fibrosis. Forty-seven children from ages 2 to 20 years old were recruited in the study. According to different diagnostic methods (American Rhinologic Society (ARS) guidelines), the rate of chronic rhinosinusitis in children with cystic fibrosis was 11% to 38%. According to SN-5 (Sinus and Nasal Quality of Life Survey), there were no significant changes in quality of life of children with history of sinusitis treatment before and after the treatment [4].

Cystic fibrosis patients are known to have physical symptoms associated with chronic sinusitis. They are also reported to have an almost constant increase in the thickness of mucoperiosteal based on CT scans, and nasal polyps are found in more than 48% of children with cystic fibrosis [5, 6]. However, the actual prevalence of chronic rhinosinusitis and its effect on the quality of life of children with cystic fibrosis is not well described. In one study, 10% of the children had sinonasal symptoms [7]; while in other studies, the prevalence of symptoms was up to 62% [8]. A study conducted on a group of children with cystic fibrosis by Sino-Nasal Outcome Test SNOT-16 test showed little effect on their quality of life compared to asymptomatic adults, but they had better quality of life than adults with chronic rhinosinusitis [9]. SN-5 is a valuable test in assessing the children's quality of life [10].

In a study by Rudnick et al. on long-term improvement in postoperative quality of life in children with chronic rhinosinusitis, the children's caregivers filled out the SN-5 questionnaire before and after the surgery. Out of all the 22 children with mean age of 5.7 years old, the mean score before surgery was 25.6 and after surgery was 11.7 in the short term, and 11.5 in the long term. The decrease was significant in both cases and reflected the long-term improvement in quality of life [11]. By increasing the longevity of patients, a series of new psychological issues were emerging, including affection, self-care, peer relationships, occupation, health concerns, and prognosis [3, 12-14].

Although the symptoms of sinusitis in children are rarely serious or life threatening, it is essential to measure these children's quality of life. With the necessary medical

and psychological support, children and adolescents with cystic fibrosis can be less likely to suffer from illness and will become active and independent in the middle age. Thus, the question is: What is the effect of chronic sinonasal problems on the quality of life of children with cystic fibrosis? Therefore, the objective of this study was to determine answer this question.

Materials and method

The present study was a diagnostic study which was conducted on 80 children with cystic fibrosis from 2 to 20 years old who were referred to cystic fibrosis clinic of Masih Daneshvari Hospital from 2017–2018. Patients were excluded if they had a nonroutine appointment in the clinic (such as acute ill patient).

The objectives of the study were first reported to patients and their parents, and then if they agreed to participate in the study, the questionnaire was given to them. The questionnaire consisted of three parts. The first part was related to the personal characteristics of patients, such as age and gender; the second part was related to the screening of chronic rhinosinusitis based on the European task force; and the third part was related to the assessment of the sinonasal quality of life based on the SN-5 form. The Sinonasal-5 (SN-5) is a validated pediatric sinonasal quality of life instrument. Each of the questions in SN-5 was scored from 1 to 7 (none of the time = 1, all of the time = 7). In this study, chronic pediatric rhinosinusitis was detected based on the presence of 2 or more of the following items for up to 12 weeks. The symptoms were nasal obstruction, nasal discharge, facial pain or pressure, and reduced sense of smell. Radiological and endoscopic examinations were not benchmarks. Data were analyzed by SPSS software version 25 using descriptive and inferential tests.

Ethical approval: The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance the tenets of the Helsinki Declaration, and has been approved by the Shahid Beheshti University of Medical Sciences Ethics Committee (IR.SBMU.NRITLD.REC.1396.446).

Informed consent: Informed consent has been obtained from all individuals included in this study.

Results

Results demonstrated that 41 subjects (51.3%) were female and 39 were male (48.8%). Sixty-one subjects (76.3%) had

Table 1: Comparison of mean SN-5 in patients with chronic rhinosinusitis and those non-chronic rhinosinusitis in patients with cystic fibrosis referred to The Masih Daneshvari hospital from 2017–2018.

