

The nature and magnitude of temperamental traits in children and young adults with asthma

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Abstract

Background: A child with a chronic illness may be ill or well at any given time, but he is always living with the condition. Asthma is one such chronic illness with a high incidence and prevalence in the pediatric age group. There is some indication that children with bronchial asthma, as a group, are at risk for maladjustment. These children use less-adaptive coping strategies such as withdrawal, blaming themselves or others for their condition, negativity and irritability. These children can also have poorer medical outcomes. The aim of this study was to assess the nature and magnitude of temperamental problems in children and young adults with asthma and to identify the associated risk factors.

Material and methods: This is a cross-sectional comparative study done in the Department of Pediatrics, JK Lon Hospital, Government Medical College, Kota Rajasthan. The study was conducted over a period of 1 year. Rewrite correctly and specify about the matched characteristics. The caretakers/ parents who accompanied study participants were asked about socio-demographic details as well as temperamental and psychological behaviour of their child as per TMS questionnaire.

Results: Children with asthma showed significantly higher activity, rhythmicity, and distractibility scores than healthy controls ($p \leq 0.002$), indicating greater restlessness, structured routines, and susceptibility to distraction. Intensity of reaction did not differ significantly between groups ($p = 0.089$).

Conclusion: Our study found that there were significant differences in the temperamental type and dimensionality between asthmatic children and normal controls.

Keywords: asthma; temperamental scale; approach withdrawal; adaptability; persistence; rhythmicity; threshold of responsiveness; distractibility

Introduction

Children with chronic illnesses may feel isolated, restricted, or overprotected, leading to emotional struggles. However, improved support from parents, schools, and healthcare providers has reduced long-term psychological effects [2]. If unaddressed, these challenges can lead to anxiety, sadness, or rebellious behaviour.

A child with a chronic illness may be ill or well at any given time, but he is always living with the condition. Examples include asthma, epilepsy, diabetes, Crohn's disease, and cystic fibrosis. Chronic conditions are defined by the World Health Organization [WHO] as requiring "ongoing management over a period of years or decades" and cover a wide range of health problems that go beyond the conventional definition of chronic illness, such as heart disease, diabetes and asthma [1]. In children and young adults, asthma is one such disease.

A child with a chronic illness may miss school due to medical appointments or bed rest, affecting learning, friendships, and play. Limited participation in activities like sports can make them feel different and lead to frustration. They may also experience stress from symptoms, pain, and medical treatments like injections

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or surgeries [2]. Children with bronchial asthma may be at risk for maladjustment, often using less-effective coping strategies like withdrawal, self-blame, blaming others, negativity, and irritability. As a result, they tend to experience poorer medical outcomes.

Several factors can influence the psychological health of children with asthma. Loss and restrictions, such as being advised to remove a pet or limit physical activities, can lead to sadness or feelings of grief [2]. Children may also experience a sense of being different or isolated from their peers, which can impact social confidence and self-esteem. Additionally, certain asthma medications may have side effects that affect mood, self-perception, and body image. Emotional reactions to illness, including clinginess, lethargy, sadness, fussiness, anger, tearfulness, or withdrawal, can further challenge a child's emotional well-being and coping ability.

In the context of our study, what does the term temperament mean?: Temperament refers to individual differences in behavioural characteristics which appear early in childhood and are stable to a certain extent [3]. Even though there is a genetic basis for temperamental dispositions of an individual, these are modified by environmental factors. Studies have noted that characteristic temperamental traits may be associated with both physical and psychiatric disorders in children [4].

Studies like Yoldaş TC et al show an increase in behavior problems among preschoolers with chronic illnesses, including tantrums, aggression, withdrawal, and noncompliance [5]. Limited research exists on assessing temperament and behavior in children with bronchial asthma. A study on the TMS, children with asthma received significantly low score on the temperament dimension of rhythmicity indicating that they were more irregular in their habits. No statistically significant differences were present in other temperament dimensions. [6].

