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Original Article

Effect of Mitchell's Physiological Relaxation Technique Educational Program on Ameliorating Pediatric Asthma Severity, Stress, Anxiety, and Depression

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ABSTRACT

Background: Bronchial asthma is a common chronic inflammatory airway disease that significantly affects children's health and quality of life. Therefore, integrating safe and effective complementary therapies, such as Mitchell's physiological relaxation technique, alongside standard medical care may help improve both clinical and psychological outcomes. **The aim of the study was** to evaluate the effect of Mitchell's physiological relaxation technique educational program on ameliorating pediatric asthma severity, stress, anxiety, and depression. **Research design:** A quasi-experimental research design was utilized. **Setting:** The study was conducted at the Inpatient Pediatric Chest Unit at Tanta Main University Hospital. **Subjects:** A purposive sampling of 80 children from the previously mentioned setting. They were divided into two equal groups. **Tools of the study:** Three tools were used. **Tool I:** Socio-demographic and clinical profile of children with asthma questionnaire. **Tool II:** Pediatric asthma severity score. **Tool III:** depression anxiety stress scales – youth version. **Results:** The study found significant improvements in pediatric asthma severity scores in both the study and control groups pre- to post-program, with greater improvement in the study group post-educational program (p=0.003). The study group showed significant reductions in depression, anxiety, and stress post-educational program. **Conclusion:** Applying Mitchell's physiological relaxation technique had a significant positive effect in ameliorating pediatric asthma severity, stress, anxiety, and depression. **Recommendations:** Providing regular in-service training programs for pediatric nurses regarding Mitchell's physiological relaxation technique application to enhance asthma care.

Keywords: Anxiety, Asthma Severity, Depression, Educational Program, Mitchell's Physiological Relaxation Technique, Pediatric Asthma, and Stress.

Introduction

Pediatric asthma, a prevalent Type 2 inflammatory disorder of the lower airways, imposes a significant disease burden globally, with 30-50% of cases remaining uncontrolled despite pharmacotherapy (**Global Initiative for Asthma (GINA), 2023; Dharmage et al., 2019**). Furthermore, there was a bidirectional relationship between asthma and mental health that created a vicious cycle, worsening both **(Griffiths et al., 2021).**

Emerging evidence delineates a reciprocal relationship between pediatric asthma and generalized anxiety disorder (GAD), mediated by dysregulated hypothalamic-pituitary-adrenal (HPA) axis activity and elevated IL-6 production **(Ye et al., 2021).** These neuroendocrine disturbances may worsen asthma control through enhanced parasympathetic tone and elevated pro-inflammatory cytokine production—key mediators in asthma pathogenesis **(Ye et al., 2021; Yang et al., 2017).**

Moreover, psychiatric comorbidity significantly exacerbates asthma-related symptoms, including dyspnea, hypoxic episodes, and acute exacerbations, while simultaneously diminishing quality of life and increasing healthcare expenditures **(Christensen et al., 2022).** Also, children with severe asthma frequently experience comorbid anxiety and depression, which significantly worsens disease prognosis and increases complication risks **(GINA, 2023; Sastre et al., 2018).** Research indicates these psychological co-morbidities correlate with poorer clinical outcomes, including more frequent asthma attacks, severe dyspnea, emergency visits, hospitalizations, and medication side effects **(Ritz et al., 2016).**

Also, the perceived inadequacy of asthma treatments may exacerbate some mental health symptoms while substantially reducing quality of life (**Montalbano et al., 2020).** Psychological factors like illness uncertainty, diminished self-esteem, and catastrophic thinking patterns further negatively influence children's disease perception and well-being **(Dafauce et al., 2021)**. Alarmingly, many researchers suggested a link between suicidal behavior and asthma, even when controlling for the effects of socioeconomic status, physical health status, comorbid chronic medical diseases, and depressive mood **(Vázquez et al., 2021; Chung et al., 2016).**

On the other hand, corticosteroid therapy represents a critical factor in understanding the association between asthma and psychiatric conditions. While these medications effectively manage acute asthma exacerbations, prolonged administration may negatively impact both physical and psychological well-being **(Nasereddin et al., 2024).** Corticosteroid use in asthma treatment presents significant neuropsychiatric implications, with both systemic and inhaled forms associated with cognitive impairment, mood disorders, and metabolic complications**.** These medications may disrupt hippocampal neurogenesis through glucocorticoid-mediated pathways **(Nasereddin et al., 2024; Alturaymi et al., 2023; Savas et al., 2020).** Also, the timing of corticosteroid dosing may influence psychological outcomes, as morning administration potentially aligns better with natural cortisol rhythms **(Mohd Azmi et al., 2021).**

The complex interplay between these psychological conditions and asthma pathophysiology warrants further investigation to optimize comprehensive treatment approaches. Relaxation techniques represent evidence-based interventions designed to alleviate both physiological and psychological manifestations of stress **(Verma et al., 2025).** These psychophysiological approaches, widely incorporated into therapeutic practice, serve as effective adjunct therapies for managing diverse clinical conditions, including mood disorders, chronic pain, and stress-related conditions **(Volpato et al., 2018).**

Mitchell's Physiological Relaxation Technique (MPRT), a specialized form of progressive muscle relaxation (PMR), offers significant benefits for pediatric asthma management by promoting diaphragmatic breathing and reducing respiratory muscle tension, though more research is needed to fully establish its efficacy **(Saxena et al., 2024; Raipure & Patil, 2023).** The technique, originally

developed by Laura Mitchell in 1977, corrects stress-induced postural deviations by counteracting the characteristic "punching stance" associated with heightened sympathetic arousal (**Linardatou et al., 2014).** This structured approach helps children gain better breathing control, potentially decreasing asthma attack frequency and severity through combined "top-down" and "bottom-up" neuronal processing. Studies demonstrate that MPRT/PMR effectively reduces stress and depression while improving oxygenation and cardiac function when paired with deep breathing techniques (**Raipure & Patil, 2023; Hamdani et al., 2022).**

Moreover, MPRT employs a systematic approach involving deliberate countermovement to tense body regions followed by controlled release, facilitating comprehensive muscular relaxation. The technique operates through a neurophysiological mechanism whereby targeted muscle group activation induces automatic relaxation in corresponding antagonist muscles **(Ganesh et al., 2017).** Also, the intervention is cost-effective, requiring minimal training for healthcare providers (**Raipure** & **Patil, 2023).** Thus, providing ongoing, cost-effective, and evidence-based education on MPRT is crucial for pediatric nurses. MPRT education is a key in closing the gap between the most up-to-date evidence and the practices currently used in clinical settings.

