Section: Pediatrics

Original Research Article

A STUDY TO ASSESS THE RELATIONSHIP BETWEEN QUALITY OF LIFE(QOL) AND SEVERITY OF ASTHMA IN CHILDREN AT TERTIARY CARE CENTRE

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ABSTRACT

Background: Asthma is a prevalent chronic respiratory disorder in children that significantly impacts their physical, emotional, and social well-being. Evaluating the quality of life (QOL) in asthmatic children and their caregivers helps to assess the broader implications of disease severity and treatment outcomes. **Aims and Objectives:** To assess the relationship between the quality of life (QOL) and the severity of asthma in children at a tertiary care centre and to estimate the prevalence of comorbid conditions among these children. **Materials and Methods:** A cross-sectional study was conducted at Niloufer Hospital, Hyderabad, between June 2021 and December 2022. A total of 200 children aged 7–12 years, diagnosed with asthma based on GINA guidelines, were enrolled. The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) was administered to children, while the Pediatric Asthma Caregivers Quality of Life Questionnaire (PACQLQ) was administered to their caregivers. Data on demographic variables, clinical features, comorbidities, asthma severity, and asthma control status were collected. Statistical analyses included descriptive statistics, Student's t-test, and Chi-square test. **Results:** Of the 200 children studied, 63% were males, and 41% were in the 11–12 years age group. Moderately persistent asthma was most common (51%), followed by mild persistent (21%), mild intermittent (18%), and severe asthma (10%). Comorbid conditions included allergic rhinitis (17%), eczema (9%), and food allergies (8%). A statistically significant improvement in asthma control was observed after treatment ($p=0.0003$). QOL scores were inversely correlated with asthma severity for both children and caregivers ($p<0.000001$), indicating lower QOL in children with more severe asthma. **Conclusion:** The study demonstrated that asthma severity negatively impacts the quality of life of both children and caregivers. Effective asthma control improves QOL, highlighting the need for comprehensive management strategies.

INTRODUCTION

Asthma is among the most prevalent chronic respiratory illness in children globally, with clinical features of airway inflammation, reversible obstruction of airflow, and airway hyperresponsiveness.[1] Health has been defined by the World Health Organization (WHO) as "a state of complete physical, mental, and social well-being, and not merely the absence of disease." It follows this definition that health measurements must not only involve clinical results but should also measure an individual's quality of life (QOL), particularly in chronic diseases like asthma.[2]

Asthmatic children usually have repeated periods of wheezing, breathlessness, chest tightness, and cough, especially at night or in the early morning. The effects of these symptoms go beyond physical distress, having an effect on emotional state, activity restriction, school functioning, social relationships, and overall QOL. In addition, asthma carries psychological and social burdens not only for

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children but also for their parents, affecting family functioning and parental stress levels.[3,4]

Asthma has been defined by the Global Initiative for Asthma (GINA) as a chronic inflammatory airway disease affecting many cells and mediators, causing airway hyperresponsiveness and episodic symptoms of variable frequency and severity. Clinical features and causative stimuli of asthma vary according to age groups, where viral infections are common in preschool children, whereas environmental allergens tend to dominate in school children.[5,6]

A number of factors are involved in the pathogenesis and aggravation of asthma, including hereditary tendency, environmental factors (e.g., allergens, pollutants, and smoking), viral respiratory infections, nutritional factors, and co-morbid atopic conditions like allergic rhinitis, eczema, and food allergy. The severity of the disease varies from mild episodic symptoms to long-standing severe forms necessitating intensive pharmacological control.[7,8]

Health-related quality of life (HRQOL) has emerged as a desirable outcome measure in chronic pediatric illnesses, complementing traditional clinical indicators. Questionnaires like the Pediatric Asthma Quality of Life Questionnaire (PAQLQ) and Pediatric Asthma Caregivers Quality of Life Questionnaire (PACQLQ) provide reliable measures to assess QOL in asthmatic children and their caregivers, respectively. These questionnaires include various dimensions, such as physical, emotional, and social, and provide a holistic estimate of disease burden.[9,10]

Since asthma is a chronic condition with the potential to affect QOL, particularly among children of heterogeneous sociocultural backgrounds, it is essential to assess the degree of impairment of QOL and its association with the severity of the disease. There is scarcity of Indian research focusing on this association with the aid of validated questionnaires.