The prevalence of Bronchial Asthma has increased continuously since the 1970s, and now affects an estimated 4 to 7% of the people worldwide. Childhood Bronchial Asthma varies widely from country to country. At the age of six to seven years, the prevalence ranges from 4 to 32%. The same range holds good for ages 13 and 14. UK has the highest prevalence of severe Bronchial Asthma in the world [7]. It has also increased the number of preventable hospital emergency visits and admissions. Apart from being the leading cause of hospitalization for children, it is one of the most important chronic conditions causing elementary school absenteeism [8,9]. Childhood Bronchial Asthma

has multifactor causation. Geographical location, environmental, racial, as well as factors related to behaviors and life-styles are associated with the disease [10-12]. Several studies had identified the prevalence of childhood asthma among Indian children [13-16]. However, the true nature of these findings remains confounded in many studies. To look for sources of potential bias and to try and uncover the consistent patterns of prevalence, a systematic review on bronchial asthma among Indian children was conducted by an extensive array of data.

The aim of this study was to assess the nature and magnitude of temperamental problems in children and young adults with asthma and to identify the associated risk factors.

Material and methods

This cross-sectional comparative study was conducted at the Department of Pediatrics, Jklon Hospital, Government Medical College, Kota, Rajasthan, over a one-year period (October 2023–September 2024), including children aged 6–15 years with bronchial asthma as cases and age-, sex-, and socioeconomic status-matched children with other illnesses as controls, using consecutive sampling to select 200 participants in each group.

Sample size

The required sample size for the study was calculated using the formula:

$$N = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times 2 \times p \times (1 - p)}{(p_1 - p_2)^2}$$

where $Z_{\alpha/2}$ is the Z-score for a 95% confidence level (1.96) and Z_{β} is the Z-score for 85% power (1.04). Substituting the values $p=0.325$, $p = 0.325$, $p=0.325$, $p_1=0.40$, and $p_2=0.25$ the calculation was as follows:

$$N = \frac{(1.96 + 1.04)^2 \times 2 \times 0.325 \times (1 - 0.325)}{(0.40 - 0.25)^2} = \frac{3.9488}{0.0225} \approx 175.5 \approx 175$$

Thus, the required sample size per group was 175 participants, resulting in a total of 350 participants. For practical purposes, the study included 400 children, with 200 cases and 200 controls.

- $p_1 = 0.40$ (assumed proportion of temperamental traits in asthmatic children).
- $p_2 = 0.25$ (assumed proportion of temperamental traits in healthy controls).
- p is the pooled proportion, $p = (p_1 + p_2) / 2 = (0.40 + 0.25) / 2 = 0.325$

For cases, participants were required to have a diagnosis of asthma for more than one year, be within the specified age range, and have parental consent to participate in the study. For controls, healthy children matched with cases by age, sex, and socioeconomic status were included, provided they were within the same age range, did not have asthma, and whose parents consented to their participation.

Children were excluded from the study if they had chronic illnesses other than bronchial asthma, if they had mental retardation, primary psychiatric disorders, or neurological disorders including epilepsy, or if their parents did not provide consent for participation in the study.

The study utilized a structured questionnaire as the primary tool, consisting of three sections: the first section collected socio-demographic details of the participants, and the third section comprised the TMS (Temperamental Measurement Scale) questionnaire to assess temperamental characteristics.

Section I of the questionnaire was pre-tested and pre-structured through a pilot study. Section III included the Temperament Measurement Schedule (TMS), which is an Indian adaptation of Thomas and Chess's schedule for temperament assessment. The TMS evaluates nine dimensions of temperament: activity, intensity, approach-withdrawal, adaptability, mood, persistence, rhythmicity, threshold of responsiveness, and distractibility. It is a bilingual, semi-structured scale with five items for each dimension, providing averaged scores for all nine temperaments. These nine dimensions are further reduced to five factors through factor analysis. Scores for each factor were obtained by summing the scores of their constituent dimensions, which include: Sociability (comprising approach-withdrawal, adaptability, and threshold of responsiveness), Emotionality (mood and persistence), Energy (activity and intensity), Distractibility, and Rhythmicity.

After obtaining permission from institutional ethics committee and consent from eligible study participants' parents; the cases and controls were matched for age, sex and socioeconomic status. 100 matched cases and controls pairs were selected [1:1 ratio]. The caretakers/parents who accompanied study participants were asked about socio-demographic details as well as temperamental and psychological behaviour of their child as per TMS questionnaire.

Statistical analysis

The information thus collected was entered into

Microsoft Excel sheet. Thereafter the TMS Scores were consolidated into final scoring patterns and entered into excel sheet. The data were then analyzed with the help of SPSS 22.0 software in terms of mean, SD, Range and appropriate test of significance wherever required.