Significance of the study

Despite advances in pharmacotherapy, 30-50% of pediatric asthma cases remain uncontrolled (**GINA, 2023; Dharmage et al., 2019**), highlighting the need for complementary interventions. This study addresses this gap by evaluating Mitchell's Physiological Relaxation Technique (MPRT) as an evidence-based nursing intervention that targets both respiratory symptoms and psychological comorbidities, which are increasingly recognized as key contributors to poor asthma outcomes. By integrating MPRT into standard care, nurses can adopt a holistic, patient-centered approach that enhances asthma management while mitigating the adverse effects of prolonged corticosteroid use. The intervention's practicality and low-cost nature make it particularly valuable for implementation across diverse clinical settings, including resource-limited environments. Furthermore, this study contributes to nursing science by demonstrating how non-pharmacological strategies can improve both physiological and psychological outcomes, thereby optimizing quality of life for pediatric asthma patients. The findings underscore the pivotal role of nurses in bridging the gap between biomedical and psychosocial care, ultimately supporting the shift toward integrative asthma management models in clinical practice.

Aim of the Study:

The aim of this study was to evaluate the effect of Mitchell's physiological relaxation technique educational program on ameliorating pediatric asthma severity, stress, anxiety and depression

Research Hypothesis:

H1: Asthmatic children who will receive Mitchell's physiological relaxation technique educational program are expected to have a positive effect on ameliorating pediatric asthma severity.

H2: Asthmatic children who will receive Mitchell's physiological relaxation technique educational program are expected to have a positive

effect on ameliorating stress, anxiety, and depression.

Subjects and Method

Research Design:

A quasi-experimental research design was utilized.

Settings:

This study was conducted at the Inpatient Pediatric Chest Unit at the Pediatrics Department of Tanta Main University Hospital, which is affiliated with the Ministry of Higher Education and Scientific Research.

Subjects: A purposive sampling of 80 children aged from 7 to 18 years was included from the previously mentioned setting. They were divided into two equal groups:

- **Study group**: Comprised of 40 asthmatic children who received Mitchell's physiological relaxation technique educational program.
- **Control group**: Comprised of 40 asthmatic children who received the standard hospital medical care for bronchial asthma (drug therapy, oxygen therapy, or other interventions were customized for each patient according to their medical condition*).*

The total estimated number of asthmatic children is 100 children per year, using Epi Info 10 to estimate the minimum sample size required. The minimum sample size was 71, but the researchers recruited 80 children for better coverage of the phenomenon. The sample size was calculated using the following parameters: 95% confidence coefficient, 80% prevalence rate, and 5% acceptable error.

Inclusion criteria:

- Both sexes of children aged from 7 to 18 years.
- Children had bronchial asthma for at least 6 months before the start of the study.
- Children are free from any other chronic diseases such as cardiac or renal diseases or psychiatric disorders.

Tools for data collection:

This current study utilized three tools for data collection, namely, Socio-demographic and Clinical Profile of Children with Asthma Questionnaire, Pediatric Asthma Severity Score (PAS), and Depression Anxiety Stress Scales – Youth Version (DASS-Y).

Tool I: Socio-demographic and clinical profile of children with asthma questionnaire.

It was developed by the researchers after a review of literature. It consists of three parts, namely, socio-demographic characteristics related to asthmatic children, medical history of asthmatic children, and general knowledge of asthmatic children about bronchial asthma and Mitchell's physiological relaxation technique. (**Raipure** & **Patil, 2023; Hamdani et al., 2022*;* Maue et al., 2017).**

Tool II: Pediatric Asthma Severity Score (PAS):

The Pediatric Asthma Severity Score employed a 3-point Likert scale, assigning 1 point for mild, 2 for moderate, and 3 for severe asthma symptoms per item. The total score (range: 5-15) was derived by summing five variables' scores, with severity classified as mild (5-7 points), moderate (8-11), or severe (12-15) ***(*Maue et al., 2017).**

Tool III: Depression Anxiety Stress Scales – Youth Version (DASS-Y):

This tool was developed by **Szabo and Lovibond (2022).** The DASS-Y (21-item version) measures psychological distress in asthmatic children aged 7-18, assessing depression, anxiety, and stress through simplified questions tailored for youth. Depression symptoms include items (3, 5, 10, 13, 16, 17, and 21), anxiety symptoms include items (2, 4, 7, 9, 15, 19, and 20); and stress symptoms include items (1, 6, 8, 11, 12, 14, and 18). It generates total scores (0-63) and subscale scores (0-21 per domain**) (Marianna and Peter, 2022).**

Cutoff scores for the DASS-Y scales and total scores are as follows:

For the depression subscale, 0–6 points are defined as normal, 7–8 points as mild, 9–13 points as moderate, 14–16 points as severe, and ≥17 points as extremely severe.

- For the anxiety subscale, 0–5 points indicate normal, 6–7 points mild, 8–12 points moderate, 13–15 points severe, and ≥16 points extremely severe anxiety.
- Stress subscale, 0–11 points are defined as normal, 12–13 points indicate mild stress, 14–16 points indicate moderate stress, 17–18 points are defined as severe stress, and 19 points and above indicate extremely severe stress.
- For the total of DASS scale, 0–23 points are defined as normal, 24–29 points as mild, 30–39 points as moderate, 40–46 points as severe, and ≥47 points as extremely severe**.**

Method

1. Administrative steps:

- Official permission was obtained from the directors of the hospital of the selected setting (Inpatient Pediatric Chest Unit, in the Pediatrics Department at Tanta Main University Hospital).
- The study was designed to ensure no physical or psychological harm to participants.
- All collected data was handled with strict confidentiality and privacy protection.
- Verbal consent was obtained from both the children and their mothers after explaining the study's purpose, emphasizing their right to withdraw at any time without consequence.