The current research was carried out with the aim of evaluating the quality of life and severity of asthma among children visiting a tertiary care centre in Hyderabad, India. The research also set out to estimate the prevalence of comorbidities among asthma patients in this group.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional observational study was conducted in the Department of Pediatrics at Niloufer Hospital, Institute of Child Health, Osmania Medical College, Hyderabad. Niloufer Hospital is a major tertiary care referral centre catering to pediatric patients from Hyderabad and surrounding regions.

Study Period

The study was carried out over a period of 18 months, from June 2021 to December 2022.

Study Population

The study included children aged 7 to 12 years, who were diagnosed with bronchial asthma as per the Global Initiative for Asthma (GINA) guidelines and presented to either the outpatient department (OPD) or inpatient department (IPD) of the hospital during the study period.

Sample Size

A total of 200 children meeting the inclusion criteria were enrolled in the study.

Inclusion Criteria

- Children aged between 7 to 12 years.
- Both genders.
- Diagnosed with bronchial asthma according to GINA guidelines.
- Children whose parents or guardians provided informed consent to participate in the study.

Exclusion Criteria

- Children with active concomitant pulmonary diseases other than asthma.
- Children with chronic systemic illnesses.
- Children with mental retardation.
- Children and parents who were unwilling to participate in the study.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethical Committee, Osmania Medical College, Hyderabad, prior to the commencement of the study. Informed consent was obtained from the parents or legal guardians of all participants prior to enrolment.

Study Procedure

Eligible children were enrolled into the study following informed consent from their parents or guardians. Detailed history regarding demographic data, asthma symptoms, severity classification, allergy history, comorbidities, and treatment history was obtained. Each child underwent a thorough general and systemic physical examination.

The severity of asthma was classified based on GINA guidelines into four categories: mild intermittent, mild persistent, moderate persistent, and severe persistent asthma.

Quality of Life Assessment

The quality of life (QOL) was assessed using two validated questionnaires:

- **Pediatric Asthma Quality of Life Questionnaire (PAQLQ):**

Administered to children. This questionnaire consists of 23 items distributed across three domains: activity limitation, symptoms, and emotional function. It is designed for children aged 7 to 17 years.

- **Pediatric Asthma Caregivers Quality of Life Questionnaire (PACQLQ):**

Administered to caregivers. This questionnaire assesses the impact of the child's asthma on caregiver quality of life, particularly focusing on activity limitation and emotional function.

Higher scores in both questionnaires indicate better quality of life, while lower scores reflect greater impairment.

Pulmonary Function Testing

All participants underwent pulmonary function testing (spirometry) to assess lung function parameters including:

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- Forced Vital Capacity (FVC)
- Forced Expiratory Volume in 1 second (FEV_1)
- FEV_1/FVC ratio

Asthma Control Assessment

Asthma control was assessed both before and after treatment based on clinical evaluation and spirometry findings, and categorized into:

- Well-controlled
- Partially controlled
- Poorly controlled

Treatment and Follow-up

Children received asthma treatment as per GINA guidelines. After initiating treatment, asthma control was reassessed and quality of life evaluations were repeated.

Data Entry and Statistical Analysis

- Data were entered into Microsoft Excel 2010.
- Statistical analysis was performed using Microsoft Excel 2010 and Epi Info version 7.2.0.
- Descriptive statistics were presented as mean ± standard deviation (SD) for continuous variables, and as frequency and percentage for categorical variables.
- The Student's t-test was used for comparing means between groups.
- The Chi-square test was used for assessing associations between categorical variables.
- A p-value < 0.05 was considered statistically significant.

