

CHILDHOOD OBESITY: AN APPROCH TO DEVELOP A THERAPEUTIC STRATEGY WITH AYURVEDA

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ABSTRACT

Childhood obesity has reached to epidemic proportions in both developed as well as developing states. Obesity in childhood are associated with emergence of comorbidities including type 2 diabetes mellitus, hypertension, nonalcoholic fatty liver disease, obstructive sleep apnea, and dyslipidemia at a younger age. The most common cause of obesity in children is a positive energy balance caused by excess caloric intake in respect to caloric expenditure. Childhood obesity can profoundly affect children's physical health, social, and mental well-being. In traditional text of *Ayurveda*, obesity associated pathological consequences has been described under the heading of *Sthoulya* or *Atisthoulya*. There is no any specific description of childhood obesity in *Ayurvedic* compendia although general principle of treatment and therapeutics of obesity are well documented. This study aims at scanning of both conventional and *Ayurvedic* literatures to provide a direction towards a childhood obesity management strategy through *Ayurveda*.

Keywords: Childhood obesity, *Sthoulya*, *Atisthoulya*

INTRODUCTION

Obesity is defined as a condition of abnormal or excessive fat accumulation in adipose tissue.¹ Pathological consequences in obesity is associated with both the degree of obesity as well as ectopic accumulation of body fat.² Overeating results in increased size of adipocytes. At the optimum size of adiposites, proliferation is induced and massive, irreversible obesity may result.³ Android type obesity is associated with dominant visceral and upper thoracic distribution of adipose tissue, whereas adipose tissue is found predominantly in the

lower part of the body (Hips and thighs) in gynecoid obesity.⁴ Childhood obesity leads to adult obesity and its related comorbidities including type 2 diabetes, hypertension, early puberty, menstrual irregularities and polycystic ovary syndrome, steatohepatitis, sleep apnoea, asthma, benign intracranial hypertension, musculoskeletal disorders and psychological problems.⁵ In *Ayurvedic* literature, *ati-sthaulya* or *sthaulya* has been described not as obese state only rather than a clustering of pathological events associated with

obesity. *Ati-sthaulya* is a morbid condition that invites several grievous diseases, which even could lead to sudden death.⁶ The pathological manifestations of *Atisthoulya* includes - Ayuhras (Reduced life span), Jaboporodh (Restricted movement or Hypokinesia), Kriccha-vyavaya (Sexual dysfunction), Dourbalya (Fatigue), Dourgandha (Bromhidrosis), Swedabadha (Hyperhidrosis), Atikhuda (Polyphagia), Atipipasa (Polydipsia).⁷

CAUSES OF CHILDHOOD OBESITY

It is widely accepted that obesity is resulted from an imbalance between energy intake and expenditure. An increase in positive energy balance is closely associated with sedentary lifestyle and the obesogenic dietary preferences. However, there is increasing evidence indicating that an individual's genetic background is important in determining obesity risk.⁸ However genetic susceptibility often needs to be coupled with contributing environmental and behavioral factors in order to affect body weight. According to Ayurveda *ati-sampuran* (Excessive dietary habit) and *avyam* (Sedentary lifestyle) and *bija-swabhava* (Genetic predisposition) are the major factors that contribute to the development of obesity.⁹

PATHOLOGICAL CONSEQUENCES OF OBESITY

Normally adipocytes are associated with lipid storage function and excess lipids utilization. But an extreme elevation of lipid may causes a spill over of lipid into non-adipose cells. Excess lipid in non adipose tissue may follows potentially toxic pathways of nonoxidative metabolism and results in accumulation of harmful lipid intermediates and subsequent cellular dysfunction as well as injury. This is known as lipotoxicity.¹⁰ The adipose tissue

also plays a central role in the regulation of whole-body energy homeostasis.

Adipose tissues secrete various hormones, cytokines, and metabolites (termed as adipokines) that control systemic energy balance.

In response to changes in the nutritional status, the adipose tissue undergoes dynamic remodeling, including quantitative and qualitative alterations in adipose tissue-resident cells.

