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"EFFICACY OF *VYAYAMA* (EXERCISE) IN THE MANAGEMENT OF CHILDHOOD OBESITY"

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ABSTRACT

Childhood obesity has emerged as growing epidemic both in developed as well as in developing countries in last few decades, affecting all socio-economic groups, irrespective of age, sex or ethnicity. Globally, an estimated 10 percent children, between 5 to 17 years of age, are overweight or obese. Data from various parts of India reveals that in Delhi and Chandigarh, one in every four teenagers is obese, while a study of school children in Chennai shows 18 percent boys and 16 per cent girls are overweight. Reduced physical activity in young children is one of the important factors in childhood obesity. Moderate intensity regular physical activity is essential for the prevention of overweight and obesity as well as for treatment of the same. Ayurveda explains vyayama (Exercise) as one of the important Dinacharya procedure (daily regimen) to be followed by every healthy individual for maintenance of health and prevention of diseases. Acharya Charaka while explaining treatment of Atisthaulya (obesity) mentioned the use of vyayama in the management of obesity. Acharya Sushruta highlights importance of vyayama as there is nothing equal to vyayama that can reduce bulkiness (plumpness) of the body.

KEYWORDS: Vyayama, Exercise, Childhood obesity, Physical activity.

INTRODUCTION

Obesity prevalence has been increasing globally which has imposed major impact on public health services in both developed as well as developing countries. Globally, an estimated 10 percent children, between 5 to 17 years of age, are overweight or obese. Data regarding childhood obesity from different parts of India are alarming. In Chennai, 17 per cent of teenagers between 13 and 18 years are overweight or obese, while 18 percent boys and 16 per cent girls are overweight. In Delhi and Chandigarh, one in every four teenagers is obese.

"Today, many children spend a lot of time being inactive and simultaneously overeating," says Dr Rekha Harish. "An average child spends about four hours a day with television, the internet, mobile phones or video games during which they often snack on fast food and gulp down a lot of sugary soft drinks, all of which can add up huge calories." Inactivity and junk food make a dangerous mix.

Childhood obesity is an important health concerns due to its tendency to create secondary health problems that were once confined to adults like diabetes, high blood pressure and high cholesterol etc. Childhood obesity can also lead to mental health issues like poor self-esteem or depression.

Reduced physical activity is one of the major contributing factor in causation of overweight or obesity in early stages of life. Moderate intensity regular physical activity is essential for the prevention of overweight and obesity and as a treatment in itself. Research evidence prove that once a child starts putting on weight and become obese, there is a high possibility that the child will continue to be an obese adult. Children should be prioritized in the community for intervention strategies aimed at curing and preventing the onset of obesity and related complications.

Ayurveda explains vyayama or exercise as one of the important *Dinacharya* procedure (daily regimen) to be followed by every healthy individual for maintenance of health and prevention of diseases. *Acharya Charaka* while explaining treatment of *Atisthaulya* i.e. obesity, elaborates the use of *vyayama* in obesity.[1] Regarding the beneficial effects of vyayama or exercise, *Acharya Sushruta* quotes that *vyayama* makes the body stout and strong, helps in the symmetrical growth of the limbs and muscles, improves the complexion and digestive fire (power), prevents laziness and makes the body light and glossy, firm and compact.[2] *Acharya*

Sushruta further states that there is nothing equal to vyayama that can reduce bulkiness (plumpness) of the body.[3]

Present study analyzes the beneficial effects of *vyayama* as a *Dinacharya* (daily regimen) procedure in the management of childhood obesity.

AIM

Study the efficacy of *vyayama* as a *Dinacharya* procedure in the management of childhood obesity.

METHODOLOGY

A clinical study on the overweight or obese children from various school of Pune city was conducted. The total schools in Pune city were listed and out of them ten schools were selected using simple random sampling method. From the ten schools selected, students from class 7^{th} to class 10^{th} were selected for the study. Total 60 diagnosed students of overweight or obesity (based on standard BMI classification chart) within the age group of 12-15 years, willing to participate in the study were enrolled. All the enrolled students were asked to perform vyayama every day 30 minutes for a duration of 90 days. Periodic follow ups were taken during and after the *vyayama* for a total period of 6 months.