2. Ethical and legal considerations:

Ethical considerations: Approval was obtained from the Scientific Research Ethical Committee at the Faculty of Nursing, Tanta University, with the assigned ethical approval code No: 557-11-2024.

Oral consent was taken from children and their mothers to participate in the study. The researchers emphasized that the participation in the study is voluntary and anonymous. Children and their mothers were informed of the confidentiality of their names, all data obtained from them, the nature of the study, and their right to withdraw from the study at any time.

3. Tools Development: Three study tools were structured and developed based on a review of the related literature, namely, Socio-demographic and Clinical Profile of Children with Asthma Questionnaire (tool I), the Pediatric Asthma

Severity Score (PAS) (tool II), and the Depression Anxiety Stress Scales – Youth Version (DASS-Y) (tool III).

4. **Content validity:** The tools were reviewed by a jury of three pediatric nursing experts to assess their clarity, efficiency, and content validity. Based on their evaluation, necessary adjustments were implemented. The experts confirmed the tool's face validity after analyzing the content validity of its items.
5. **A pilot study**: Before starting collection of data, the tools were pretested in the same study setting. The tools were assessed for their accuracy, feasibility, clarity, and reliability. A pilot study was conducted with 10% of the studied subjects (8 children with asthma). Based on the findings, certain questions were reorganized, and some items were reworded for clarity. The children who participated in the pilot study were excluded from the final sample and replaced with new participants.
6. **Reliability:** An appropriate statistical test was used to evaluate the tool's internal consistency. The coefficient value for the pediatric asthma severity score scale was 0.83, and for the depression anxiety stress scales—youth version, it was 0.87.

Phases of the study: Assessment, planning, implementation, and evaluation comprised the teaching program's four phases of the present study.

1. Assessment phase:

The researcher interviewed each studied child and their mother individually and briefly explained the nature and the purposes of the study and asked for participation. All patients were informed that participation is voluntary after obtaining acceptance from each patient to participate in the present study.

Collection of data began with the socio-demographic and clinical profile of children with asthma questionnaire, and it was completed within 10 to 15 minutes for each patient. After that, the Pediatric Asthma Severity Score (PAS) scale was also completed within about 5 minutes for each patient; in the end, Depression Anxiety Stress Scales – Youth Version (DASS-Y) took about 10 minutes for each participant. So, each patient needs about 25-30 minutes to complete the questionnaire. Filling out the previously mentioned tools was done by the researcher before implementation of Mitchell's physiological relaxation technique educational program.

2- Planning phase:

Following the findings of a requirements analysis and a literature review, the educational program for asthmatic children was designed with the following: a) Defining clear learning objectives for the educational program. b) Developing content and explaining the purpose of the program. c) Incorporating interactive teaching methods such as PowerPoint slides, illustrated booklets, visual aids, and hands-on demonstrations. Children in the study group participated in Mitchell's physiological relaxation technique educational program. While those in the control group received only standard hospital care for bronchial asthma (drug therapy, oxygen therapy, or other interventions were customized for each patient according to their medical condition).

3- Implementation phase:

- Prior to program implementation, researchers conducted pretest interviews with eligible participants' children individually after obtaining verbal consent, ensuring adherence to inclusion criteria.
- The educational program content and its objectives were developed by the researcher in the form of six sessions (two sessions for the theoretical parts and four sessions for the practical parts). Each session takes about 30-40 minutes according to the patient's understanding and span of attention. The children were divided into 10 smaller groups of 8 children for each session.

Researchers conducted morning and afternoon sessions (9:00 am-6:00 pm) three days weekly for two weeks at Tanta University Hospital's Pediatric Chest Unit. The data collection of this study was collected over a period spanning five months (December 2024-April 2025), encompassing pretest, intervention delivery, and immediate posttest administration.

- **Study group: who received Mitchell's physiological relaxation technique educational program**

Structured Sessions for Mitchell's Physiological Relaxation Technique Educational Program in Pediatric Asthma Patients

Program Introduction: (Time: 10-15 min)

The preliminary session established program objectives and expected outcomes and determined the meeting time that was 3 times/week. Researchers obtained verbal confirmation of participant understanding and commitment

Session 1: Theoretical session (Time: 30 min)

The main objective of this session was to help the patients to identify bronchial asthma disease (definition, clinical manifestations, common triggers and exacerbation factors, and pharmacological treatment).

Session 2: Theoretical session (Time: 30 min)

The main objective of this session was to help the patient to gain overview knowledge about Mitchell's physiological relaxation technique.

Session 3: practical session (Time: 30 min)

The main objective of this session was to help the patients to apply steps of Mitchell's physiological relaxation technique that targeted lower body part anatomical regions sequentially (feet, calves, thighs, and trunk)**.**

These steps are performed during each respiratory cycle and include the following:

1. **Positioning:** Semi-Fowler's position with knee support or any comfortable position.
2. **Breathing:** Inhale deeply for 4 counts (let abdomen rise), exhale slowly for 4 counts. Repeat once, then resume natural breathing, and with each breath, sink deeper into relaxation.
3. **Progressive sequence:**
   - **Feet:** fully extend feet, hold for 4 sec, release for 4, and feel the contrast between tension and relaxation.
   - **Calves:** Flex toes/ankles upward to stretch calves**,** hold for 4 sec, release for 4, and pay attention to the relaxed state afterward.
   - **Thighs:** Rotate thighs outward (away from each

other), hold for 4 sec, release for 4, and sense the relief as muscles unwind.

- **Trunk:** Press your torso firmly into the bed/chair, release and let muscles go slack, and notice how your body feels fully supported without effort.

