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Effect of treatment on quality of life of rural asthmatic children

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Introduction: *Medications relieve symptoms of asthma but affected children are significantly bothered by physical, educational and emotional impairments. Urban studies from India evaluated on how this disease affects quality of life. Aim of our study was to evaluate quality of life of rural asthmatic children both before as well as after the treatment.*

Methods: *Asthmatic children 7 to 17 years visiting to rural tertiary care teaching hospital were included. Tool used for the study was Pediatric Asthma Quality of Life Questionnaire - Standard (PAQLQS) which were measured at the time of inclusion and four weeks after treatment. It assessed the QOL (Quality of Life) under symptoms, activity limitation and emotional function domains. Mean difference in pre and post treatment PAQLQ score was assessed.*

Results: *Total 46 children were included from rural setup. Majority were male 60% and had a normal BMI (54%) which was followed by undernutrition (28%). Majority children in both age group 7-11 year and 12-17 year, presented with moderate asthma (80%) and (62%) (according to GINA 2022) respectively followed by mild. The rural cohort post treatment showed significant improvement in individual ($p<0.005$) as well as in overall PAQLQ post treatment ($p<0.002$).*

Conclusion: *The study has highlighted that good asthma control even after short duration of treatment helped in improvement quality of life of affected children. To maintain quality of life it is expected that the patient remains adhered to proper treatment.*

Key words: ASTHMA; QUALITY OF LIFE; RURAL POPULATION

INTRODUCTION

Asthma is a chronic inflammatory disease of the lower airways of the lungs, which may need recurrent hospitalization. The overall burden of asthma is increasing worldwide, particularly among children (1). The recent Global Asthma Study (GAN) phase reported that the global prevalence of asthma was 11% in children aged 6–7 years and 9.1% among children aged 13–14 years (2).

Children with persistent asthma may be able to breathe normally with the help of medications but may experience asthma exacerbation of varying severity resulting in significant number of hospitalizations, interference in routine daily activities and school absenteeism leading to poor school performance, low self-image, and disruption of family life (3 ,4, 5). Thus, children with asthma are troubled not only by symptoms such as shortness of breath, cough and wheeze but are also bothered by the physical, social, educational and emotional impairments.

Hence, when a child is diagnosed with bronchial asthma, all the attention is focused on helping the child. After knowing about the illness of their child, parents show a series of reactions that may be a mix of guilt, sorrow, denial and anger. They go through intense emotional and psychological stress and may have fewer resources of emotional gratification. They struggle to cope with the financial costs and are confronted with new and unexpected experiences. Thus, the burden of the disease affects patients and their families alike (6, 7).

There has been tremendous interest in the measurement of "Quality of Life" (QOL) in chronic disorders in both adults and children over the last two decades. With increasing inci-

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dence and burden of pediatric asthma, the assessment of QOL among these patients has become need of the day. Such assessment yields several benefits such as aiding in the monitoring of treatment, better understanding of the patient's feelings and enhancing communication between clinicians and patients (8).

The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) is an example of such attempts. The questionnaire developed and validated by Juniper et al. (9) reveals areas of functions that are important to patients with asthma including physical and emotional functions. The PAQLQ was also designed to be an evaluative instrument that is sensitive to small changes over time, within the patients and therefore is appropriate for capturing the effect of an intervention in a clinical trial. PAQLQ has been validated and applied to the assessment of the QoL of asthmatic children in USA, Europe and some Asian countries (9, 10, 11).

Majority of studies on quality of life among asthmatic children and its impact on parents have been carried out in western countries. Indian setup where word "Asthma" itself is considered dreadful, there is hardly any significant data on how this disease affects quality of life of asthmatic children We could hardly find studies conducted in India and none of them has been carried out exclusively in rural setup where approach towards chronic diseases is altogether different.

METHODS

The prospective study was carried out from June 2022 to April 2023. in Parul Sevashram hospital catering to rural population of Gujarat and Madhya Pradesh.

