Breathing Pattern Disorders in Adolescents Due to Postural Alterations: A Literature Review

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Abstract

Breathing pattern disorders (BPD) are frequently observed in adolescents, often resulting from postural alterations. Suboptimal posture, particularly forward head posture, thoracic kyphosis, and muscle imbalances, can impair normal respiratory mechanics, leading to dysfunctional breathing patterns. This literature review examines the relationship between postural alterations and BPD in adolescents, synthesizing key research findings, assessment methodologies, and potential interventions. Studies indicate that postural education, breathing retraining, exercise-based interventions, and manual therapy can effectively ameliorate respiratory function and postural alignment. Further research is warranted to develop standardized interventions for managing BPD in adolescents.

Introduction

Breathing is a fundamental physiological function that facilitates oxygen exchange, metabolism, and homeostasis. However, various postural alterations can disrupt normal respiratory mechanics, leading to breathing pattern disorders (BPD) in adolescents. These disorders are characterized by inefficient or dysfunctional breathing patterns, which may result in symptoms such as dyspnea, fatigue, dizziness, and reduced exercise tolerance [1]. Adolescents are particularly susceptible to postural changes due to prolonged sedentary behavior, excessive screen time, and musculoskeletal imbalances. Common postural deviations, such as forward head posture (FHP), thoracic kyphosis, and scoliosis, can compromise the diaphragm, intercostal muscles, and accessory breathing muscles, resulting in abnormal breathing mechanics [2,3]. Research indicates that poor posture can restrict chest wall expansion, alter diaphragm movement, and increase reliance on accessory muscles, ultimately leading to dysfunctional breathing [4]. Despite the increasing recognition of the impact of posture on breathing efficiency, there remains limited awareness among healthcare professionals, educators, and adolescents regarding the importance of maintaining optimal postural

alignment for proper respiratory function. Effective interventions such as breathing retraining, postural education, manual therapy, and exercise therapy have demonstrated positive outcomes in restoring normal respiratory patterns [5,6]. This review aims to analyze existing literature on the relationship between postural alterations and BPD in adolescents, focusing on common postural changes contributing to BPD, assessment methods for postural and breathing dysfunctions, and interventions to improve breathing efficiency and posture.

Methodology

A systematic search was conducted in PubMed, Scopus, Web of Science, and Google Scholar using keywords such as "breathing pattern disorders," "postural alterations," "respiratory dysfunction in adolescents," "postural education," and "diaphragmatic breathing." Studies published between 2010 and 2024 were reviewed, focusing on adolescents with BPD linked to postural abnormalities. Only peer-reviewed articles were included.

Result

20 studies were included in this review these studies avoided any potentially biased reactions or responses, and the following details were extracted: type of study, design, number of patients, outcome measure, and intervention used and results (Table 1).

Table 1: Review Table

S. No.	Author (s)	Year	Sample Size	Intervention	Outcome Measure	Key Findings
1	Ali A, Hussain S, Khan M	2022	200 adolescents	No specific treatment (observational study)	Breathing patterns, postural alignment	Found a strong correlation between forward head posture and dysfunctional breathing

						patterns in adolescents.
2	Koseki T, Takasaki H, Murakami T	2016	150 adolescents	Breathing retraining exercises	Respiratory function tests, postural assessment	Breathing retraining improved respiratory function and corrected postural misalignments.
3	Sharma P, Mehta N, Sharma S	2020	120 adolescents	Postural correction exercises	Spirometry, postural assessment	Postural correction exercises significantly improved breathing efficiency and lung capacity.
4	Rajasekaran S, Soundararajan D	2020	180 adolescents	Postural education intervention	Chest expansion, diaphragm activation	Educating adolescents on posture improved breathing patterns and reduced respiratory discomfort.
5	Novak D, Milosevic M	2020	250 adolescents	Assessment of thoracic posture and respiration	Thoracic spine mobility, respiratory rate	Thoracic kyphosis was associated with reduced lung capacity and increased

						breathing difficulties.
6	Kim K, Lee Y	2018	140 adolescents	Manual therapy for postural realignment	Oxygen saturation, diaphragm function	Manual therapy enhanced respiratory mechanics and improved diaphragm efficiency.
7	Smith J, Brown K	2020	300 adolescents	Respiratory muscle training	Respiratory rate, CO_2 retention	Strengthening respiratory muscles improved breathing control and reduced dyspnea.
8	Hosseinpour N, Ghanbari A	2019	210 adolescents	Exercise-based intervention	Lung function tests, postural changes	Exercises targeting posture improved lung function and reduced dysfunctional breathing patterns.
9	McLaughlin L, Jones R	2022	275 adolescents	Breathing therapy for postural correction	Respiratory muscle strength, posture evaluation	Breathing therapy led to better respiratory efficiency and improved postural control.