Session 4: practical session (Time: 30 min)

The main objective of this session was to help the patients to apply the steps of Mitchell's physiological relaxation technique that targeted upper body part anatomical regions sequentially (hands, elbows, shoulders, eyes, mouth & jaw). These steps are performed during each respiratory cycle and include the following:

1. **Positioning:** Semi-Fowler's position with knee support or any comfortable position.
2. **Breathing:** Inhale deeply for 4 counts (let abdomen rise), exhale slowly for 4 counts. Repeat once, then resume natural breathing, and with each breath, sink deeper into relaxation.
3. **Progressive sequence:**

- **Hands:** fully extend fingers, hold for 4 sec, release for 4, and feel the contrast between tension and relaxation.
- **Elbows:** Straighten arms by stretching elbows, hold for 4 sec, release for 4, and observe the change in muscle position.
- **Shoulders**: Gently pull shoulders down toward your feet, hold for 4 sec, release for 4 sec, and notice the shift in muscle tension as you relax.
- **Eyes:** Close eyes while lifting eyebrows high, hold tension for 4 sec, then relax, and feel the softening around your forehead and eyes.
- **Mouth & Jaw:** Keep lips lightly closed, and teeth slightly apart, let tongue rest loosely in the middle of your mouth, and notice the release of tension in your jaw and cheeks

Session 5-6: practical sessions (Time: 30 min)

The main objective of this session was to help the patients to apply all steps of Mitchell's physiological relaxation technique that targeted all body part anatomical regions sequentially with proprioceptive awareness of tension release during each respiratory cycle

Ending session: (Time: 10 min)

Global summarization after termination of the six sessions for the patient. In addition to evaluating the effectiveness and the outcomes of the educational program implementation.

- **The control group received the standard hospital medical care for bronchial asthma (drug therapy, oxygen therapy, or other interventions were customized for each patient according to their medical condition).**

4.Evaluation phase:

After the implementation of Mitchell's Physiological Relaxation Technique educational program, the evaluation phase commenced. For the study group, a post-test was administered after the end of the program sessions, using the same tools (Tool II and III) as the pre-test to assess program outcomes. In contrast, the control group—which received only standard hospital care for bronchial asthma—underwent their post-test two weeks after the pre-test (also using Tools II and III).

Statistical Design:

The study used IBM SPSS version 20.0 for data analysis, employing percentages and numbers for qualitative data and the Shapiro-Wilk test to assess normality. Quantitative data were described using range, mean, standard deviation, and median, with significance set at 5%. Seven statistical tests were applied, including the chi-square test for categorical data (with Monte Carlo correction for small expected counts) and the marginal homogeneity test for different stages. Parametric tests like Student's t-test, ANOVA (F-test), and paired t-test were used for normally distributed data, while the Pearson coefficient assessed correlations between such variables. The analysis relied on IBM Corp's 2011 software for all statistical procedures.

Results:

Figure (1): Socio-demographic Characteristics of the studied asthmatic children illustrates that more than half (55%) of the study group and more than two-thirds (65%) of the control group were less than 10 years old, with males comprising 67.5% and 75% of the study and control groups, respectively. Nearly most children in both groups (80% and 85%) attended primary school. Additionally, less than three-quarters (72.5%) of the study group and the majority (82.5%) of the control group resided in rural areas.

Table (1): **The distribution of the studied asthmatic children according to their medical history** clarified that half of the study group (50%) and less than two-thirds (60%) of the control group had asthma attacks lasting 4–6 days, with 100% of both groups currently using nebulizers/inhalers, while more than three-quarters (77.5%) of the study group and more than half (57.5%) of the control group had comorbid allergies. Most children in the study and the control groups (87.5% and 82.5%, respectively) developed asthma before age 2, with attacks recurring monthly in 42.5% and 47.5%, respectively. A family history of asthma was more common in the study group (82.5% vs. 72.5%), affecting over half of their parents, while comorbid allergies in families were reported in more than one-third (35%) of the study and half (50%) of the control group children.

Table (2): **Distribution of total level scores of total pediatric asthma severity score (PAS) of studied asthmatic children** shows that statistically significant differences were found among the study group children and among control group children in relation to the total level scores of the total pediatric asthma severity score (PAS) pre- and directly post-educational program ($p < 0.001$, $p = 0.005$, respectively). Also, statistically significant differences were noticed between the two studied groups as regards the total level scores of the pediatric asthma severity score (PAS) directly post educational program ($p = 0.003$).

Table (3): **Distribution of total level scores of depression, anxiety, and stress scales—youth version (DASS-y) subscales of studied asthmatic children** presents that statistically significant differences were found among study group children pre- and directly post educational program regarding total level scores of depression, anxiety, and stress

(p=0.002, p<0.001, and p<0.001, respectively). Also, statistically significant differences were noticed between the two studied groups directly post educational program as regards to the total level scores of depression, anxiety, and stress **(p=0.012, p<0.001, and p<0.001, respectively).**

Table (4): Distribution of total level scores of depression anxiety stress scales of studied asthmatic children demonstrates that statistically significant differences were discovered among study group children pre- and directly post educational program regarding total level scores of depression anxiety stress scales—youth (DASS-Y) (p<0.001). Furthermore, statistically significant differences were observed between the two studied groups directly post educational program as regards to the total level scores of depression, anxiety, and stress scales—youth (DASS-Y) (p<0.001)

Table (5) Correlation between pediatric asthma severity score (PAS) and depression anxiety stress scales – youth illustrates that statistically significant and positive correlations were detected among study group children directly post educational program regarding pediatric asthma severity score versus depression (p=0.036 and r = 0.332), anxiety (p=0.024 and r = 0.356), stress (p=0.014 and r = 0.386), and depression anxiety stress scale – youth (DASS-Y) (p<0.001 and r = 0.739).

