Determinants of Good Adherence with Pediatric Asthma Care: A Cross-Sectional Survey in Bangalore, India

Abstract:

Context: Adherence to inhaler medication remains suboptimal amongst pediatric asthma patients, despite adherence being the most effective mechanism to control and improve their condition. Although causes of poor adherence with asthma treatment have been studied extensively, determinants of good adherence have yet to be found in India.

Aims: The purpose of this study was to understand the factors that improve parents' desire to adhere with their child's asthma treatment.

Settings and Design: A survey was created in order to understand predictors of a strong desire to adhere with asthma treatment. Survey topics included common asthma misconceptions, factors that improved the desire to adhere with treatment, and external factors affecting asthma perceptions (eg. COVID-19).

Methods and Material: An oral cross-sectional survey was conducted with parents of adherent pediatric asthma patients using Likert Scale questions.

Statistical analysis used: Logistic regression was performed using R to isolate factors that significantly predict strong adherence.

Results: A good perceived understanding of asthma was found to be the main factor improving adherence. Notably, a good perceived asthma understanding was not related to accurate knowledge about asthma misconceptions. Additionally, the main predictor for a good perceived asthma understanding was a good explanation by the doctor.

Conclusions: A strong doctor-patient-parent relationship is a significant factor improving pediatric asthma adherence levels.

Key-words: Asthma, Adherence, Pediatrics

Key Messages: A strong doctor-parent-patient relationship is essential in order to improve adherence with pediatric asthma care.

Introduction

Asthma is the most common chronic disease in children [1], and pediatric asthma has a prevalence of 15% in India, accounting for 6% of the world's cases [2]. Asthma is a chronic condition that is characterized by inflammation and narrowing of the airways, causing bouts of wheezing, coughing, chest tightening, and shortness of breath [2]. The primary treatment goal for asthma is to gain good control of symptoms, which is achieved through prescribed use of inhaled cortico-steroids (ICS) [3]. However, the average adherence in pediatric asthma is consistently below 50% in India, leading to increased risk for hospital admissions, death, and has severely negative impacts on quality of life [4]. Therefore, it is vital to understand mechanisms to improve adherence.

Causes for poor adherence with asthma care include cost, difficulty understanding proper technique, fear of steroid medication, and language barriers, amongst others [5]. Although factors leading to poor asthma care adherence have been studied extensively both in India and across the world, limited studies have been done to understand the factors that give rise to good adherence. Understanding these factors is necessary in order to design effective treatment regimens that productively improve overall patient adherence levels. This is the first study to examine the primary factors motivating good adherence with pediatric asthma treatment regimens in India.

Methods

Study Population & setting

A cross-sectional survey was conducted over phone and in-person in Bangalore, KA from May 2022 to June 2022. 350 patients were selected from a Bangalore children's hospital database.

Of these, 150 parents consented to take part in this cross-sectional study. 80 of their children were found to fulfill the inclusion criteria– adherence with treatment >= 80% of days [6] and well-controlled asthma, or an Asthma Control Test score of >19 [7].

Study Procedure

Prior to the survey, each participant was provided with information about the study and oral consent was contained. Study variables were obtained through an oral survey, either over phone (20%) or in-person (80%). Questions were posed in a yes/no format or a Likert Scale format, Study variables included the doctor-patient-parent relationship, asthma knowledge and misconceptions, and external factors (eg. COVID-19). Ethical clearance for this study was obtained from a university Institutional Review Board.

Statistical analysis

Likert scale responses were dichotomized into a positive response (Agree/Strongly Agree), or a non-positive response (Neutral, Disagree, Strongly Disagree). Logistic regression was performed using R in order to determine the odds ratio and respective 95% confidence interval for each factor and its effect on the parent's desire to adhere to their child's asthma treatment. Subsequently, models were created in order to determine factors affecting perceived asthma knowledge. Each model was controlled for age, geographic location (urban/rural), level of education, and number of children present in the home. Logistic regression models were checked for validity using the Hosmer/Lemeshow test.