Chronic Rhinosinusitis	N	Mean	Std. Deviation	Std. Error Mean	Mean Rank	P-value	
SN-5 Score	No	61	1.8426	0.79759	0.10212	34.08	0.000
	Yes	19	3.4105	1.47041	0.33734	61.11	

Table 2: Comparison of quality of life scores between people with nasal obstruction and those no nasal obstructions using the Nonparametric Mann-Whitney U test.

Nasal Congestion or Obstruction	N	Mean	Median	Mean Rank	Std. Deviation	P-value
Sinus Infection	No	61	2.69	2.00	34.58	0.000
	Yes	19	4.95	5.00	59.50	
Nasal Obstruction	No	61	1.80	1.00	33.25	0.000
	Yes	19	4.26	4.00	63.79	
Allergy Symptoms	No	61	1.66	1.00	35.49	0.000
	Yes	19	3.21	3.00	56.58	
Emotional Discomfort	No	61	1.70	1.00	39.14	0.269
	Yes	19	2.68	1.00	44.87	
Activity Limitation	No	61	1.34	1.00	38.77	0.080
	Yes	19	2.00	1.00	46.05	
Schematic Score	No	61	7.97	8.00	40.52	0.991
	Yes	19	7.47	8.00	40.45	

no chronic rhinosinusitis and 19 (23.8%) had chronic rhinosinusitis. The mean SN-5 score in 19 patients with chronic rhinosinusitis was 3.4105 and the mean score of patients without rhinosinusitis was 1.8426, with a P-value of 0.000. The mean SN-5 score difference was statistically significant between the two groups (Table 1).

The findings showed that in patients with nasal congestion, there was a significant difference in quality of life factors such as sinus infection, nasal obstruction, and allergy symptoms ($P < 0.001$, Table 2).

In patients with reduced sense of smell there was a significant difference in quality of life factors such as sinus infection, nasal obstruction, and allergic symptoms ($P < 0.001$, Table 3).

There was a significant difference in the quality of life factors such as sinus infection, nasal obstruction, and allergy symptoms, and activity limitation in patients with facial pain, fullness, or pressure ($P < 0.05$, Table 4).

The findings also depicted that there was a significant difference in the quality of life factors such as sinus infection, nasal obstruction, and allergy symptoms in

patients with nasal discharge or postnasal drip ($P < 0.001$, Table 5).

Based on the SN-5 variables, sinus infection had the highest effect and activity limitation had the least effect on the quality of life (Table 6, Figure 1).

Discussion

The study aimed to demonstrate a small part of health related quality of life in patients with chronic cystic fibrosis after promoting its use in daily visits and practice. The findings showed that quality of life scores from sinus infection, nasal obstruction, and allergy symptoms in patients with nasal congestion were significantly higher than in those without nasal congestion. Nasal congestion occurs due to cold and sinus infections, which blocks the nasal bacteria and viruses and makes it harder to breathe. In most cases, this can be remedied within a week with medication and some topical treatments [12].

Table 3: Comparison of quality of life scores between people with reduced sense of smell and those no reduced sense of smell using the Nonparametric Mann-Whitney U test.

Reduced Sense of Smell		N	Mean	Median	Mean Rank	Std. Deviation	P-value
Sinus Infection	No	72	3.06	3	38.69	1.96	0.033
	Yes	8	4.75	6	56.81	1.98	
Nasal Obstruction	No	72	2.17	1	37.94	1.64	0.002
	Yes	8	4.38	6	63.56	2.00	
Allergy Symptoms	No	72	1.88	1	38.96	1.29	0.049
	Yes	8	3.38	4	54.38	2.20	
Emotional Discomfort	No	72	1.85	1	39.75	1.56	0.308
	Yes	8	2.75	2	47.25	2.66	
Activity Limitation	No	72	1.47	1	40.18	1.22	0.588
	Yes	8	1.75	1	43.38	1.39	
Schematic Score	No	72	7.92	8	41.37	2.06	0.303
	Yes	8	7.25	7	32.69	2.12	

Table 4: Comparison of quality of life scores between people with facial pain, fullness, or pressure and those no -facial pain, fullness, or pressure using the Nonparametric Mann-Whitney U test.