All the asthmatic patients aged between 7 and 17 years, diagnosed, classified and treated with the help of GINA 2022 guidelines were eligible to participate (12). Patients, who provided consent/ascent to participate, were able to communicate directly with the interviewer in Hindi or Gujarati and capable of performing a maneuver of PEFR and spirometry, included in the study. The children with illnesses other than asthma that might have an impact on health-related Quality Of Life (QOL) e.g. intellectual impairment, history of recurrent chest infections, on oral steroids anytime in the 2 weeks prior to data collection, already diagnosed as asthma previously and on preventer therapy were excluded.

Sample size - An estimated prevalence rate of childhood asthma in India ranges from 2% to as high as 23%. Assuming lowest prevalence of 2%, at 95% confidence limits and 3% absolute precision, calculated sample size is 42. Accounting 10% for refusals, the sample size is further increased to 46. The participants for the study were selected by purposive sampling.

Data were collected through a structured interview to obtain information regarding demographics, family, socioeconomic history and history of allergies.

Detailed clinical history and examination was carried out. Clinical assessment of nutritional status was done by measuring weight and height using standardized scales. Body mass index (BMI) was calculated and classified as per the WHO charts. All efforts were made to confirm diagnosis in already clinically diagnosed cases of asthma by objective criteria such as Pulmonary Function Test (PFT).

PAQLQ questionnaire which were used in this study is already validated and used multiple times in past in various languages. The PAQLQ is a disease-specific questionnaire for children with asthma. It was intended to assess QOL in children between 7 and 17 years old children. In this study, the standardized version of the interviewed-administered versions was used. It has been shown that children as young as 7 years old could easily complete the questionnaire and could accurately understand questions. It includes 23 items in three domains, i.e., activity limitation, symptoms and emotional functions. Response to each item ranges from 1 (indicating maximum impairment) to 7 (no impairment at all). Results were expressed as the mean score per item for each of the domains as well as for overall quality of life. Therefore, both the domains and overall scores range from 1-7. Patients were asked to recall impairments they have experienced during the previous week. All the asthmatic children were analyzed by ACS score after 1 week and 4 weeks of enrollment and graded accordingly.

Data were analyzed using IBM SPSS (Version.17) software. The demographic particulars were expressed as percentage. QOL were presented as mean scores and comparison of QOL of pre and post treatment by using Paired sample t test. A P-value of < 0.05 were considered statistically significant.

RESULTS

A total of 46 children with newly diagnosed asthma were enrolled, with the proportion of males being 60.86%. When the cohort was divided into two groups, 54.5% (N=25) belonged to the younger age group (7-11 years), as shown in Table 1. 54.4% of the children with asthma in our study had a normal BMI. 41% of participants had a family history of allergic disease, the most common being allergic rhinitis (19.5%). In our study, 65% cooked with biomass and 45% of asthmatic children had a history of contact with pets (Table 1). Most children belonged to a low socioeconomic class according to the Kuppusamy classification (56.5%, N=26).

According to the 2022 GINA guidelines, the severity of asthma was classified, with most participants having moderate

TABLE 1. Base Line Demographics characteristics

S.no	Characterstics	Frequency	%
1	Age		
	7-11 years	25	54.34%
	12-17 years	21	45.64%
2	Sex		
	Male	28	60.86%
	Females	18	39.14%
3	Nutrition status		
	Undernourished	13	28.2%
	Normal	25	54.3%
	Overweight	6	13%
	Obese	2	4.3%
4	Family history of Allergic Disorder	19	41%
	Asthma	8	17.3%
	Allergic rhinitis	9	19.5%
	Urticaria	4	8.6%
	Food allergy	1	2.1%
5	Exposure to pets	21	45.6%
6	Exposure to Tobacco smoke (passive)	23	50%
7	Exposure to Biomass fuel	30	65%

persistent asthma (71.7%), while 2.2 of patients had severe persistent asthma (Figure 1). Patients with mild persistent asthma received preventive therapy with inhaled corticosteroids. Moderate and severe persistent asthmatics were treated with corticosteroids and long-acting beta-agonists as MART therapy according to the GINA guidelines 2022 (12).

Based on the clinical severity of asthma (ACS), children were categorized separately as well-controlled, partially controlled, and poorly controlled at each visit. According to the ACS score determined before and after treatment, there was a decrease in asthma severity after treatment (Table 2).

