

LITERATURE REVIEW

EFFECTS OF PHYSICAL ACTIVITY INTERVENTIONS IN CONTROLLING OBESITY AMONG CHILDREN WITH ASTHMA- A LITERATURE REVIEW**Krunal Shah^{1*}, Rajitha Alva²**¹Department of Physiotherapy, Ramaiah Medical College, Bangalore,² Department of Physiotherapy, Ramaiah Medical College, Bangalore**ABSTRACT**

Background: Childhood asthma and obesity are growing concerns among children worldwide. Obesity among asthmatic children can be considered in two ways; either obese children are more vulnerable to develop asthma or the asthmatic children are more vulnerable to develop obesity or overweight. Obese children tend to have poor control over the disease symptoms and making it difficult to treat the asthma-obesity phenotype. A reduction in weight among asthmatic children could improve their overall quality of life. It is a well established fact that physical activity interventions can reduce the risk of obesity or over weight across the lifespan. However, effect of physical activity interventions in terms of asthma remains inconclusive. Thus, the present literature review was formulated to provide an overview on effect of physical activity interventions in controlling obesity among asthmatic children.

Objective: To review previously published studies about effects of physical activity interventions in controlling obesity among the asthmatic children

Methods: A comprehensive literature search was performed in PubMed, Cochrane database and Google scholar. A search strategy was devised, articles were screened based on inclusion and exclusion criteria, and data was extracted from the eligible studies. Total number of studies included were 6 of which 3 systematic reviews, 1 randomized control trial, 1 opinion review, 1 longitudinal experimental, and 1 cross-sectional study respectively.

Results and conclusion: A reduction in the body weight had a positive impact on the asthmatic children treatment. But most of the treatment interventions were multidimensional not exclusively on PA interventions. Thus, at present, the independent effect of physical activity on the management of obesity in asthmatic children remains unclear. In future studies must focus on studying the effect of physical activity interventions individually in controlling weight gain among asthmatic children.

Keywords: Asthma; Children; Obesity; Physical activity.

INTRODUCTION

Childhood asthma is the most common non-communicable respiratory condition characterized by episodes of reversible airway obstruction, in which the underlying mechanisms involve chronic airway inflammation and airway hyper-responsiveness. These episodes present with symptoms such as recurrent wheezing, chest tightness and cough or breathlessness. These symptoms may be present every day or only during an asthma attack limiting their daily activities. The prevalence of asthma among children has increased steadily over the last few years significantly. Current estimates suggest that asthma affects 300 million people of varying ages worldwide with a predicted additional 100 million impacted by 2025^{1, 2 & 3}.

There is no cure for asthma but the disease can be controlled with proper prevention and treatment. Mostly, asthma symptoms are controlled by bronchodilators and anti-inflammatory drugs among asthmatic children⁴. Drug dosage is determined based on the child's body weight, therefore more the body weight requires higher drug dosage to control the disease. Long term usage of these drugs can cause adverse effects like obesity and overweight. Evidence suggests that due to obesity and asthma related symptoms children are likely to lead a sedentary life style and decreased physical activity^{5, 6}.

In general, strategies in treating obesity are reducing sedentary behaviour and increasing physical activity levels⁷. Given the high prevalence of asthma with obesity the treatment should not be confined to only pharmacology interventions;

however, the focus must shift towards a multidimensional approach. Multidimensional approach mainly consists of lifestyle modifications, diet, physical activity interventions and behavioural interventions. However, PA interventions are considered to be one of the main treatment strategies in controlling obesity among asthmatic children. Therefore, this literature review aims to assess the effects of physical activity interventions in controlling obesity and overweight problems in asthmatic children.

MATERIAL AND METHODS

A comprehensive literature search was performed during the academic year 2018-19 using PubMed, Cochrane Library and Google scholar databases. The keywords that were used "Children," "Obesity", "Physical Activity," and "Asthma." Boolean concept such as "AND" and "OR" were used to searching the articles in all the databases. MeSH terms were used in Pubmed database search.

Articles were screened based on predefined inclusion criteria such as the last ten years of articles, English language, age group of 6-12 years, asthmatics with no other co-morbidities. Exclusion criteria included adults and kids below six years, asthmatics with other co-morbidities, normal weight and no details on asthma treatment. The data was extracted from eligible studies and the information was summarized.