Table (6) Correlation between pediatric asthma severity score and depression anxiety stress scale—youth with age presents that statistically significant and negative correlations were detected among study group children directly post educational program regarding age versus pediatric asthma severity score (PAS) **(p < 0.001 and** r = -0.892), depression (p = 0.005 and r = -0.431), anxiety (p = 0.045 and r = -0.319), stress (p = 0.042 and r = -0.323), and depression anxiety stress scale—youth (DASS-Y) (p < 0.001 and r = -0.692). However, a statistically significant and negative correlation was found among control group children directly post educational program regarding age versus pediatric asthma severity score (PAS) (p = 0.019 and r = -0.370)

Table (7) Relation between total pediatric asthma severity score (PAS) with age, clarified that statistically significant differences were discovered among study group children and among control group children directly post educational program (p<0.001, p=0.018, respectively).

Table (8) Relation between total score of depression anxiety stress scale–youth (DASS-Y) with age, shows that a statistically significant difference was detected among study group children directly post educational program **(p<0.001).**

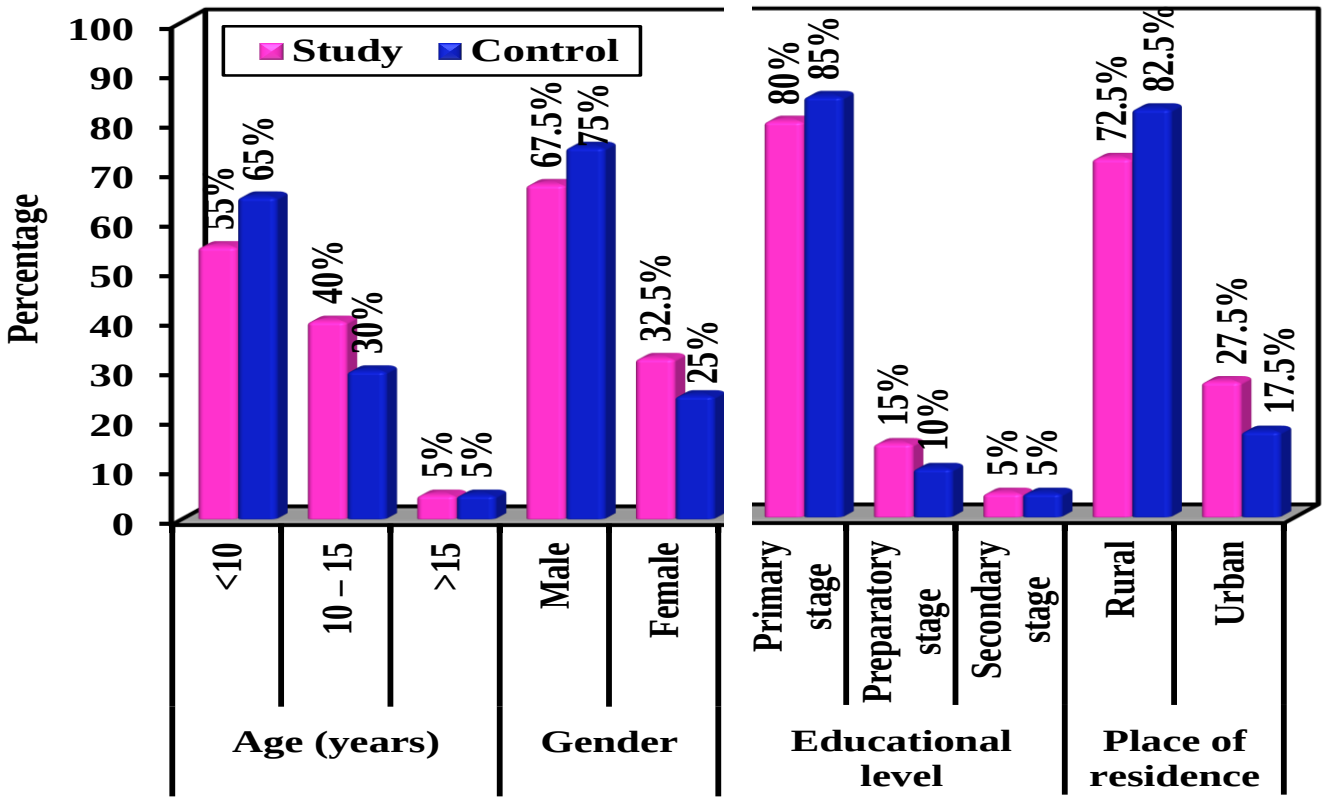

Figure (1): Socio-demographic Characteristics of the Studied Asthmatic Children (n=80)

Table (1): Distribution of the Studied Asthmatic Children regarding their Medical History (n=80)

Medical history of asthmatic children	Study (n = 40)		Control (n = 40)		Test of Sig.	P
	No.	%	No.	%		
A- The child's present medical history:						
Onset of the present asthma attack						
Since 1-3 days	16	40.0	13	32.5	χ^2= 0.875	0.701
Since 4-6 days	20	50.0	24	60.0		
Since More than 6 days	4	10.0	3	7.5		
The child currently using nebulizer/inhaler	40	100.0	40	100.0	–	–
If yes, mention the total hours per day does the child use nebulizer /inhaler (n = 40)	5.0 ± 1.36		5.45 ± 1.50		U= 668.00	0.159
The child has any comorbid disease, such as allergic dermatitis, conjunctivitis or rhinitis						
No	9	22.5	17	42.5	χ^2= 3.647	0.056
Yes	31	77.5	23	57.5		
B-The child's past medical history:						
The first child asthma attack begins.						
At age <2 years	35	87.5	33	82.5	0.392	0.531
At age of 2– <4 years	5	12.5	7	17.5		
Frequency of the child's asthma attack is every						
One week	12	30.0	9	22.5	1.154	^{MC}p= 0.773
Two weeks	8	20.0	7	17.5		
One month	17	42.5	19	47.5		
Two months	3	7.5	5	12.5		