RESULTS

The present study included 200 children aged 7–12 years diagnosed with bronchial asthma attending the Department of Pediatrics, Niloufer Hospital, Hyderabad. The majority of the study population were aged 11–12 years, with males predominating. Most children had normal BMI. Comorbid allergic conditions and family history of bronchial asthma were prevalent in a significant proportion. Moderate persistent asthma was the most common classification at diagnosis. Asthma control significantly improved after treatment. Quality of life scores (both PAQLQ for patients and PACQLQ for caregivers) were inversely correlated with asthma severity, showing statistically significant association.

Table 1: Age distribution of the study population

Age Group	Frequency	Percentage
7–8 years	54	27%
9–10 years	64	32%
11–12 years	82	41%
Total	200	100%

Table 1 shows the distribution of children according to age groups, demonstrating that 41% of the participants were aged 11–12 years, 32% were aged 9–10 years, and 27% were aged 7–8 years.

Table 2: Gender distribution of the study population

Gender	Frequency	Percentage
Male	126	63%
Female	74	37%
Total	200	100%

Table 2 depicts the gender-wise distribution, where 63% of the study population were males and 37% were females.

Table 3: BMI distribution of the study population

BMI Category	Frequency	Percentage
Underweight	24	12%
Normal	168	84%
Overweight	6	3%
Obese	2	1%
Total	200	100%

Table 3 demonstrates the BMI status of the children, indicating that 84% had normal BMI, 12% were underweight, 3% were overweight, and 1% were obese.

Table 4: History of allergies in the study population

Allergy Type	Frequency	Percentage
Allergic Rhinitis	34	17%
Food Allergy	16	8%
Eczema	18	9%

Table 4 represents the prevalence of various allergies among the participants, with allergic rhinitis present in 17%, eczema in 9%, and food allergy in 8%.

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Table 5: Family history of bronchial asthma

Family History	Frequency	Percentage
Present	68	34%
Absent	132	66%
Total	200	100%

Table 5 illustrates the distribution of family history of asthma, showing that 34% of children had a positive family history, while 66% did not.

Table 6: Classification of asthma at the time of diagnosis

Asthma Classification	Frequency	Percentage
Mild Intermittent	36	18%
Mild Persistent	42	21%
Moderate Persistent	102	51%
Severe	20	10%
Total	200	100%

Table 6 shows the classification of asthma severity, demonstrating that moderate persistent asthma was most common (51%), followed by mild persistent (21%), mild intermittent (18%), and severe asthma (10%).

Table 7: Asthma control before treatment

Asthma Control Status	Frequency	Percentage
Well Controlled	26	13%
Partial Control	172	86%
Poor Control	2	1%
Total	200	100%

Table 7 represents asthma control status before treatment, where 86% of children had partial control, 13% had well-controlled asthma, and 1% had poor control.

Table 8: Asthma control after treatment

Asthma Control Status	Frequency	Percentage
Well Controlled	52	26%
Partial Control	148	74%
Poor Control	0	0%
Total	200	100%

Table 8 shows asthma control status after treatment, where 26% of patients achieved well-controlled asthma, and 74% had partial control. No patients remained in poor control.

Table 9: Association of asthma control before and after treatment

Asthma Control	Before Treatment	After Treatment
Well Controlled	26	52
Partial Control	172	148
Poor Control	2	0

Chi-square = 16.11; df = 2; p = 0.0003 (statistically significant)

Table 9 demonstrates the association between asthma control status before and after treatment, showing statistically significant improvement (p = 0.0003).

Table 10: Quality of life domains among the study population

QOL Domain	Mean	Standard Deviation
Patients		
Activity Limitation	4.4	0.98
Symptoms	4.9	1.23
Emotional Function	5.1	1.98
Total	4.8	0.52
Caregivers		
Activity Limitation	2.56	1.96
Emotional Function	5.76	0.98
Total	4.16	0.69

Table 10 represents the mean QOL scores for both patients and caregivers across different domains of activity limitation, symptoms, and emotional function.