RESULTS

The selection process of articles summarized using PRISMA flow diagram (Figure No: 1) and the study details (sample size, interventions, outcomes, results and conclusion) are furnished in Table-1

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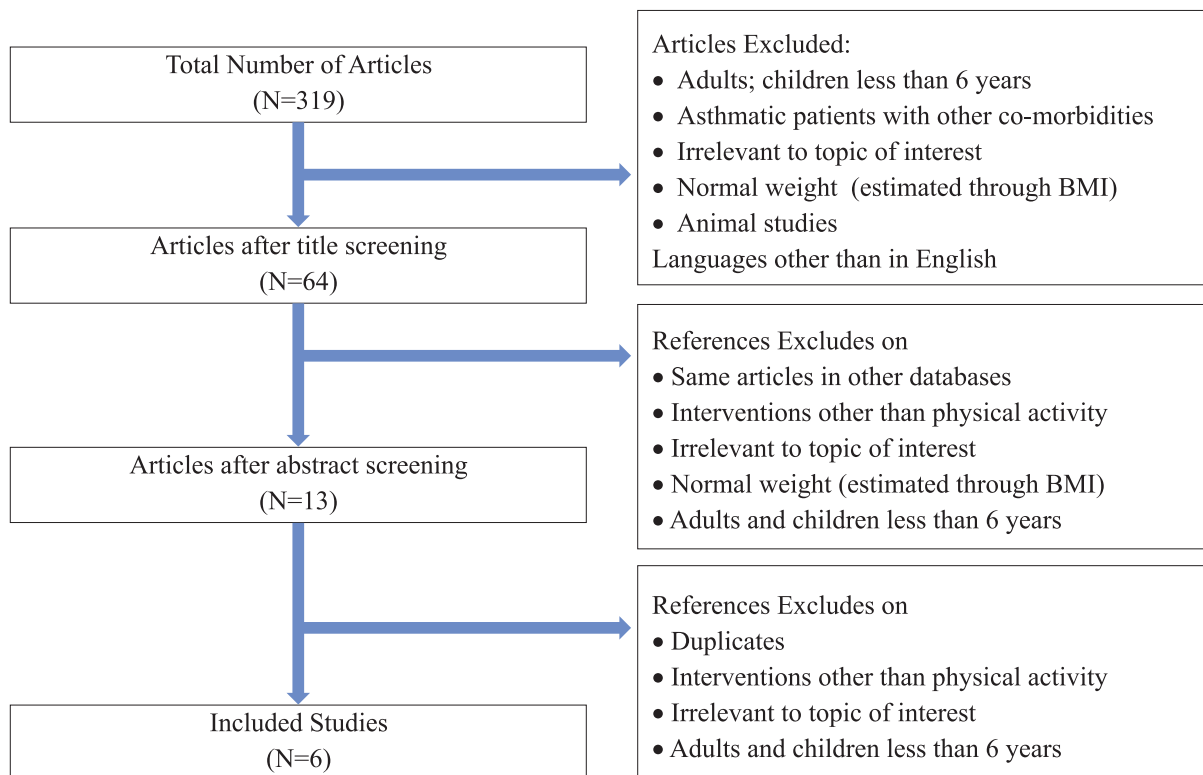


Figure 1. PRISMA Flow Diagram for Selection of Articles

Table 1 – Summary of the articles

S. No.	Author Name and year	Study type	Sample size	Method/ Intervention	Outcome Measure	Result	Conclusion
1.	Brown T et al. (2019) ⁸	Systematic Review	16 RCT's were included	Central, Medline, Embase, Psycinfo And Cinahl/ Diet And Physical Activity Interventions		Out of 153 RCT'S only 16 studies were pertaining to physical interventions	Review concluded modest evidence on diet and physical activity interventions among 6- 18 year's asthmatic children.
2.	Kim D. Lu, Dan M. Cooper, Fadia Haddad, and Shlomit Radom-Aizik (2018) ⁹	Experimental, Longitudinal	19	16-week aerobic exercise training (45min session, three days a week) at school.	PFT, DXA, CPET, BMI, Asthma questionnaire, Lipid profile.	Peak VO2 improved by 8.1%, SD ± 10.1. There was no change in BMI percentile but a significant improvement in lean body mass	The exercise interventions were effective in improving aerobic fitness, body composition, asthma quality of life& lipid outcomes.

S. No.	Author Name and year	Study type	Sample size	Method/ Intervention	Outcome Measure	Result	Conclusion
						(1%, SD \pm 2.0) & a decrease in body fat (1.9%, SD \pm 4.6).	
3.	Heather Holderness, Nancy chin et.al.(2017)10	Observational, cross-sectional	324	60 mins or more of physical activity per day	BMI, Asthma questionnaire, Minutes of physical activity.	Children with poorly controlled asthma experienced a limitation in gym class (58% vs. 43%), during sports activities (71% vs. 52%), during strenuous activities (77% vs. 59%), and even during mild activities, such as walking (28% vs. 14%).	Children with persistent asthma are overweight or obese had significant PA limitations. This study clearly indicated that PA must be encouraged among these population so as to reduce PA inactivity effects.
4.	Maartje Willeboordse, Kim D.G.van de Kan, Frans E.S.Tan, Sandra Mulkens, et.al. (2016) ¹¹	RCT	87	18-month multi factorial weight reduction program included lifestyle modifications, parental involvement, sports sessions etc.	FEV1, BMI, lung function, inflammatory markers, asthma-related QOL, FVC,	BMI-SDS decreased by -0.14 ± 0.29 points in the intervention group and -0.12 ± 0.34 points in the control group. Asthma features and lung function indices improved significantly over time in both groups. The FVC% predicted improvement over time by $10.1 \pm 8.7\%$ in the intervention group vs. $6.1 \pm 8.4\%$ in the control group.	Clinically relevant improvements in body weight, lung function, and asthma features were found in both groups; some effects were more pronounced in the intervention group. It implies that a weight reduction intervention could be clinically beneficial for children with asthma.