When the PAQLQ was evaluated, statistically significant improvements were found in the individual areas of activity

TABLE 2. Asthma Control as per Asthma Clinical Severity Score (ACS)

Status	Pre-treatment No (%)	Post-treatment No (%)
Well controlled	7 (15.21%)	13 (28.3%)
Partially controlled	37 (80.4%)	33 (71.7%)
Poorly controlled	2 (4.5%)	0

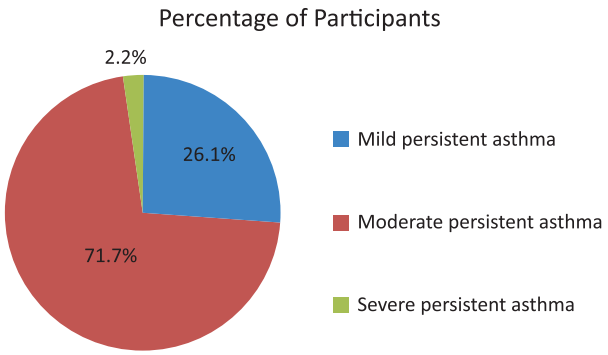

FIGURE 1. Grading of asthma at the time of diagnosis

limitation, symptoms and emotions. There was also a significant change in the mean PAQLQ total score (P<0.002), demonstrating an overall improvement in the child's condition as a result of the medical intervention (Table 3).

DISCUSSION

Quality of life in asthmatic children with asthma is measured on perception of symptoms, activity limitation and emotional factors along with clinical symptoms. Study has observed that a higher prevalence of asthma in the younger age groups was consistent with the widely believed concept of "children outgrow their allergies" (13) which was like our study. In our study, most children belonged to low and middle socioeconomic class. Similar results are seen in study from *Gomes P et al.,* which highlights that asthma is no longer limited to high socioeconomic class and it can affect the quality of life of affected children irrespective of socioeconomic class (14). Australian study by *Knibbs LD et al.* identified gas stove's role in significant proportion of the childhood asthma burden, as our study reports where use of Biomass fuel was associated in 65% of participants (15). Majority of newly diagnosed asthmatics with varying severity of our study were male (60.86%) which was similar to study by *Nogueira KT et al.* (16).

Most of the children in both age groups suffered with moderate persistent asthma similar to findings of other studies (7, 16). Positive family history of allergy and exposure to pets 41% and 45% were found in present study (17). *Ratageri et al.* found that family history of allergic rhinitis and asthma and exposure with tobacco smoke had strong association

TABLE 3. Mean PAQLQS Score -Pre and Post treatment

QOL domain	Pre –treatment Mean (SD)	Post treatment Mean (SD)	Mean Difference	T- Palue	P value
Activity (5)	4.421 (0.574)	5.886 (0.258)	-1.468	2.35	0.0015
Symptoms (10)	4.09 (0.43)	5.63 (0.24)	-1.54	1.83	<0.0003
Emotion (8)	4.255 (0.27)	5.13 (0.171)	-0.875	1.89	<0.0002
Grand Total	4.25 (0.164)	5.54 (0.386)	-1.29	2.91	0.002

with development of asthma in children, which is similar to findings of our study (18). Although obesity figured as an associated risk factor for asthma, in our study 54.34% of children had normal BMI. The findings are consistent with study done by *Battula et al.* (19).

Study signifies the importance of asthma control and its impact on the quality of life of the affected patient. It highlights post treatment significant improvement in all three domains as well as overall PAQLQ score. Similar findings as the present study were observed in study done by *Nair et al.* (20) and *Juniper et al.* (9) In our study participants showed improvement in all 3 domains individually as well as there was overall improvement in PAQLQ score. *Nair et al.* found overall improvement in PAQLQ score but didn't have significant improvement in emotional domain. This difference may be because principally our patients were from rural part of India, contrast to *Nair et al.* study who had recruitment from urban background. Apart from that *Nair et al.* used mini PAQLQ which has 13 items (emotional -4) in three domains while in present study Original PAQLQ was used which has 23 (emotional -8) items.