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Table 11: Mean quality of life scores according to asthma severity

QOL Domain	Severe (n=20)	Moderate Persistent (n=102)	Mild Persistent (n=42)	Mild Intermittent (n=36)
Patients				
Activity Limitation	3.12 ± 0.56	3.8 ± 0.98	4.82 ± 0.98	6.1 ± 0.54
Symptoms	3.3 ± 1.2	4.1 ± 1.02	5.4 ± 0.68	6.9 ± 0.25
Emotional Function	3.98 ± 1.56	4.9 ± 1.23	5.9 ± 0.98	7
Caregivers				
Activity Limitation	1.54 ± 1.2	2.08 ± 1.56	2.8 ± 1.96	3.9 ± 1.98
Emotional Function	4.46 ± 1.25	5.49 ± 0.98	6.4 ± 0.21	6.8 ± 0.1

Table 11 depicts the distribution of QOL scores among patients and caregivers across different asthma severity levels, revealing progressive decline in QOL with increasing disease severity.

Table 12 demonstrates a statistically significant negative correlation between asthma severity and QOL scores in both patients and caregivers ($p < 0.000001$).

Table 12: Statistical association between QOL and asthma severity

Domain	p-value
Patients – Activity Limitation	<0.000001
Patients – Symptoms	<0.000001
Patients – Emotional Function	<0.000001
Caregivers – Activity Limitation	<0.000001
Caregivers – Emotional Function	<0.000001

In Table 1, age distribution showed highest frequency in 11–12 years. Table 2 demonstrated male predominance. Table 3 indicated normal BMI was most common. Table 4 showed allergic rhinitis as the most prevalent comorbidity. Table 5 revealed that 34% of children had a family history of asthma. Table 6 classified majority under moderate persistent asthma. Table 7 and Table 8 highlighted improved asthma control after treatment. Table 9 confirmed statistically significant improvement post-treatment. Table 10 detailed mean QOL scores across domains. Table 11 illustrated declining QOL scores with increasing severity. Table 12 confirmed statistically significant association between asthma severity and QOL.

DISCUSSION

The present study was conducted in the Department of Pediatrics at Niloufer Hospital, Hyderabad, which is one of the largest tertiary care centers catering to pediatric patients. The primary objective of this study was to evaluate the relationship between asthma severity and quality of life (QOL) among children aged 7 to 12 years, and to assess the prevalence of comorbidities in these patients.[11] In the present study, 41% of the participants belonged to the 11–12 years age group, followed by 32% in the 9–10 years group, and 27% in the 7–8 years group. These findings indicate that asthma remains prevalent across all childhood age groups, with a higher proportion of slightly older children. Similar trends in age distribution have been reported in previous studies. Battula M et al. observed that the majority of participants were between 12–17 years, while Kouzegaran S et al. included children aged 8–12 years. Safa et al. also reported mean ages close to 9–10 years, consistent with our findings.[12,13,14]

Male predominance was observed in this study, with 63% males and 37% females, which is in line with previous studies. Battula M et al. reported 64% males, Kouzegaran S et al. reported 58% males, and Safa et al. reported 62.2% males in their respective studies. This gender distribution is consistent with global literature suggesting higher asthma prevalence in male children, potentially due to gender-based anatomical and immunological differences during early childhood.[13,14]

In terms of nutritional status, 84% of the children had normal BMI, while 12% were underweight, 3% overweight, and 1% obese. The proportion of underweight children in this study was similar to that reported by Battula M et al., who found 13.2% underweight. Obesity and overweight percentages in both studies remained low, reflecting the mixed nutritional profile in pediatric asthma populations in developing countries.[13]

Allergic comorbidities were common in the study population. Allergic rhinitis was the most prevalent, observed in 17% of children, followed by eczema (9%) and food allergies (8%). Similar trends were reported by Battula M et al., who noted allergic rhinitis in 17.2% and food allergy in 8.1% of their participants. Safa et al. and Ricci et al. also documented high prevalence of allergic conditions in asthmatic children, emphasizing the strong association between atopy and asthma.[12,13,17]