Procedure

Duration of vyayama to be performed every day was around 25-30 minutes which was divided as follows.

1. Physical education: 5 minutes of physical education and warm up was demonstrated to the students.
2. Walking: brisk walking for about 8-10 minutes (around 500 meters).
3. Running: running for about 8-10 minutes (around 01 km).
4. Skipping: lastly[4-5] minutes of skipping was done (minimum 50-60 rounds).

Selection Criteria

Diagnosed students of overweight or obese between the age group 12-15 years were included. Students of both the sex and with BMI above 85 percentiles were selected for the present study.

Exclusion Criteria

Individuals contraindicated for *Vyayama* as per the classics were excluded like those suffering from indigestion, those suffering from vata and pitta disease etc. Students suffering from any other systemic disorder or secondary cases of obesity were excluded from the study.

Assessment Criteria

Various features of obesity described in *Ayurveda* were considered and graded to analyze the results statistically as follows.

1. Assessment of *chala spik, stana* and *Udara (pendulous waist, breast, abdomen)*

a.	Absence of *chalatva*	0
b.	*Chalatva* during fast movement	1
c.	*Chalatva* during moderate movement	2
d.	*Chalatva* during slight movement	3

2. Assessment of *Ayata upachaya, utsaha hani* (sluggish movement of body)

a.	Unimpaired *utsaha*	0
b.	On desire can work sluggishly but properly	1
c.	On desire can work sluggishly but improperly	2
d.	Even on desire do not like to work	3

3. Assessment of *Sweda adikyata- excess sweating* (At normal condition and at comfortable zone i.e. temperature of 27^0 c, humidity of 65%)

a.	No sweating	0
b.	Profuse sweating after moderate work	1
c.	Profuse sweating after slight work	2
d.	Sweating even in resting condition	3

4. Assessment of *Ati kshudha* (excessive hunger)

a.	Feels hunger at next *annakala* only	0
b.	Feels hunger for once in between *Anna kala*	1
c.	Feels hunger for more than twice	2
d.	Feels hunger always	3

5. Assessment of *Ati Pipasa* (excessive thirst)

a.	Normal excessive thirst	0
b.	Up to one-litre excess intake of water / fluids	1
c.	Up to two-three-litre excess intake of fluids	2
d.	More than three-litre excess intake of fluids	3

Objective Parameters

- Height and Weight.
- BMI- percentile.
- Waist circumference.
- Physical activity:

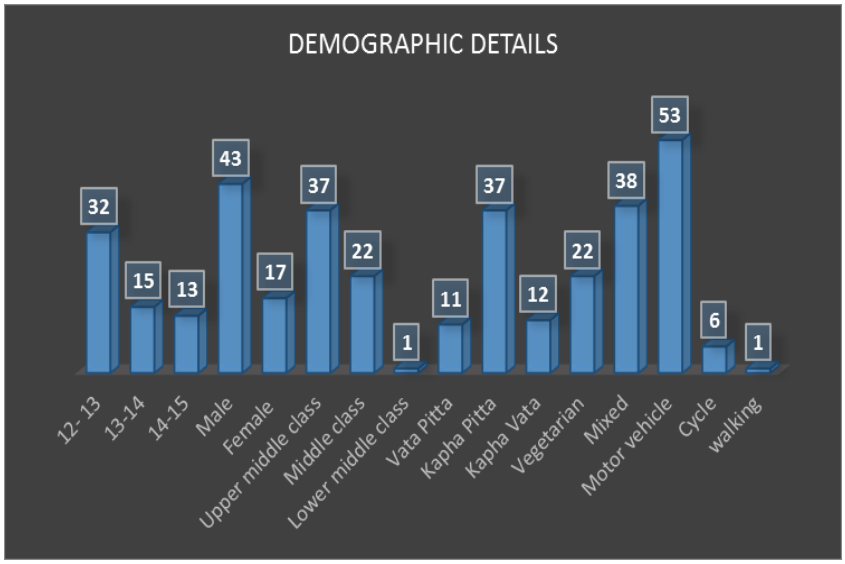
- Classroom time.
- Study time after school.
- Sports time in school.
- Physical training time in school.
- After school play time.
- Total sports-physical activity time.
- Total time spend watching tv, computers or mobile games.
- Mode of commuting to school.