Medical history of asthmatic children	Study (n = 40)		Control (n = 40)		Test of Sig.	P
	No.	%	No.	%		
C-Family Medical History: There is a person in the family other than the child has bronchial asthma						
No	7	17.5	11	27.5	1.147	0.284
Yes	33	82.5	29	72.5		
If yes, what is the relation of this person to the child	(n = 33)		(n = 29)			
Father/ Mother	19	57.6	15	51.7	4.744	$^{MC}p=0.200$
Brother/ Sister	0	0.0	4	13.8		
Parental Uncle/ Aunt	6	18.2	5	17.2		
Grandfather/Grandmother	8	24.2	5	17.2		
There is a person in the family other than the child has any co-morbid disease as allergic dermatitis, conjunctivitis or rhinitis						
No	26	65.0	20	50.0	1.841	0.175
Yes	14	35.0	20	50.0		
If yes, choose the relation of this person to the child	(n = 14)		(n = 20)			
Father/ Mother	7	50.0	11	55.0	1.530	$^{MC}p=0.945$
Brother/ Sister	3	21.4	2	10.0		
Parental Uncle/ Aunt	2	14.3	4	20.0		
Maternal Uncle/ Aunt	1	7.1	1	5.0		
Grandfather/Grandmother	1	7.1	2	10.0		

Data is presented as: χ^2: Chi square test,MC: Monte Carlotest, p: p value for comparing between the two studied group

Table (2): Distribution of Total Level Scores of Total Pediatric Asthma Severity Score (PAS) of Studied Asthmatic Children (n=80)

Total Pediatric asthma severity score (PAS)	Study (n = 40)				Control (n = 40)				Test of sig.(p_1)	Test of sig.(p_2)
	Pre-test		Post-test		Pre-test		Post-test			
	No.	%	No.	%	No.	%	No.	No.		
Mild (5 – 7)	4	10.0	23	57.5	5	12.5	10	25.0	χ^2=0.324 (^{MC}p= 0.907)	χ^2=10.679* (^{MC}p= 0.003*)
Moderate (8 – 11)	19	47.5	17	42.5	20	50.0	26	65.0		
Severe (12 – 15)	17	42.5	0	0.0	15	37.5	4	10.0		
MH (p_0)	59.000* (<0.001*)				50.000* (0.005*)					
Total score (5 – 15) Mean ± SD	10.63 ± 2.24		7.30 ± 1.74		10.28 ± 2.26		8.75 ± 2.24		t=0.695 (0.489)	t=3.232* (0.002*)
t_0 (p_0)	7.498* (<0.001*)				3.549* (0.001*)					

*** Statistically significant at p ≤ 0.05**

Table (3): Distribution of Total Level Scores of Depression Anxiety Stress Scales- youth version (DASS-Y) Subscales of Studied Asthmatic Children (n=80)

Total scores of (DASS-Y) subscales	Study (n = 40)				Control (n = 40)				Test of sig. (p_1)	Test of sig. (p_2)
	Pre-test		Post-test		Pre-test		Post-test			
	No.	%	No.	%	No.	%	No.	No.		
Depression										
Normal (0 – 6)	20	50.0	34	85.0	23	57.5	23	57.5	χ^2=0.552 (^{MC}p= 0.799)	χ^2=8.335* (^{MC}p= 0.012*)
Mild (7 – 8)	16	40.0	6	15.0	14	35.0	13	32.5		
Moderate (9 – 13)	4	10.0	0	0.0	3	7.5	4	10.0		
Severe (14 – 16)	0	0.0	0	0.0	0	0.0	0	0.0		

Total scores of (DASS-Y) subscales	Study (n = 40)				Control (n = 40)				Test of sig. (p_1)	Test of sig. (p_2)
	Pre-test		Post-test		Pre-test		Post-test			
	No.	%	No.	%	No.	%	No.	No.		
Extreme severe (≥17)	0	0.0	0	0.0	0	0.0	0	0.0		
MH (p_0)	40.000* (0.002*)				31.500(0.862)					
Total score (0 – 28) Mean ± SD.	6.38 ± 2.19		5.55 ± 1.04		5.90 ± 2.23		6.53 ± 2.86		t=0.961 (0.339)	t=2.024* (0.048*)
t_0 (p_0)	2.078* (0.044*)				1.147 (0.258)					
Anxiety										
Normal (0 – 5)	13	32.5	25	62.5	11	27.5	10	25.0	χ^2=0.840 (0.840)	χ^2=25.465* (^{MC}p <0.001*)
Mild (6 – 7)	6	15.0	12	30.0	7	17.5	6	15.0		
Moderate (8 – 12)	13	32.5	2	5.0	16	40.0	17	42.5		
Severe (13 – 15)	8	20.0	1	2.5	6	15.0	7	17.5		
Extreme severe (≥16)	0	0.0	0	0.0	0	0.0	0	0.0		
MH (p_0)	60.500* (<0.001*)				53.000 (0.505)					
Total score (0 – 28) Mean ± SD.	7.95 ± 4.38		5.08 ± 2.69		7.88 ± 3.65		8.30 ± 3.76		t=0.083(0 .934)	t=4.413* (<0.001*)
t_0 (p_0)	4.921* (<0.001*)				0.792 (0.433)					
Stress										
Normal (0 – 11)	4	10.0	18	45.0	5	12.5	4	10.0	χ^2=2.663 (^{MC}p= 0.493)	χ^2=23.434* (<0.001*)
Mild (12 – 13)	4	10.0	14	35.0	9	22.5	8	20.0		
Moderate (14-16)	13	32.5	6	15.0	11	27.5	12	30.0		
Severe (17 – 18)	19	47.5	2	5.0	15	37.5	16	40.0		
Extreme severe (≥19)	0	0.0	0	0.0	0	0.0	0	0.0		
MH (p_0)	95.500* (<0.001*)				73.000 (0.546)					
Total score (0 – 28) Mean ± SD.	15.40 ± 2.54		11.93 ± 2.25		14.75 ± 2.55		14.93 ± 2.30		t=1.142 (0.257)	t=5.898* (<0.001*)
t_0 (p_0)	8.232* (<0.001*)				0.458 (0.650)					