Family history of asthma was present in 34% of children in this study. Battula M et al. reported a lower proportion (17.2%), but the association of positive family history with asthma has been well-established in various studies, highlighting the genetic predisposition involved in asthma pathogenesis.[12]

Regarding asthma severity, the majority of children in this study were diagnosed with moderate persistent asthma (51%), followed by mild persistent (21%), mild intermittent (18%), and severe persistent asthma

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(10%). Similar patterns were seen in Battula M et al., who reported 60% moderate persistent, 21% mild persistent, 18% mild intermittent, and 1% severe asthma. Safa et al. documented a higher percentage of severe asthma cases, while Ricci et al. observed distributions closely aligned with the present study.[12,13,17]

The assessment of asthma control revealed that prior to treatment, 86% of children had partial control, 13% were well controlled, and 1% had poor control. After treatment, 26% achieved well-controlled status while 74% remained partially controlled. This improvement was statistically significant ($p = 0.0003$), highlighting the effectiveness of appropriate asthma management as per GINA guidelines. Battula M et al. similarly demonstrated significant improvement after treatment ($p < 0.0001$), reinforcing that adherence to treatment guidelines enhances clinical outcomes.[12,15]

The core objective of this study was to assess quality of life using standardized questionnaires. The mean PAQLQ scores for activity limitation, symptoms, and emotional function were 4.4, 4.9, and 5.1 respectively, with an overall score of 4.8 ± 0.52. The mean PACQLQ scores among caregivers showed activity limitation at 2.56 and emotional function at 5.76, with an overall score of 4.16 ± 0.69. These findings are consistent with prior literature where similar tools have demonstrated impaired QOL among children and caregivers of children with asthma. Battula M et al., Kouzegaran S et al., and Safa et al. consistently reported reduced QOL across various domains in asthmatic children.[12,13,14]

A progressive decline in QOL scores was observed with increasing asthma severity, both for children and caregivers. Among patients with severe asthma, the PAQLQ scores for activity limitation, symptoms, and emotional function were markedly lower than in children with mild intermittent asthma. Caregivers of children with severe asthma also experienced poorer QOL, particularly in the domains of activity limitation and emotional function. These differences were statistically significant ($p < 0.000001$). Similar negative correlations between asthma severity and QOL have been documented by Miadich AS et al., Stelmach et al., Kiotseridis et al., and Reichenberg et al., further validating the findings of the present study.[16,18,19,20]

This study also emphasizes that as asthma severity increases, the burden on caregivers grows significantly. Parents of children with severe asthma experienced notable restrictions in their own daily activities and emotional well-being. This finding is supported by Stelmach et al., who found significant correlations between children's asthma control and caregivers' QOL scores.

The results of this study underscore the need for comprehensive asthma management that not only focuses on symptom control but also addresses quality of life for both patients and their families. The utilization of validated QOL assessment tools such as PAQLQ and PACQLQ enables a more holistic evaluation of treatment outcomes and highlights the importance of psychosocial support as part of asthma care.

CONCLUSION

The present study comprehensively evaluated the relationship between asthma severity and quality of life among children aged 7–12 years and their caregivers attending a tertiary care center. The findings demonstrated that with increasing asthma severity, there was a significant decline in quality of life scores across all domains, both in children and caregivers, as measured by PAQLQ and PACQLQ instruments. A statistically significant improvement in asthma control was observed following appropriate treatment according to GINA guidelines. The study also highlighted the considerable psychosocial and emotional burden faced by caregivers, particularly in cases of severe asthma. These findings underscore the importance of regular monitoring of quality of life along with clinical parameters to ensure holistic management of pediatric asthma. Comprehensive care models incorporating medical management, psychological support, family counselling, and education may further enhance outcomes and improve the overall well-being of children suffering from asthma and their families.

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