RESULTS

Childhood obesity should be tackled to the earliest because the extra pounds often start children on the path to health problems that were once restricted to adults such as diabetes, high blood pressure and high cholesterol. Moderate intensity regular physical activity is essential for the prevention of overweight and obesity. Vyayama or exercise when included in moderate ways as a daily routine for the present study in 60 children revealed the data which is summarized as follows.

Table no.1 Showing demographic details of the students

Criteria		**No. of Students**	**Percentage**
Age (in years)	12- 13 13-14 14-15	32 15 13	53.33 25 21.67
Sex	Male Female	43 17	71.67 28.33
Socio-economic status	Upper middle class Middle class Lower middle class	37 22 01	61.66 36.66 0.016
Prakruti (constitution)	Vata Pitta Kapha Pitta Kapha Vata	11 37 12	18.33 61.67 20
Diet	Vegetarian Mixed	22 38	36.67 63.33
Mode of commuting to school	Motor vehicle Cycle walking	53 06 01	88.33 10 1.67

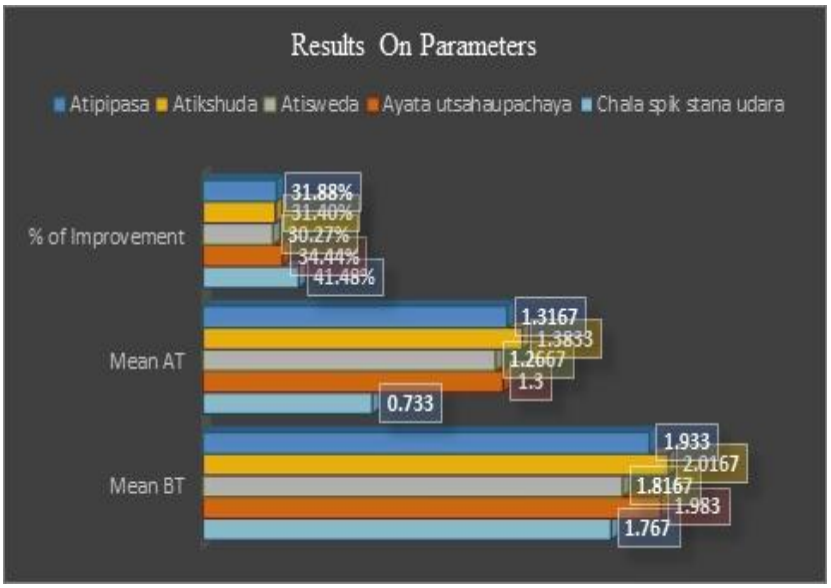


In the present study 32 students were in the age group of 12-13 years, 15 in 13-14 and 13 in 14-15 years of age group. Out of 60 students 43 were male and 17 were female, 37 were from upper middle class; 22 from middle class; 01 from lower class. 38 students consumed mixed diet whereas 22 were vegetarians, 53 students travelled to school by motor vehicle; 6 using bicycle and 01 student walked to school daily.

Overall Results of *Vyayama* (Exercise)