Results

Table 1: Demographic Characteristics (n = 80)

Demographics	**Categories**	**n (%)**
Sex	Male	48 (60.0%)
	Female	32 (40.0%)
Geographic setting	Urban	70 (87.5%)
	Rural	10 (12.5%)
Age	< 5 yo	29 (36.2%)
	>5 yo	51(63.8%)
Number of Children in Home	1	35 (43.7%)
	2	38 (47.5%)
	3+	7 (8.7%)
Parental Education Level	Both parents college or above	58 (72.5%)
	1 parent college or above	11 (13.8%)
	No parents college or above	11 (13.8%)

Table 2: Odds ratio and 95% confidence interval of factors affecting desire to adhere with treatment (n = 80)

Factor	**OR**	**95% CI**	**P value (α = .05)**
Affordability of Inhalers	2.1	(.3, 26.6)	.3
COVID 19	1.3	(.8, 2.31)	.2
Good Perceived Understanding of Asthma	2.8	(1.4, 7.0)	.01*
Duration of symptoms less than 7 days after inhaler use	2.4	(.9, 6.9)	.1

*significant (< .05)

Perceived understanding of asthma was found to be the only significant factor affecting the desire to adhere with treatment. Therefore, factors improving perceived asthma knowledge were studied. Additionally, perceptions about asthma misconceptions were studied in relation to perceived

asthma knowledge in order to determine whether a good perceived understanding of asthma relates to accurate asthma misconception understanding.

Table 3: Factors Affecting Level of Perceived Understanding of Asthma & Association of Asthma Understanding with Misconception Knowledge

Factor	**OR**	**95% CI**	**P value (α = .05)**
Good Explanation of Asthma by the Doctor	20.61	(5.39, 111.15)	$6.8 \cdot 10^{-5}$ *
Practice Using the Inhaler with the Doctor	1.7	(.6, 5.1)	.3
Internet Searches	3.74	(.9, 26.6)	.1
Perception that inhalers are unsafe to use over long time periods	.4	(.1, 1.2)	.1
Belief that the child will outgrow asthma	.7	(.2, 2.5)	.6
Misconception that inhalers are addictive	.6	(.1, 2.0)	.3
Belief that inhalers lose effectiveness over time	1.1	(.3, 4.7)	.9
Belief that oral medication is more effective than inhaled therapy	.1	(0, 3.1)	.3
Misconception that asthma is contagious	4.9	(.6, 112.2)	.2

*significant (< .05)

There were no significant associations found between accurate responses to asthma misconception questions and a good perceived understanding of asthma. The only significant factor found to be associated with a strong perceived asthma understanding was a good explanation by the doctor, suggesting that the doctor-patient-parent relationship therefore plays an important role in improving adherence.

Discussion

Adherence with ICS medication is the primary mechanism by which pediatric asthma patients can gain control of their condition, yet adherence levels remain suboptimal. Though

determinants of poor asthma adherence have been studied, there is a lack of understanding of the factors that encourage families to take their prescribed medication. Therefore, this study explores the primary factors that influence good adherence.

Although affordability has been previously cited as an issue preventing adherence, this study indicates that improving affordability of inhalers does not necessarily improve parents' with inhaler therapy [8]. Similarly, COVID-19 and the duration of symptoms post-inhaler use did not significantly improve parents' desire to adhere with treatment.

A good perceived understanding of asthma was found to be the predominant factor improving the desire to adhere with treatment. Significantly, however, a good perceived understanding of asthma was not related to accurate knowledge about any misconceptions included in the survey. Rather, perceived asthma knowledge was found to improve with a strong relationship with the child's physician, as demonstrated by the strong association between a good explanation of asthma by the doctor and a good perceived understanding of asthma.

Because doctor-parent-patient relationship remained the predominant factor improving perceived understanding of asthma and, subsequently, desire to adhere with treatment amongst the respondents despite unaffordability, doubts about the safety of inhalers, and a discrepancy between perceived knowledge and accurate misconception understanding, it is necessary to understand the strategies that can be employed to fortify this relationship. Literature has described several steps to this end, including forming a personal connection with the patients and parents, spending adequate time with each patient, and fostering an inclusive and non-judgmental space that accommodates individuals from all socioeconomic backgrounds [9] [10]. Additionally, it has been found that parents of pediatric patients gain trust and emotional support from doctors' exercise of authority [11].