Such remodeling on adipose tissue is closely associated with altered adipose tissue function as well as uncontrolled inflammatory responses, leading to systemic lowgrade inflammation. In obesity, a pro-inflammatory state of adipose tissue, as well as dysfunctional state of adipose tissue has a significant role towards an abnormal metabolic state.¹¹

The core patho-physiological in *Ati-sthoulya* includes¹² –

- Excessive enhancement of *meda dhatu* and *Vishamadhatuposhana* (derangement in normal physiology of *dhatu*)
- *Meda-dusti* (Vitiated *meda dhatu*)

CRITERIA & CLASSIFICATION OF OBESITY

Traditionally, overweight and obesity have been evaluated by anthropometric measurement of weight-for-height. More recently, BMI has been used. Body mass index (BMI) correlates well with percentage of body fat.¹³ The normal range is 19-24.9 kg/m², overweight is 25-29.9 kg/m², and obesity ≥ 30 kg/m². Not only is the total amount of fat an individual carries important, but also where the fat is distributed in the body. Fat in a central or upper body distribution is most related to health risk.

A classification of obesity and associated health risk may be categorized as following¹⁴ -

Nutrition status	BMI (kg/m ²)	Obesity Class	Disease Risk (Relative to Normal Weight and Waist Circumference)	
			Men ≤40 inches (≤ 102 cm) Women ≤ 35 inches (≤ 88 cm)	Men > 40 inches (> 102 cm) Women > 35 inches (> 88 cm)
Underweight	< 18.5	-	-	-
Normal	18.5–24.9	-	-	-
Overweight	25.0–29.9	-	Increased	High
Obesity	30.0–34.9	Class I	High	Very High
	35.0–39.9	Class II	Very High	Very High
Extreme Obesity	≥ 40	Class III	Extremely High	Extremely High

OBESITY CONTROL STRATEGIES

The World Health Organization (WHO) experts have estimated that there are 43 million overweight children under the age of 5 and by 2020 more than 60% of global disease burden will be the result of obesity related disorders.¹⁵ Avoidance of obesogenic environment and a healthy lifestyle behaviors from early life are the favored against the epidemic of obesity at the global level.¹⁶ Dietary modification in children over two years of age, should include increased consumption of fruits and vegetables, whole grains, low-fat and non-fat dairy products, beans, fish and lean meats. Treatment should be targeted to reduce high-fat and high calorie foods, and to reduce or eliminate sugar sweetened beverages such as soft-drinks and fruit drinks.¹⁷ Child's physical activity should be increased to at least 60 minutes/day on all or most days of the week.¹⁸ The goal of physical activity should not just be caloric expenditure, but also fostering an enjoyment of physical activity.¹⁹ pharmacological intervention is usually designated for children with severe obesity (BMI ≥ 99th percentile).²⁰

DISCUSSION

AYURVEDIC PRINCIPLE OF MANAGEMENT TO ALLEVIATE OBESITY

In *Ayurveda*, following strategies are recommended in generally to manage a disorder²¹

- *Nidan Parivarjan* (Avoidance of causitive factor)

- *Shodhana* (Elimination of involved *dosha*)
- *Shamana* (Pacification of *dosha* and restoration of the normal strength of *dushya dhatu*)

Nidan Parivarjan (Avoidance of causitive factor)

Mainly an obesogenic diet and sedentary lifestyle are thought to be responsible behind obesity in *Ayurveda* although a genetical predisposition is also considered as an important factor.²² According to *Ayurvedic* principle, diet are designated in obesity to pacify *vata* and to eliminate *kapha* and *meda*.²³ Dietary components of an obese patient should include whole grain cereals along with amlaki as well as honey mixed water.²⁴

Vyama (Exercise), *vyavaya* (Coitus), *prajagara* (Night awaking), *chintan* (Mental exercise) has been advised in *Ayurveda* to reduce the weight gradually.²⁵

Sodhana (Elimination of involved *dosha*)

In obesity, *vasti* (Trans-rectal medication) medicated with *rukshna* and *ushna dravya* are recommended. Specially *lekhan vasti* composed of *triphala* decoction, *gomutra*, *madhu*, *javakshara* and *ushakadi gana* drugs are beneficial to reduce reduce adiposity.^{26,27}

Udvarthan (Transdermal medication) with *tikshna* and *ruksha dravya* are also considered as a potential therapeutic option in obesity.²⁸

Shamana (Pacification of *dosha* and restoration of the normal strength of *dushya dhatu*)

Guru as well as *atarpankaraka dravya* are the mainstay of therapeutics in obesity. *Guru dravya*

plays a potential role to pacify the aggravated agni and *atarpankarak dravya* are itself antiobesogenic. Such types of diets are designated to achieve the goal of *karshana* (Weight reduction).²⁹ *Madhu* (Honey) possess both qualities together and acts as a

potential agent to combat obesity.³⁰ *Virukshaniya* and *chedaniya dravya* has beneficial effects in obesity.³¹ A number of therapeutic agents has been mentioned in context to obesity management in *Ayurvedic* texts.