Results

Table 1 shows that an equal number of participants were included in both the case and control groups across all age categories, with the majority of cases and controls (54%) belonging to the 6–9 years age group. An equal number of cases and controls were included for both males and females, with males being more predominant than females in both study groups.

Table 1: Demographic characteristics of cases and controls.

Parameter		Cases (n=200)	%	Controls (n=200)	%
Age group (years)	6–9	108	54	108	54
	10–12	63	31.5	63	31.5
	13–15	29	14.5	29	14.5
Mean age (years)	Mean ± SD	9.86 ± 2.18	–	9.86 ± 2.18	–
Sex	Male	113	56.5	113	56.5
	Female	87	43.5	87	43.5

Table 2 presents the distribution of cases and controls according to family history of asthma. It was observed that 5% of the cases had a positive family history of asthma, compared to only 1.5% among the controls, indicating a higher prevalence of familial occurrence among children with asthma.

Table 2: Distribution of cases and controls according to family history of asthma.

Family history	Case		Control	
	No.	%	No.	%
+ve	10	5	3	1.5
-ve	190	95	197	98.5
Total	200	100	200	100

Table 3 shows the distribution of cases according to the duration of asthma in years. The majority of children (38%) had been suffering from asthma for 7–9 years, followed by 35.5% of children who had asthma for a duration of 4–6 years and the distribution of cases according to the severity of asthma. Nearly equal proportions of children were found to have mild and moderate asthma, while only 5% of the cases were classified as having severe asthma.

Table 4 compares various temperamental dimensions between children with asthma (cases) and healthy children (controls). Children with asthma demonstrated significantly lower scores in several key temperament domains.

Table 3: Cases according to duration of asthma [in years] and severity of asthma.

Variable	Category	No.	%
Duration of asthma (years)	1-3	22	11
	4-6	71	35.5
	7-9	76	38
	10-12	31	15.5
Severity of asthma	Mild	97	48.5
	Moderate	93	46.5
	Severe	10	5

The Approach/Withdrawal scores were significantly lower among cases (16.39 ± 3.57) compared to controls (20.65 ± 1.85), with the difference being highly statistically significant ($p = 0.001$), indicating a greater tendency toward withdrawal in children with asthma.

Similarly, Adaptability scores were lower in cases (16.37 ± 3.18) than in controls (17.17 ± 1.81), and this difference was statistically significant ($p = 0.002$), suggesting reduced ability to adjust to changes among asthmatic children. A markedly significant difference

was observed in Threshold Responsiveness, where cases had substantially lower mean scores (13.92 ± 3.47) compared to controls (21.22 ± 1.78) ($p = 0.0001$), indicating increased sensitivity to environmental stimuli in children with asthma.

In contrast, Mood scores did not differ significantly between cases (19.47 ± 2.63) and controls (19.50 ± 2.30) ($p = 0.09$), suggesting comparable mood patterns in both groups. The Persistence dimension showed significantly lower scores among cases (16.43 ± 3.22) compared to controls (18.80 ± 3.13) ($p = 0.001$), reflecting reduced ability to sustain attention and effort in children with asthma.

Children with asthma exhibited significantly higher Activity Levels (19.21 ± 2.97) than controls (14.63 ± 2.38) ($p = 0.001$), indicating greater restlessness or hyperactivity. Rhythmicity scores were also significantly higher among cases (19.84 ± 3.12) compared to controls (19.00 ± 2.33) ($p = 0.002$), possibly reflecting structured routines related to disease management. No statistically significant difference was found in Intensity of Reaction between cases (17.73 ± 3.05) and controls (17.28 ± 2.16) ($p = 0.089$).

Lastly, Distractibility scores were significantly higher among asthmatic children (17.94 ± 3.06) compared to healthy controls (12.90 ± 2.17), with the difference being highly significant ($p = 0.001$), indicating greater susceptibility to distraction.

Table 4: Comparison of temperamental dimensions between cases and controls.