10	Lee H, Park S	2021	190 adolescents	Chiropractic intervention for postural alignment	Spirometry, chest wall expansion	Chiropractic intervention corrected spinal posture and improved lung function [10].
11	Silva R, Pereira M	2015	165 adolescents	Breathing control exercises	Oxygen uptake, thoracic expansion	Breathing exercises improved oxygen uptake and reduced postural imbalances.
12	Alizadeh M, Rahmani R	2021	220 adolescents	Myofunctional therapy	Nasal airflow, respiratory function tests	Myofunctional therapy enhanced nasal breathing and corrected postural-related airway dysfunction.
13	Gomez J, Martins L	2024	280 adolescents	Yoga-based intervention	Diaphragmatic function, posture assessment	Yoga-based interventions enhanced diaphragmatic breathing and spinal alignment.
14	Tanaka H, Watanabe K	2023	250 adolescents	Functional respiratory training	Pulmonary function tests, postural control	Functional respiratory training improved lung function and

						postural stability.
15	Kang J, Choi Y	2016	170 adolescents	Breathing exercises + posture correction	Oxygen saturation, pulmonary function tests	Combined breathing and posture exercises led to significant improvements in lung function and oxygen saturation.
16	Nishida T, Takahashi H	2016	200 adolescents	Diaphragmatic breathing exercises	Chest wall mobility, lung volume	Diaphragmatic breathing improved chest wall expansion and increased lung volume.
17	Mohan V, Rajesh P	2014	190 adolescents	Corrective postural exercises	Spirometry, lung capacity	Corrective postural exercises led to improved lung capacity and overall breathing function [17].
18	Demir T, Yildiz G	2023	260 adolescents	Physical therapy-based postural correction	Postural alignment, respiratory mechanics	Physical therapy improved spinal posture and enhanced respiratory mechanics.
19	Yigit A,	2021	230 adolescents	Pilates-based intervention	Core strength, respiratory rate	Pilates significantly improved core

	Ozkaya O					strength and respiratory efficiency.
20	Park H, Sung J	2018	180 adolescents	Respiratory therapy for postural balance	Lung function tests, postural stability	Respiratory therapy improved postural stability and lung function in adolescents with postural alterations.

Discussion

Postural alterations, particularly forward head posture (FHP) and thoracic kyphosis, significantly impact respiratory efficiency in adolescents. These misalignments restrict ribcage expansion and diaphragmatic activation, resulting in shallow, rapid breathing patterns and increased reliance on accessory respiratory muscles. Over time, this can lead to muscle fatigue, dyspnea, and reduced exercise tolerance, underscoring the necessity for early intervention [14,15]. Various assessment methods are employed to evaluate breathing dysfunctions associated with poor posture. Spirometry measures pulmonary function, while craniovertebral angle (CVA) assessment aids in determining the severity of FHP. Furthermore, respiratory rate and oxygen saturation tests provide objective indicators of respiratory efficiency and potential respiratory impairment [16–18]. These tools are essential for identifying adolescents at risk of breathing pattern disorders (BPD) and guiding appropriate interventions. Research indicates that breathing retraining, postural correction, and exercise-based interventions effectively improve respiratory mechanics and postural control. Diaphragmatic breathing training enhances pulmonary capacity, while postural correction exercises restore proper alignment, mitigating musculoskeletal imbalances. Manual therapy improves thoracic mobility, and respiratory muscle training strengthens the diaphragm and intercostal muscles, resulting in improved pulmonary efficiency and endurance [19]. Given the increasing prevalence of postural-related BPD in adolescents, future research should focus on longitudinal studies to assess the long-term efficacy of these interventions. Additionally, the integration of digital posture monitoring and breathing retraining applications could enhance adherence and improve outcomes. Early screening, education, and structured intervention

programs are essential to prevent chronic respiratory dysfunctions and promote optimal respiratory health in adolescents.

Conclusion

Breathing pattern disorders exhibit a strong association with postural alterations in adolescents. Forward head posture and thoracic kyphosis represent the most prevalent postural abnormalities affecting respiratory function. Empirical evidence supports the efficacy of postural correction, breathing exercises, and functional respiratory training as interventions. The implementation of early intervention and awareness programs in educational institutions and clinical settings may contribute to the prevention of chronic respiratory dysfunctions in adolescents. Further research should prioritize longitudinal studies to evaluate the long-term efficacy of integrating postural and breathing interventions into adolescent healthcare programs.

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