

## Yoga as a Cost-effective Alternative Therapy for Managing Pediatric Obesity: An Overview

Neha Pathak<sup>1</sup>, Abhishek Kumar Bhardwaj<sup>2</sup>

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### Abstract

Obesity becomes a universal health issue and due to lifestyle changes, it is regularly increasing day-by-day. Childhood/pediatric obesity become recent pandemic with high magnitude. Familiar mutation and lifestyle factors like intake of excessive high energy food, physical inactivity are most common causes of overweight and obesity. Wide ranged review was conducted from databases including PubMed and Google Scholar. The study assesses changes in the anthropometric index and quality of life in obese children following yoga. Yoga plays a significant role in reducing anthropometric index in obese and over weight children and improves psychological and emotional functioning including quality of life.

**Keywords:** Pediatric Obesity; Adolescents Obesity; Anthropometry; Yoga.

## INTRODUCTION

Obesity is a state where fat cells are enlarged due to excessive growth of adipose tissue or the number of fat cells increased<sup>1</sup> (Godbole *et al.*, 2020). Energy is stored in adipose tissue in terms of fat<sup>2</sup> (Warnick *et al.*, 2020). Obesity is basically measured in the form of Body Mass Index (BMI) which is use to express obesity in terms of height and weight<sup>1</sup> (Godbole *et al.*, 2020). According to WHO<sup>3</sup>, over weight is examined if BMI is equal to or more than 25kg/m<sup>2</sup> and obesity examined if BMI is equal to or more than 30kg/m<sup>2</sup> (Rshikesan

& Subramanya, 2016). According to Indian Health Ministry, BMI equal to or more than 23kg/m<sup>2</sup> is examined as over weight and BMI equal to or more than 25kg/m<sup>2</sup> is examined as obese<sup>4</sup> (Bhardwaj & Bhardwaj, 2015). Now a day's childhood obesity is most frequent chronic disease. In Adolescents, the very basic reason is to not following the everyday healthy routine<sup>5</sup> (Rio *et al.*, 2020).

Obesity becomes a universal health burden and due to lifestyle changes it is regularly increasing day-by-day<sup>6</sup> (Ganpat *et al.*, 2015). The most common factors of its high universality are improper dietary habits, familiar predispositions and physical inactivity<sup>1</sup> (Godbole *et al.*, 2020). In India, pediatric obesity is recent pandemic with high magnitude. A study identified that prevalence of overweight was probable to be 12.64% (95% CI 8.48–16.80%) and that of obesity to be 3.39% (95% CI 2.58–4.21%)<sup>7</sup> (Midha *et al.*, 2012). Another study of Indian school going children from urban areas estimated a high prevalence of childhood obesity<sup>8</sup> (Raj *et al.*, 2007). In United States also, it becomes a major health issue. There are more than 31% of aged 2-19 years

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**Author Affiliation:** <sup>1</sup>Ph.D Scholar, Department of Yoga Science, <sup>2</sup>Associate Professor, Department of Psychology, University of Patanjali, Haridwar 249405, Uttarakhand, India.

**Corresponding Author:** Abhishek Kumar Bhardwaj, Associate Professor, Department of Psychology, University of Patanjali, Haridwar-249405, Uttarakhand, India.

**E-mail:** abhishek@uop.edu.in

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are enduring over weight and obese<sup>9</sup> (Fulkerson *et al.*, 2020). Globally, the prevalence rate of pediatric obesity is increasing continuously. The International Association for the study of Obesity (IASO) and International Obesity Task Force (IOTF) stated that greater than 200 million school children are found as over weight or obese<sup>10</sup> (Rajnani *et al.*, 2016). WHO describe some facts that in 2016, 340 million adolescents aged 5-19 were overweight and obese and in 2020, over 39 million children under the age of 5 years were over weight and obese.

There are various multiple factors caused obesity. These factors keep varying from genetic factors to lifestyle factors<sup>1</sup> (Godbole *et al.*, 2020). Lifestyle factors includes intake of excessive high energy food, physical inactivity. Nowadays, intake of fast foods and soft drinks with artificial sweeteners contributes more in development of obesity. In Ayurveda, energy riched food describes as Meda enhancing food (*Guru, Snigdha, Madhur, Shit ahar* in excess quantity)<sup>1</sup> (Godbole *et al.*, 2020).

Pediatric obesity is linked with higher risk with various undesirable health consequences including chronic states like type-2 diabetes mellitus, hypertension, asthma, cardiovascular disease, sleep apnea, non alcoholic fatty liver disease and musculoskeletal pain across lifetime<sup>2</sup> (Warnick *et al.*, 2020). There are very limited present solutions for prevention and reduction of childhood obesity and have bad effects<sup>3</sup> (Rshikesan & Subramanya, 2016).

Yoga is an art of self-realization and life management. Every practitioner can achieve health profit and improvements of human intelligence which are inseparable by products of yoga practices. Aurobindo 11 (1999) defines yoga as "a practical discipline incorporating a wide variety of practices whose goal is the development of a state of mental and physical health, well-being, inner harmony and ultimately a union of the human individual with the universal and transcendent exercise".<sup>11</sup> Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual well-being of an individual<sup>12</sup> (Iyengar, 1976).

### Search Methodology

A systematic search was conducted in databases including PubMed and Google Scholar. Following terms or keywords were used while searching the relevant studies: children obesity, adolescents obesity, childhood obesity/pediatric obesity, anthropometry, body composition and each united with yoga. We included a search under the age

range of 6-12 years. Our initial search of databases resulted in 23 studies. The articles that were repeated or not yoga based or inappropriate for our study were excluded. Five studies were considered eligible for inclusion as they were experimental in nature and based on particular age range that's between 8 to 14 years.