S. No.	Author Name and year	Study type	Sample size	Method/ Intervention	Outcome Measure	Result	Conclusion
5.	Nan lv, Lan Xiao, Jun Ma (2015) ¹²	Systematic review	3 RCTs (n= 170)	An electronic literature search was done using PubMed, CINAHL, PsychINFO, and Cochrane in November 2014	ACQ, PFT, inflammatory markers, PAQLQ	179 Articles were found to meet the criteria; seven RCTs were included by the author, 4 in adults and 3 in children/ adolescents	3 RCTs in children suggested that modest calorie reductions alone or combined with increased physical activity or even a healthy normo-caloric diet, may lead to improved asthma outcomes.
6.	Jason E Lang (2014) ¹³	Opinion review article	-	-	-	-	The author emphasizes weight loss strategies that include increased physical activity & reduced calories as the first step to treat obesity in asthmatic children
7.	Adeniyi FB, Young T (2012) ¹⁴	Cochrane systematic review	4 RCTs (n=197)	Databases like MEDLINE, EMBASE, CINAHL, AMED, and PsychINFO, CAGR, CENTRAL along with trials the author searched web sites and dissertation databases up to March 2012	SGRQ, FEV1, FEV, FVC, PEF, BMI,	4 studies were included. Interventions included physical activity, low-calorie diet, and anti-obesity drugs (singly or in combination), and were compared to usual care (two studies), low-calorie diet (one study), while one study had three intervention arms (physical activity versus low calorie diet versus a combination of the two)	There is inadequate evidence to comment on weight-loss interventions on quality of life and health care utilization. The benefit of weight loss as an intervention for asthma control remains uncertain.

DISCUSSION

Summary of main results

This review looked at studies on the effects of physical activity interventions in managing obesity in asthmatic children. Review included 7 studies consisting of 7058 participants of various research designs, outcomes, results, and conclusions. Out of these 7 studies, 3 were systematic reviews, 1 randomized control trial, 1 opinion review, 1 longitudinal experimental, and 1 cross-section observational study. The definition of 'overweight' and 'obesity' was relatively uniform in all of the studies. Diagnosis of asthma was by a physician in all reviews; hence there were very few misdiagnosis biases. Although there were many ways of measuring obesity, most of these studies used BMI as the main predictor of obesity, along with varying degrees of other outcomes.

Most importantly, the studies included in this review highlighted that a reduction in body weight had a positive impact on the fitness, body composition, lipid profile, lung functions and lung functions. Interventions included in controlling obesity not only included physical activity interventions also other treatment strategies such as diet, behavioural therapy and lifestyle modifications. Hence, the effectiveness of any one intervention remains questionable, and therefore, the clinical application of data may be questionable.

Quality of evidence

In this review studies have a broad spectrum of evidence with a mean rate at moderate to low due to lack of RCT or meta-analysis. The adherence to intervention is unknown in most studies so commenting on the results is debatable. Most studies were carried out in countries with a High HDI index; therefore, the applicability of developments in low socio-economic countries remains uncertain.

Agreements and disagreements with other studies or reviews

Most of the studies favoured positive outcomes whereas, Adeniyi et al (2012)¹⁴ had mixed reviews suggesting that weight loss followed by physical interventions are unclear.

Implication for practice

It is evident from this review, that physical activity interventions can control the weight gain among asthmatic children to an extent. Therefore, at this point we can incorporate physical activity interventions in the clinical practice.

Implications for research

Most of the studies included in this review were of low methodological quality, highlighting the need for well-designed RCTs, emphasizing larger sample size, more extended intervention, follow-up duration, and a single intervention to determine physical activity interventions effect in controlling obesity rather than a multifactorial intervention. The studies also needed to seek a structured PA program that needs to be incorporated in the multifactorial RCTs. Future studies need to report more on relevant outcomes like lung function, asthma control, quality of life, and BMI. There is also a need to evaluate the intervention's adherence and determine if the effects are still significantly present after a considerable period.

CONCLUSION

It is very evident that reduction in the body weight had a

positive impact on asthmatic children's health. All the literature included in the review are emerging from high income countries; hence results cannot be generalized to our population. In addition, this review also revealed that all the cross sectional data suggesting in terms of reduced PA among asthmatic children are also from western population. This suggests that future studies must focus on developing data specific to the Indian population.

Limitations:

This review has used a very basic search strategy to search literatures and free databases are consulted. Therefore, it's true that all the related literatures may not have picked up during the search.

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Conflict of Interest- None.

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