Limitation and Strengths

As this was a hospital-based study with a small sample size and short follow-up period, the results may not be accurately generalizable to the community. Therefore, a similar study with a large sample size should be conducted. Previous studies looking specifically at quality of life have been conducted in adults, but there are very few in the pediatric population. Our study differs slightly from other studies because the patients we recruited were from the rural part of the country where the concept of quality of life is somewhat different

CONCLUSION

Control of asthma symptoms should not be the only goal of management of asthma, but it should focus more on overall quality of life of the patients. Our study has highlighted that good asthma control even after short duration of treatment helped in improvement in quality of life of affected children in all domains i.e. symptoms, activity and emotions. To maintain such improvement, it is strongly advisable that patients should adhere with treatment to get best possible long-term outcome. Here we propose to conduct similar multicentric trials with larger sample sizes involving both urban and rural population to get better insight.

Acknowledgement

PAQLQS (original both Hindi and Gujarati version) adapted with prior permission of Elizabeth Juniper.

Abbreviations:

PAQLQ – Pediatric Asthma Quality of Life Questionnaire
QOL – Quality of Life
GINA – Global Initiative for Asthma
BMI – Body Mass Index
WHO – World Health Organization
PFT – Pulmonary Function Test
MART – Maintenance And Reliever Therapy
ACS – Asthma Clinical Severity

REFERENCES

1. Asher I, Pearce N. Global burden of asthma among children. Int J Tuberc Lung Dis. 2014;18(11):1269–78. doi:10.5588/ijtld.14.0170
2. García-Marcos L, Asher MI, Pearce N, et al. The burden of asthma, hay fever and eczema in children in 25 countries: GAN Phase I study. Eur Respir J. 2022;60:2102866. doi: 10.1183/13993003.02866-2021.
3. Okelo SO, Wu AW, Krishnan JA, Rand CS, Skinner EA, Diette GB. Emotional quality-of-life and outcomes in adolescents with asthma. *J Pediatr*. 2004;145(4):523-529. doi:10.1016/j.jpeds.2004.06.0434. Goeman DP, Thien FCK, Abramson MJ, et al. Patients' views of the burden of asthma: a qualitative study. Med J Aust. 2002;177(6):295–9. doi:10.5694/j.1326-5377.2002.tb04786.x
5. Gustafsson D, Olofsson N, Andersson F, Lindberg B, Schollin J. Effect of asthma in childhood on psycho-social problems in the family. J Psychosom Res. 2002;53(6):1071–5. doi:10.1016/s0022-3999(02)00340-9
6. Sennhauser FH, Braun-Fahrländer C, Wildhaber JH. The burden of asthma in children: a European perspective. *Paediatr Respir Rev*. 2005;6(1):2-7. doi:10.1016/j.prrv.2004.11.001
7. Singh M. The burden of asthma in children: an Asian perspective. *Paediatr Respir Rev*. 2005;6(1):14-19. doi:10.1016/j.prrv.2004.11.0038. Annett RD. Assessment of health status and quality of life outcomes for children with asthma. *J Allergy Clin Immunol*. 2001;107(5 Suppl):S473-S481. doi:10.1067/mai.2001.114949
9. Juniper EF, Guyatt GH, Feeny DH, Ferrie PJ, Griffith LE, Townsend M. Measuring quality of life in children with asthma. *Qual Life Res*. 1996;5(1):35-46. doi:10.1007/BF00435967
10. Sanjuás C, Alonso J, Ferrer M, Curull V, Broquetas JM, Antó JM. Adaptation of the Asthma Quality of Life Questionnaire to a second language preserves its critical properties.> *J Clin Epidemiol*. 2001;54(2):182-189. doi:10.1016/s0895-4356(00)00297-311. Elizabeth C, Suzanna S, Tim CF, Shek LP, Mital R, Bee Wah L. Pediatric asthma quality of life questionnaire: validation in children from Singapore. *Asian Pac J Allergy Immunol*. 1999;17(3):155-161.
12. Reddel HK, Bacharier LB, Bateman ED, et al. Global Initiative for Asthma Strategy 2021: Executive Summary and Rationale for Key Changes. Am J Respir Crit Care Med. 2022;205(1):17-35. doi:10.1164/rccm.202109-2205PP
13. Pal R, Dahal S, Pal S. Prevalence of bronchial asthma in Indian children. Indian J Community Med. 2009 Oct;34(4):310-6. doi: 10.4103/0970-0218.58389.
14. Gomes P, Clemax Couto Sant'Anna, Maria. Quality of Life in Children with Asthma in Rio de Janeiro, Brazil. *Indian J Pediatr*. 2013;80(7):544-548. doi:10.1007/s12098-012-0930-615. Knibbs LD, Woldeyohannes S, Marks GB, Cowie CT. Damp housing, gas stoves, and the burden of childhood asthma in Australia. *Med J Aust*. 2018;208(7):299-302. doi:10.5694/mja17.00469
16. Nogueira KT, Silva JRL, Lopes CS. Quality of life of asthmatic adolescents: assessment of asthma severity, comorbidity, and lifestyle. *J Pediatr (Rio J)*. 2009;85(6):523-530. doi:10.2223/JPED.1957
17. Lau S, Wahn U. Pets—good or bad for individuals with atopic predisposition? *J Allergy Clin Immunol*. 2003;112(2):263-264. doi:10.1067/