Facial Pain, Fullness, or Pressure		N	Mean	Median	Mean Rank	Std. Deviation	P-value
Sinus Infection	No	68	2.93	3	37.43	1.84	0.004
	Yes	12	4.92	6	57.92	2.19	
Nasal Obstruction	No	68	2.00	1	36.67	1.40	0.000
	Yes	12	4.58	6	62.21	2.19	
Allergy Symptoms	No	68	1.76	1	37.53	1.13	0.003
	Yes	12	3.50	4	57.33	2.15	
Emotional Discomfort	No	68	1.66	1	38.76	1.22	0.061
	Yes	12	3.50	2	50.33	2.94	
Activity Limitation	No	68	1.32	1	38.69	0.95	0.015
	Yes	12	2.50	1	50.75	2.02	
Schematic Score	No	68	7.99	8	41.35	1.86	0.426
	Yes	12	7.08	8	35.71	2.94	

It should be noted that the quality of life scores for sinus infections, nasal obstruction, allergic symptoms, and activity limitation in patients with facial pain were significantly higher than in those with no facial pain. Nasal congestion, nasal discharges with changed color, and facial pain or pressure are the main symptoms of

sinus infection that lasts for 7 days or more. When the sinuses become inflamed and swollen, they are no longer able to evacuate mucus, resulting in the patient feeling fullness and pain in the face [15].

In analyzing the determining factors for chronic rhinosinusitis, the findings suggested that the nasal

Table 5: Comparison of quality of life scores between people with Nasal Discharge or Postnasal Drip and without nasal Discharge or Postnasal Drip using the Nonparametric Mann-Whitney U test.

Nasal Discharge or Postnasal Drip	N	Mean	Median	Mean Rank	Std. Deviation	P-value	
Sinus Infection	No	55	2.33	2	30.57	1.52	0.000
	Yes	25	5.20	6	62.34	1.50	
Nasal Obstruction	No	55	1.87	1	34.94	1.31	0.001
	Yes	25	3.52	4	52.74	2.18	
Allergy Symptoms	No	55	1.60	1	35.02	0.97	0.001
	Yes	25	2.96	3	52.56	1.88	
Emotional Discomfort	No	55	1.62	1	39.30	1.01	0.420
	Yes	25	2.64	1	43.14	2.55	
Activity Limitation	No	55	1.25	1	38.45	0.75	0.085
	Yes	25	2.04	1	45.02	1.81	
Schematic Score	No	55	8.24	8	43.44	1.54	0.085
	Yes	25	7.00	8	34.04	2.75	

Table 6: Factor coefficient for determining SN-5 mean score.

	Mean	Std. Deviation	Pearson Correlation	P-value	Standardized Coefficients
SN-5 Score	2.2150	1.19441			
Sinus Infection	3.23	2.012	0.782	0.000	0.337
Nasal Obstruction	2.39	1.790	0.813	0.000	0.300
Emotional Discomfort	1.94	1.701	0.681	0.000	0.285
Allergy Symptoms	2.03	1.458	0.645	0.000	0.244
Activity Limitation	1.50	1.232	0.684	0.000	0.206

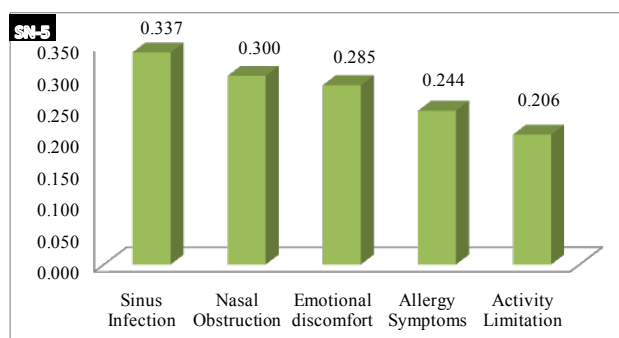


Figure 1: Factor coefficients for determining SN-5 mean score.