The pediatric doctor-patient relationship is unique as the parent is heavily involved in their child's care. In addition, there has been no correlation found between the child's knowledge of asthma or the treatment plan and good adherence, even in older children [12]. Hence, increasing pediatric adherence levels is directly tied to the parent's perception of the treatment and the doctor. While direct doctor-patient communication has been shown to improve patient experience and treatment outcomes, a doctors' positive interactions with their pediatric patients does not have nearly as significant of an impact on parent satisfaction as does accommodating and answering parent questions thoughtfully [10]. In addition, shared decision making with parents regarding the patient's asthma treatment has been shown to increase trust as well as adherence levels [13]. In India, in particular, word of mouth is one of the primary mechanisms by which parents discover and develop confidence in their doctor [14]. Although in-person word of mouth is the predominant form used, electronic word of mouth is becoming increasingly influential, and negative reviews have been found to have a greater impact on consumer perception than positive reviews [15]. Because of this, it is vital that clinicians consistently deliver strong service quality and accurate treatment advice.

One limitation of this study is the distribution of parental education level– 71% of the patients had both parents with a graduate-level education or above. Further studies are needed that target lower socioeconomic groups so as to gain a comprehensive understanding of adherence in those populations. In addition, all patients were sampled from the Shishuka Children's Specialty Hospital database, and thus most parents were from Bangalore. Rural studies can be performed to understand determinants of adherence with asthma treatment in that setting.

This study is the first to isolate factors contributing to good adherence with pediatric asthma treatment regimens in India. Improving the doctor-patient-parent relationship is critical to

improving the parents' perceived understanding of asthma, and therefore overall asthma adherence levels.

References

[1] Singh, S.K., Gupta, J., Sharma, H. *et al.* Socio-economic Correlates and Spatial Heterogeneity in the Prevalence of Asthma among Young Women in India. BMC Pulm Med 2021; 20: 190.

[2] Rashmi, R., Kumar, P., Srivastava, S. *et al.* Understanding socio-economic inequalities in the prevalence of asthma in India: an evidence from national sample survey 2017–18. BMC Pulm Med 2021; 21: 372.

[3] Lindsay JT, Heaney LG. Nonadherence in difficult asthma - facts, myths, and a time to act. Patient Prefer Adherence. 2013;7: 329-336.

[4] Sinha R, Lahiry S, Ghosh S. Suboptimal compliance to aerosol therapy in pediatric asthma: A prospective cohort study from Eastern India. Lung India. 2019; 36(6): 512-518.

[5] Bidwal M, Lor K, Yu J, Ip E. Evaluation of asthma medication adherence rates and strategies to improve adherence in the underserved population at a Federally Qualified Health Center. Res Social Adm Pharm. 2017 Jul-Aug; 13(4):759-766.

[6] Toelle B.G., Marks G.B., Dunn, S.M. Validation of the inhaler adherence questionnaire. BMC Psychol 2020; 8: 95.

[7] Liu A.H., Zeiger R, Sorkness C, Mahr T, Ostrom N, Burgess S, *et al.* Development and cross-sectional validation of the Childhood Asthma Control Test. Journal of Allergy and Clinical Immunology 2006; 119(4): 817-825

[8] Mortimer K., Reddel H.K., Pitrez P.M., Bateman E.D. Asthma management in low- and middle-income countries: case for change. European Respiratory Journal. 2022.

[9] Singh M. Communication as a Bridge to Build a Sound Doctor-Patient/Parent Relationship. Indian J Pediatr. 2016; 83: 33–37.

[10] Kiek T., Ludwien M. Doctor–parent–child communication: A (re)view of the literature. Social Science & Medicine. 2001; 52(6): 839-851.

[11] Bridget Y., Jo W., Mary F., Katja G., Peter S. Examining the validity of the unitary theory of clinical relationships: Comparison of observed and experienced parent–doctor interaction. Patient Education and Counseling. 2011; 85(1): 60-67.

[12] McQuaid E.L., Kopel S.J., Klein R.B., Fritz G.K. Medication adherence in pediatric asthma: reasoning, responsibility, and behavior. J Pediatr Psychol. 2003; 28(5): 323-33.

[13] Klok T, Kaptein AA, Duiverman EJ, Brand PL. It's the adherence, stupid (that determines asthma control in preschool children)! Eur Respir J. 2014; 43(3): 783-91.

[14] Jamid U.I., Farooqi R. Impact of Word-of-Mouth on Consumer Behavior in Indian Healthcare Industry. Global Journal of Finance and Management. 2014; 6(2): 125-132.

[15] Pauli G., Martin S., Greiling D. The current state of research of word-of-mouth in the health care sector. Int Rev Public Nonprofit Mark. 2022.