Anti-obesity drugs	
As per <i>Acharya Charaka</i> ³²	As per <i>Acharya Susruth</i> ³³
<i>Guduchi</i> (Tinospora Cordifolia)	<i>Suddha Shilajit</i> (Asphaltum Punjabianum)
<i>Mustaka</i> (Cyperus Rotundus)	<i>Suddha Guggul</i> (Commiphora Mukul)
<i>Triphala</i> (Emblica Officinalis + Terminalia Chebula + Terminalia Bellirica)	<i>Rasanjan</i> (A pharmaceutical preparation from Berberis Aristata)
Sunthi (Zingiber Officinale)	<i>Mudga</i> (Phaseolus Radiatus)
<i>Kala louha raja</i> (Fe ₂ O ₃)	<i>Shama</i> (Echinochloa Frumentace)
<i>Takraristha</i> (Alcoholic preparation of butter milk) + <i>Madhu</i> (Honey)	<i>Uddalak</i> (Paspalum Scrobiculatum)
<i>Agnimantha</i> (Clerodendrum Phlomidis) + <i>Shilajit</i> (Asphaltum Punjabianum)	
<i>Yava</i> (Hordeum Vulgare) + <i>Amlaki</i> (Emblica Officinalis)	

THERAPEUTIC DESIGN TO TREAT CHILDHOOD OBESITY THROUGH AYURVEDA

Physical Activity and Dietary Strategy

Ati-sampurana (excessive consumption of food) is chiefly responsible behind the development of obesity.³⁴ The components of energy requirement in infants and children includes basal metabolism, activity of children and growth requirement.³⁵ Rather than dietary restriction focus should be kept on appropriate nutrition in childhood obesity. Maintenance of traditional healthy dietary components (i.e. micronutrient rich food such as fruits, vegetables and whole grain cereals) and avoidance of heavily marketed energy dense fatty and salty foods should be aimed. Children should be encouraged to increase activity levels and decrease sedentary behaviors. At least one hour of vigorous 'play' per day is beneficial for children.³⁶ According to *Ayurvedic* principle dietary components of an obese child should include whole grain cereals along with amlaki as well as honey mixed water.

Sodhana Chikitsa

In case of children, *vasti* (Trans-rectal medication) is considered as a better therapeutic option than *vamam* (Emesis therapy) and *virachan* (Purgation therapy) due to its narrow ranges of contraindication.³⁷ But it should be administered when the child is lowered (Walks on ground) eats cereals.³⁸

Hence *vasti* (Trans-rectal medication) and *udvartan* (Transdermal medication) may consider for anti obesity therapy in children as described in context to general obesity management principle in *Ayurveda*.

Shamana Chikitsa

Madhu (Honey) are considered to have beneficial effects on children.³⁹ It is also helpful to reduce *meda* (adiposity) due to its *rukshya* property.

Honey might reduce weight gain via modulation of appetite-regulating hormones such as leptin, ghrelin and peptide YY.⁴⁰ It also show a potential effects against obesity when mixed with *karshaniya* drugs due to its *yogavahi* property.⁴¹ Hence anti obesity drugs may be considered along with *madhu* (Honey) in children.

CONCLUSION

Overweight and obesity rates in children and adolescents are increasing in India not just among the higher socio-economic groups but also in the lower income groups. The presence of obesity in childhood greatly increases the risk of developing diabetes in young adulthood and cardiovascular diseases in later life. Obesity also adversely affects the hormonal development of the child. There is a lack of balanced and sensitive approach in *Ayurveda* to combat such a burden. In this review an attempt has been made to provide a strategic way to combat childhood obesity in the light of general obesity management in Ayurveda. The following may be the mainstay of childhood obesity management –

- Avoidance of *ati-sampurana* (excessive consumption of food)
- Whole grain cereals based dietary approach along with amlaki as well as honey mixed water.
- Encourage the child towards a active physical state
- Application of *Ayurvedic* antiobesity drugs with *madhu* at age wise appropriate dose
- Application of *vasti chikitsa* (Trans-rectal medication) in severe obesity

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