discharge factor in patients with cystic fibrosis and chronic rhinosinusitis was significantly associated with the sinonasal quality of life. In other words, there was a

significant relationship between SN-5 components mean scores in nasal discharge and postnasal drip factors, so that patients with postnasal drip factor had higher scores of sinonasal quality of life. Often chronic inflammation in the nasal cavities leads to the swelling of inside the nose, which causes nasal obstruction and congestion. This status also plays a role in conducting fluids from the postnasal area into the throat and causes sputum [16]. Additionally, the purulent postnasal drip and nasal congestion are chronic sinusitis symptoms. The findings of this study also indicated that for evaluating factors affecting SN-5 scores, sinus infections had the highest coefficient compared to other factors. In other words, the sinus infection factor had the greatest effect on the determination of sinonasal quality of life. Friedman et al. evaluated the sinonasal quality of life and pulmonary

function test in children with cystic fibrosis. In their study, the SNOT-16 questionnaire of sinonasal quality of life was used and compared with force expiratory volume FEV1. Children below 12 years old, there was a significant relationship between SNOT-16 and FEV1. Children with higher FEV1, had lower SNOT-16. The severity of sinus disease was associated with the severity of pulmonary disease in children with cystic fibrosis below 12 years old [9].

The findings of the present study suggested that in children with cystic fibrosis, the sinonasal quality of life had a significant association with chronic rhinosinusitis. According to the data analysis of this study, children with chronic rhinosinusitis had significantly reduced sinonasal quality of life compared to children who had not chronic rhinosinusitis. In a study conducted by Habib et al., the association between chronic rhinosinusitis and health related quality of life was investigated in patients with cystic fibrosis. In 113 patients with cystic fibrosis, the prevalence of chronic rhinosinusitis in patients older than 19 years old was 59.2%. Pulmonary function test did not show any significant difference between the two groups with and without chronic rhinosinusitis. However, patients with chronic rhinosinusitis had lower scores in assessing quality of life [17].

Conclusion

The results of this study exhibited that in children with cystic fibrosis, the sinonasal quality of life has a significant relationship with the absence of chronic rhinosinusitis. According to the information analysis, this study showed that children with chronic rhinosinusitis had significantly lower sinonasal quality of life than children without chronic rhinosinusitis. From the SN-5 variable factors of sinus infection, nasal obstruction, and allergy symptoms, the quality of life score was significantly higher in patients with chronic rhinosinusitis than in those who did not have chronic rhinosinusitis. The findings of this study are important for improving children's health related quality of life, as it leads to promoting communication between the patient and the health care provider, identifying overlooked problems, monitoring the progress of the disease and the burden of treatment, and promoting interventions in the daily life of patients.

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Conflict of interest: The authors state no conflict of interest.

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Appendix

Date _____

Chronic Rhinosinusitis Screening Questionnaire

Thank you for taking the time to fill out this questionnaire. Your responses will help us improve our understanding of how diseases of the nose and sinuses affect children with cystic fibrosis, so that we can better identify and treat these problems.

Age _____ Gender: M F

Over the past 12 weeks, has your child complained of any of the following on a daily basis?

Nasal congestion or obstruction?	Yes	No
Facial pain, pressure, or fullness?	Yes	No
Smelly drainage from the front of the nose, or back into the throat?	Yes	No
Decreased sense of smell?	Yes	No

SN-5 (Sinonasal-5)

Instruction: Please help us understand the impact of sinus and/or nasal problems on your child's quality of life by checking one box for each question below. Thank you.

In the past 4 weeks, how often have these been a problem for your child?

None of the time
 Hardly any time at all
 A small part of the time
 Some of the time
 A good part of the time
 Most of the time
 All of the time

	None of the time	Hardly any time at all	A small part of the time	Some of the time	A good part of the time	Most of the time	All of the time
SINUS INFECTION Nasal discharge, bad breath, daytime cough, post-nasal drip, headache, facial pain or head banging.							
NASAL OBSTRUCTION Stuffy or blocked nose, nasal congestion, reduced sense of smell, trouble breathing with mouth closed.							
ALLERGY SYMPTOMS Sneezing, itchy nose/eyes, need to rub nose/eyes, or watery eyes							
EMOTIONAL DISTRESS Irritable, frustrated, sad, restless, or trouble sleeping because of nose or sinus illness							
ACTIVITY LIMITATIONS Missed school/daycare, lost time with family/friends, unable to do projects because of nose or sinus illness							