### Yoga for anthropometric measures

The 5 years intervention non-randomized non-blinded school based study was conducted included 7-10 years or 12-15 years children in Pune school and similar age attending the school in Nasik, India. The study assessed the effect of 5 years multiple intervention program including three sections: physical activity, diet and daily yoga based breathing exercises. According to the simple tests of strength, flexibility and endurance, diet and lifestyle indicators the main measurable outcomes were body mass index, waist circumference, and physical fitness. The intervention was not so much effective for BMI or frequency of overweight and obesity but it reduces the waist circumference. It also improves physical fitness but had no impact on children's BMI or on the pervasiveness of overweight and obesity<sup>13</sup> (Bhave *et al.*, 2015).

Another study was conducted in obese adolescent girls to assess eating behaviour and anthropometric indices. There were sixty obese adolescents girls participants having BMI greater than 95th percentile of age range 11-15 years were randomized for behaviour modification program which was conducted for four hours structured session weekly held for 16 weeks. Every session includes 2 hours of behaviour modification or dietary instructions and 2 hours of yoga therapy. The given intervention helped in decreasing body weight, BMI, arm circumference and improving eating behaviour in adolescents. This program not only focused on weight reduction of children but also pushed to achieve healthy lifestyle<sup>14</sup> (Sarvestani *et al.*, 2009).

### Yoga for quality of life

A Pre-post pilot study was conducted to access gait and emotional functioning. Health related quality of life (HQoL), physical activity and pain were secondary outcomes. In this study 9 youths (11-18 years) were included having BMI more than 95th percentile and at least one medical comorbidity. The intervention included bi-weekly, 60 minutes classes, for eight weeks (16 classes consists yoga poses (asanas) and controlled

breathing (pranayama) in Iyengar style of yoga. The eight weeks of Iyengar yoga program improved balance and the walking abilities in obese children and reduced unusual position of lower limbs and had less impaired mobility. Health related quality of life considerably improved in practitioners as well as emotional functioning also improved<sup>15</sup> (Hainsworth *et al.*, 2018).

Another pilot study was conducted based on alignment based Iyengar yoga style to assess prior experience and expectation, Health related quality of life, state anxiety and functional limitations. The study involved 16 youths ages 11-17 years for 8 weeks biweekly, 60 minutes yoga classes. Each participant attended at least 7 classes. Health

related quality of life significantly improved and state anxiety decreased by this yoga protocol<sup>16</sup> (Hainsworth *et al.*, 2012).

In a separate pre-post pilot study based on Hatha Yoga style of B.K.S Iyengar, physical and psychological functioning including quality of life, fitness and state anxiety were assessed. The intervention given to the 20 students of age range 2-18 years biweekly 60 minute classes for 8 weeks. Total 15 Hatha yoga style classes were conducted. Following the intervention, there was not much significant change observed in weight but improved their physical and psychological functioning including quality of life and state anxiety in severely obese adolescents<sup>17</sup> (Hainsworth *et al.*, 2014).

**Table 1:** Evidence-based yoga intervention for quality of life and anthropometric measurements

Sl. no.	Author (year)	Study design	No. of participants (age range)	Intervention(s)	Assessments	Outcomes
1.	Bhave et al., (2015)	Non-randomized non-blinded school based intervention study	865 school children (7-10 years or 12-15 years)	5 years multiple intervention program including: physical activity, diet and daily yoga based breathing exercises	Body mass index, waist circumference, and physical fitness	Intervention did not helped in reducing BMI or the prevalence of overweight/obesity, but it helped in reducing waist circumference.
2.	Sarvestani et al., (2009)	Quasi-experimental design	60 obese Adolescent girls (11-15 years)	4 hours structured session including 2 hours of behaviour modification and dietary instructions and 2 hours of yoga therapy	Eating behaviour and anthropometric indices	Eating behavior improves and anthropometric indices reduces with the help of intervention.
3.	Hainswort et al., (2018)	Pre-post Pilot study	9 Youths (11-18 Years)	Bi-weekly, 60 min classes, for eight weeks (16 classes involved yoga poses (asanas) and controlled breathing (pranayama) in Iyengar style of Yoga	Primary outcome- Gait Secondary outcome- Health-related quality of life (HRQoL), physical activity and pain	Health related quality of life significantly improved in practitioners as well as emotional functioning also improved
4.	Hainswort et al., (2012)	Pilot study	16 youths (11-17 years)	8-weeks bi-weekly, 60 minutes yoga classes	Health-related quality of life, state anxiety and functional measures	Health-related quality of life significantly improves, state-anxiety decreased by yoga protocol.
5.	Hainsworth et al., (2014)	Pre-post pilot study	20 Students (2-18 years)	Bi-weekly 60 minutes classes for 8 weeks (Total 15 Hatha yoga style classes)	Physical and psychological functioning including quality of life, fitness and state anxiety	There was not much significant change in weight but improved physical and psychological functioning including state anxiety and quality of life.

## DISCUSSION AND CONCLUSION

We have examined modern as well as yogic concepts of childhood obesity, its causes, symptoms, health consequences, prevention and management. Evidence based literature review stated that obesity is not only universal epidemic but also recent pandemic in India with high magnitude. It could be managed by practicing yoga regularly. Globally, yoga has appeared as evidence - based practice. Studies provided strong evidence that yoga has great potential to prevent the increasing frequency of overweight and obesity as well as Diet and lifestyle factors also helps in improving obese health. Primarily, yoga plays a significant role in reducing overweight and obesity and secondarily, it also improves psychological and emotional functioning including quality of life and state anxiety etc. This review results that overweight or obesity are positively associated with yogic practices and dietary behaviour.

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