mai.2003.166818. Ratageri VH, Kabra SK, Dwivedi SN, Seth V. Factors associated with severe asthma. *Indian Pediatr*. 2000;37(10):1072-1082.
19. Battula M, Arunashekar P, Nagarajan VP. A Prospective Study to Assess the Quality of Life in Children with Newly Diagnosed Asthma and Their Caregivers using the Pediatric Asthma Quality of Life Questionnaire. *J Prim Care Community Health*. 2020;11:2150132720961272. doi:10.1177/2150132720961272
20. Nair S, Nair S, Sundaram KR. A prospective study to assess the quality of life in children with asthma using the pediatric asthma quality of life questionnaire. Ind JACI. 2014;28(1):13. *doi:* 10.4103/0972-6691.134210

SAŽETAK

Utjecaj liječenja na kvalitetu života djece astmatičara u ruralnim sredinama

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Uvod: *Medikamentozna terapija značajno ublažava simptome astme, ali bolest u djece utječe i na psihološke, socioekonomske i obrazovne aspekte života. Studije urbanih područja Indije procijenile su kako ova bolest jasno utječe na kvalitetu života. Cilj našeg istraživanja bio je procijeniti kvalitetu života djece s astmom u ruralnim sredinama prije i nakon liječenja.*

Metode: Prospektivna studija provedena je nakon dobivanja etičkog odobrenja, a uključena su djeca s astmom u dobi od 7 do 17 godina iz ruralnih sredina Indije. Alat korišten za studiju bio je standardizirani upitnik kvalitete života pedijatrijske astme - Standard (PAQLQS) koji je mjeren u vrijeme uključivanja u studiju i četiri tjedna nakon liječenja. Procijenio je QOL (Quality of Life) u domenama simptoma, ograničenja aktivnosti i emocionalnih funkcija. Procijenjena je srednja razlika u PAQLQ rezultatu prije i nakon liječenja.

Rezultati: *Ukupno je uključeno 46 djece iz ruralnih sredina. Većina ispitanika su bili su muškog spola (60%), urednog indeksa tjelesne mase (ITM, 54%) nakon čega je značajn broj ispitanika bio pothranjen (28%). Većina djece u obje dobne skupine 7-11 godina i 12-17 godina imala je umjerenu astmu (80%) odnosno (62%) (prema GINA 2022.) nakon koje je slijedila blaga astma. Ruralna kohorta nakon liječenja pokazala je značajno poboljšanje kod ispitanika ($p < 0,005$), kao i u ukupnom PAQLQ nakon liječenja ($p<0,002$).*

Zaključak: *Ovom studijom smo pokazali da je dobra kontrola astme nakon kratkog trajanja liječenja značajno utjecala na kvalitetu života oboljele djece. U cilju poboljšanja kvalitete života, bolesnicima se preporuča pridržavanje preporučenog liječenja.*

Key words: ASTMA; KVALITETA ŽIVOTA; RURALNA POPULACIJA