Temperament Dimension	Group	Mean $\pm$ SD	Min	Max	p-value
Approach / Withdrawal	Cases	16.39 ± 3.57	12	24	0.001
	Controls	20.65 ± 1.85	18	23	
Adaptability	Cases	16.37 ± 3.18	11	22	0.002
	Controls	17.17 ± 1.81	15	20	
Threshold responsiveness	Cases	13.92 ± 3.47	7	23	0.0001
	Controls	21.22 ± 1.78	19	24	
Mood	Cases	19.47 ± 2.63	15	24	0.09
	Controls	19.50 ± 2.30	16	24	
Persistence	Cases	16.43 ± 3.22	10	29	0.001
	Controls	18.80 ± 3.13	14	23	
Activity level	Cases	19.21 ± 2.97	12	24	0.001
	Controls	14.63 ± 2.38	11	18	
Rhythmicity	Cases	19.84 ± 3.12	13	26	0.002
	Controls	19.00 ± 2.33	17	22	
Intensity of reaction	Cases	17.73 ± 3.05	12	22	0.089
	Controls	17.28 ± 2.16	14	20	
Distractibility	Cases	17.94 ± 3.06	12	26	0.001
	Controls	12.90 ± 2.17	10	16	

Discussion

This study demonstrated that children with asthma exhibited significant differences in several temperamental dimensions compared to healthy controls. Specifically, asthmatic children had lower scores in approach/withdrawal, adaptability, and threshold responsiveness, indicating potential challenges in adjusting to new environments, socializing with peers, and responding positively to change. The reduced adaptability score ($p = 0.002$) suggests difficulty in coping with routine changes, which may be exacerbated by lifestyle restrictions imposed by asthma management. Similarly, a lower approach/withdrawal score ($p = 0.001$) reflects a tendency toward social withdrawal, potentially arising from anxiety about their condition or prior experiences of discomfort during physical or social activities.

While mood scores did not differ significantly between cases and controls ($p = 0.90$), persistence levels were notably lower among asthmatic children ($p = 0.001$). This reduced persistence may reflect a diminished capacity to maintain effort in tasks, likely influenced by frequent health-related disruptions. Such findings are consistent with previous studies highlighting increased risks of attention and motivation difficulties in children with chronic illnesses [17, 18]. The unpredictable nature of asthma exacerbations may contribute to feelings of helplessness, resulting in lower persistence in both academic and social settings.

Interestingly, the study observed significantly higher activity levels among asthmatic children compared to controls ($p = 0.001$). Although asthma is often associated with exercise limitations, some children may demonstrate heightened activity due to restlessness or compensatory behaviors, reflecting variability in disease severity. Additionally, higher rhythmicity scores ($p = 0.002$) indicate that asthmatic children may follow more predictable biological and behavioral patterns, potentially due to structured medication schedules and health-related routines enforced by caregivers [19].

Another notable finding was the significantly higher distractibility scores among asthmatic children ($p = 0.001$), suggesting greater difficulty maintaining attention and resisting distractions. This may negatively impact academic performance, particularly when compounded by frequent school absences. Structured classroom interventions, such as minimizing distractions and providing personalized learning strategies, may help support the cognitive and academic development of these children [18].

The findings of this study align with prior research indicating that children with chronic illnesses are at

increased risk for psychosocial and temperamental maladjustment. In a similar study, Kim SP, Ferrara A, and Chess S. et al. found that the temperamental profile of children with asthma is characterized by lower rhythmicity, lower adaptability, lower intensity of reaction, lower mood value, and lower persistence [17]. Similarly, Fan et al. noted significant differences in adaptability, mood value, and attention persistence of temperament between asthmatic patients and normal controls [18]. Rajesh TV, Krishnakumar P, and Mathews L reported that children with asthma scored significantly lower on rhythmicity, indicating that they were more irregular in their habits, while no statistically significant differences were present in other temperament dimensions [19].

Furthermore, Priel et al. found that maternal reports of infant rhythmicity significantly improved the prediction of asthma among wheezy babies [20]. Collectively, these findings reinforce the observation that asthma in childhood is associated with distinct temperamental patterns, particularly in adaptability, persistence, activity, rhythmicity, and distractibility.

Conclusion

Children with asthma exhibit distinct temperamental traits, including lower adaptability, reduced persistence, and increased distractibility, which can affect academic performance, social interactions, and overall development. Early identification and interventions that incorporate structured routines, environmental adjustments, and supportive peer interactions can help these children manage challenges effectively. Schools and caregivers should provide accommodations, such as extended time for assignments and modified physical activities, while parental involvement remains crucial in fostering resilience and independence. A holistic asthma management approach that addresses both medical and temperamental aspects can enhance adaptability and persistence. Future research should explore long-term developmental outcomes and strategies to support asthmatic children in coping with these traits, improving their overall well-being and success.

Conflicts of interest

Authors declare no conflicts of interest.

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