*** Statistically significant at p ≤ 0.05**

Table (4): Distribution of total level scores of depression anxiety stress scales of studied asthmatic children (n=80)

Total level scores of depression anxiety stress scale	Study (n = 40)				Control (n = 40)				Test of sig.(p_1)	Test of sig.(p_2)
	Pre-test		Post-test		Pre-test		Post-test			
	No.	%	No.	%	No.	%	No.	No.		
Total DASS										
Normal (0 – 23)	5	12.5	27	67.5	9	22.5	4	10.0	χ^2=3.078 (^{MC}p= 0.391)	χ^2=35.799* (^{MC}p <0.001*)
Mild (24 – 29)	17	42.5	12	30.0	14	35.0	18	45.0		
Moderate (30-39)	16	40.0	1	2.5	17	42.5	16	40.0		
Severe (40 – 46)	2	5.0	0	0.0	0	0.0	2	5.0		
Extreme severe (≥47)	0	0.0	0	0.0	0	0.0	0	0.0		
MH (p_0)	64.500* (<0.001*)				24.000 (0.088)					
Total score (0 – 63) Mean ± SD.	29.73 ± 5.61		22.55 ± 2.93		28.53 ± 5.80		29.75 ± 5.75		t=0.941(0 .350)	t=7.058* (<0.001*)
t_0 (p_0)a	8.697* (<0.001*)				1.282 (0.208)					

*** Statistically significant at p ≤ 0.05**

Table (5): Correlation between Pediatric Asthma Severity Score (PAS) and Depression Anxiety Stress Scales –Youth (DASS-Y)

Pediatric Asthma Severity Score (PAS) vs.	Study (n = 40)				Control (n = 40)			
	Pre		Post		Pre		Post	
	r	p	r	p	r	p	r	p
Depression	0.019	0.908	0.332*	0.036*	0.260	0.106	0.261	0.104
Anxiety	0.262	0.102	0.356*	0.024*	0.122	0.453	0.009	0.955
Stress	0.135	0.405	0.386*	0.014*	0.305	0.055	0.066	0.686
DASS-Y	0.273	0.088	0.739*	<0.001*	0.311	0.051	0.162	0.317

Data is presented as; r: Pearson coefficient, *: Statistically significant at p ≤ 0.05

Table (6): Correlation between Pediatric Asthma Severity Score (PAS) and Depression Anxiety Stress scale –Youth (DASS-Y) with age

Age vs.	Study (n = 40)				Control (n = 40)			
	Pre		Post		Pre		Post	
	r	p	r	p	r	p	r	p
PAS	-0.062	0.702	-0.892*	<0.001*	-0.115	0.479	-0.370*	0.019*
Depression	-0.037	0.823	-0.431*	0.005*	-0.030	0.856	-0.095	0.560
Anxiety	-0.119	0.463	-0.319*	0.045*	-0.136	0.402	-0.241	0.134
Stress	-0.244	0.130	-0.323*	0.042*	-0.004	0.979	-0.021	0.896
DASS-Y	-0.189	0.242	-0.692*	<0.001*	-0.073	0.656	-0.214	0.186

Data is presented as: r: Pearson coefficient, *: Statistically significant at p ≤ 0.05

Table (7): Relation between Total Pediatric Asthma Severity Score (PAS) with Age

Total score PAS	N	Study (n = 40)		N	Control (n = 40)	
		Pre	Post		Pre	Post
		Mean ± SD.	Mean ± SD.		Mean ± SD.	Mean ± SD.
Age (years)						
<10	**22**	10.77 ± 2.25	8.59 ± 1.18	**26**	10.42 ± 2.32	9.46 ± 1.75
10 – 15	**16**	10.69 ± 2.30	5.81 ± 0.66	**12**	10.17 ± 2.21	7.33 ± 2.39
>15	**2**	8.50 ± 0.71	5.0 ± 0.0	**2**	9.0 ± 2.83	8.0 ± 4.24
F (p)		**0.953 (0.395)**	**42.760* (<0.001*)**		**0.374 (0.691)**	**4.518* (0.018*)**

Data is presented as: SD: **Standard deviation**, **t: Student t-test, F**: **F for One way ANOVA test,** p: p value for comparison between the studied categories, *: Statistically significant at p ≤ 0.05

Table (8): Relation between Total score of Depression Anxiety Stress scale –Youth (DASS-Y) with Age

Total score DASS-Y	N	Study (n = 40)		N	Control (n = 40)	
		Pre	Post		Pre	Post
		Mean ± SD.	Mean ± SD.		Mean ± SD.	Mean ± SD.
Age (years)						
<10	**22**	30.59 ± 5.58	24.27 ± 2.49	**26**	28.58 ± 6.26	30.23 ±5.79
10 – 15	**16**	28.75 ± 5.80	20.69 ± 1.85	**12**	28.75 ± 5.40	29.33 ± 6.11
>15	**2**	28.0 ± 5.66	18.50 ± 0.71	**2**	26.50 ± 0.71	26.0 ± 1.41
F (p)		**0.585 (0.562)**	**15.587* (<0.001*)**		**0.126 (0.882)**	**0.535 (0.590)**

Data is presented as: SD: Standard deviation, t: Student t-test, F: F for One way ANOVA test, p: p value for comparison between the studied categories, *: Statistically significant at p ≤ 0.05

Discussion

Asthma affects individuals worldwide, with prevalence ranging from 1-21% in adults and up to 20% in children aged 6-7 years experiencing severe wheezing **(Dharmage et al., 2019).** Outstandingly, most asthmatic children in both the study and the control group had co-morbidities like allergic dermatitis and rhinitis, potentially due to weakened immunity, exposure to poorly ventilated environments,, and lifestyle factors **(Wang et al., 2023).**

On the other hand, limited healthcare access led to reactive treatment rather than prevention, compounded by poor disease awareness and medication adherence. These findings integrate with **Denlinger et al. (2017),** who identified uncontrolled eosinophilic inflammation and aeroallergen sensitivity as additional risk factors. The bidirectional relationship between asthma and allergic conditions suggests shared immunological pathways. Collectively, these studies highlight how environmental and immunological factors interact to worsen asthma and its comorbidities.In addition**, Kumar et al. (2019) have** reported that allergic rhinitis (75%) was the most common comorbidity in children with asthma aged 5–15, followed by psychological disturbances (71%) and snoring (49.5%).

Furthermore, the present study found that over 75% of children in both groups had their first asthma attack before the age of two, likely due to immature immune systems and heightened vulnerability to triggers during infancy. Additionally, contributing factors include limited maternal education, prematurity, genetic predisposition, and exposure to secondhand smoke. These findings emphasize how early-life environmental and biological factors play a crucial role in asthma development **(Lizzo et al., 2024).** This finding is consistent with Refat **et al. (2021), who** similarly reported that 64% of children developed asthma symptoms before one year of age. Collectively, these results highlight infancy as a critical period for asthma onset due to developmental and environmental risks.

The current study revealed that over half of the asthmatic children in both the study and the control groups had a parental history of bronchial asthma. These results corroborate with **Rao et al.**

(2023), who found that 44% of pediatric asthma cases reported a family history of the condition. Additionally, the findings of **Refat et al. (2021),** who reported that 40% of children had asthmatic mothers and 44% had asthmatic fathers, strongly suggest a genetic predisposition in asthma development. The consistent evidence across studies highlights the significant hereditary component in asthma etiology.

In relation to the total pediatric asthma severity score (PAS) pre- and directly post educational program, there were statistically significant differences noticed between the two studied groups directly post educational program of MPRT ($p = 0.003$). This may be because deep breathing and relaxation stimulate the vagus nerve and send signals to the brain to activate the parasympathetic nervous system, reducing stress hormones like adrenaline and cortisol levels, which in turn lead to decreased airway inflammation and bronchospasm **(Raipure & Patil, 2023; Hamdani et al., 2022).** These findings are consistent with **Macêdo et al. (2016),** who reported that the children receiving combined self-management and relaxation-breathing training showed significantly greater anxiety reduction ($p<0.05$), improving asthmatic children's health and asthma signs/symptoms, than self-management alone.

The study found statistically significant differences in depression, anxiety, and stress scores between groups post-MPRT educational program. This may be because pediatric asthma exhibits a bidirectional relationship with depression, anxiety, and stress through psychoneuroimmune pathways, where psychological distress triggers airway inflammation (via HPA axis activation and cytokine release) while poor asthma control exacerbates mental health symptoms **(Vishnupriyanga & Kumaresan, 2025).** This finding was in agreement with **Hamdani et al.'s (2022)** analysis of 65 RCTs with 8009 young people, which showed that RTs were highly effective in treating anxiety, moderately effective in reducing distress, and had only a weak effect on improving depression in young people. On the other hand, multiple studies confirm MPRT's efficacy in alleviating depression, anxiety, and stress while enhancing the overall quality of life of asthmatic children **(Mujahid, 2022; Abdelaziz et al., 2020).**

Moreover, the study reveals a significant difference with positive correlations between pediatric asthma severity (PAS) and stress levels post MPRT educational program, highlighting stress as a key asthma trigger that exacerbates symptoms and increases attack risk, particularly in children. Known as stress-induced asthma (SIA), this condition can cause bronchoconstriction, reduced physical activity, and absenteeism due to heightened stress responses, while emotional triggers like laughter or fear may worsen hyperventilation and airway narrowing **(Jenkins et al., 2024).** These findings align with **Kirthika et al. (2018)**, who demonstrated that relaxation techniques like progressive muscle relaxation and yoga effectively manage stress-induced asthma by improving breathing and quality of life. The results underscore the importance of stress-reduction interventions in pediatric asthma management to break the cycle of stress-aggravated symptoms.

Furthermore, the study revealed significant positive correlations between pediatric asthma severity (PAS) and anxiety levels post-educational program, reinforcing the well-documented

bidirectional relationship between asthma and anxiety disorders. **Freitas et al. (2025)** confirmed that anxiety exacerbates asthma severity, especially in uncontrolled cases, while nocturnal symptoms particularly heighten anxiety compared to daytime manifestations. Notably, corticosteroid treatment for asthma may impair cognitive function independently of psychiatric conditions or inflammatory markers **(Nasereddin et al., 2024).**

These findings underscore the complex interplay between asthma pathophysiology, mental health comorbidities, and iatrogenic effects of treatment.

The present study declared that there were statistically significant and positive correlations detected among study group children directly post educational program regarding pediatric asthma severity score (PAS) and depression. This finding is compatible with the meta-analysis that revealed a bidirectional link between asthma and depression, with depressed individuals being 3.17 times more likely to develop asthma **(Freitas et al., 2025).** Also, research indicates that sleep apnea that is associated with asthmatic children is associated with higher rates of mood disorders, including depressive disorders **(Kaufmann et alal.,017).** This creates a cyclical relationship where asthma, sleep disturbances, and mental health conditions mutually reinforce each other's severity.

Conclusion: Upon the present study outcomes, it can be concluded that both children in the study and control groups demonstrated significant improvements in pediatric asthma severity scores post-program compared to pre-program, with greater improvement in the study group post-program. The study group showed significant reductions in depression, anxiety, and stress post-program implementation, reflecting the significant positive effect of Mitchell's physiological relaxation technique education program on ameliorating pediatric asthma severity, stress, anxiety, and depression.

Recommendations:

Based on the findings of this study, the following recommendations are proposed:

1. Providing regular in-service training programs and workshops for nurses in Pediatric Chest Units to enhance their skills in applying Mitchell's Physiological Relaxation Technique (MPRT) for asthmatic children.

2. Integrating Mitchell's physiological relaxation technique into standard care protocols for asthmatic children alongside medical treatment to ameliorate the severity of asthma symptoms, stress, anxiety, and depression among pediatric children.

3. Educating asthmatic children and their caregivers about complementary therapies for bronchial asthma, particularly MPRT, including proper application techniques alongside conventional medical care.

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