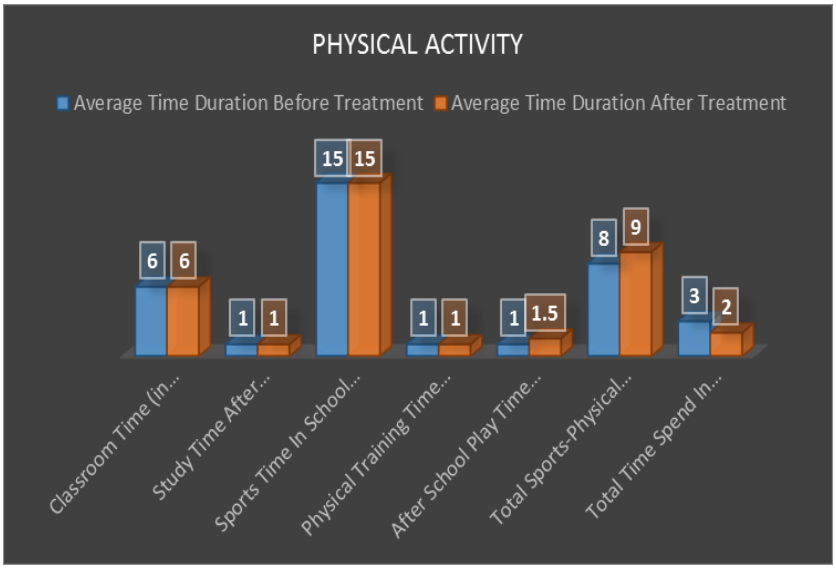
Table No. 2 Showing Statistical details of the Variables

Variables	**Mean BT**	**Mean AT**	**Mean difference**	**% of Improvement**	**P Value**
Height (in inches)	59.783	60.46	1.74	1.14%	0.0646
Weight	59.44	55.18	4.26	---	0.0001
BMI percentile	92.37	87.40	4.97	5.38%	0.0001
Waist circumference	33.59	31.62	1.97	5.86%	0.0195
Chala spik stana udara	1.767	0.733	1.034	41.48%	0.00
Ayata utsaha upachaya	1.983	1.3	0.683	34.44%	0.005
Atisweda	1.8167	1.2667	0.55	30.27%	0.014
Atikshuda	2.0167	1.3833	0.6334	31.40%	0.025
Atipipasa	1.933	1.3167	0.6163	31.88%	0.020



Effect On Physical Activity

Parameters	**Average Time Duration Before Treatment**	**Average Time Duration After Treatment**
Classroom Time	6 Hours/Day	6 Hours/Day
Study Time After School	1 Hour/Day	1 Hour/Day
Sports Time In School	15 Minutes/ Day	15 Minutes/Day
Physical Training Time In School	1 Hour/Week	1 Hour/Week
After School Play Time	1 Hour/Day	1-1½ Hours/Day
Total Sports-Physical Activity Time	7-8 Hours/Week	8-9 Hours/Week
Total Time Spend In Television, Computers Or Mobile Games	2-3 Hours/Day	1-2 Hours/Day



DISCUSSION

Age & Sex

In this study, 53.33% of students belonged to the age group of 12-13 years. Suggestive of increased cases of overweight and obesity in early ages of life. This study shows that 71.67% of the students were males. Being adolescent age group, attainment of puberty changes in females might lead to weight loss and because of over caring of male child in the family, female students were less as compared to male students.

Height

The mean before treatment for height is 151.85 and the mean after treatment is 153.59, and the mean difference is 1.74. As the study period was of 3 months, therefore there was not much difference seen in the height of the students which helped in better assessment of BMI percentile.

Weight

The mean before treatment for weight is 59.44 and the mean after treatment is 55.18; mean difference is 4.26. *Acharya Sushruta* mentioned that vyayama makes the body stout and strong, helps the symmetrical growth of the limbs and muscles, prevents laziness and makes the body light and glossy, firm and compact. The maximum reduction in weight noted was 6.9 kilograms and the minimum was 2.4 kilograms. 30 min of walking on most days of the week may be as beneficial as 60 min (in combination with diet) in promoting numerous additional healthful outcomes over diet alone following a 12-week weight loss program.[4]

BMI Percentile

The 4.26 mean difference in weight had a direct impact on the BMI percentile. The mean difference in BMI percentile was 4.97. When engaged in physical activity, calories are burned. The more intense the activity, the more calories are burned. *Vyayama* (exercise) gives the power of enduring fatigue and weariness and the variations of temperature (cold & hot), thirst, etc and ultimately leads to a healthy existence. According to *Acharya Sushruta, vyayama* proportionate body parts, enhances the *Agni* (digestive system) takes away laziness, provides lightness, purifies the body. Hence, the daily practice of vyayama showed the improvement in the BMI percentile of the students.

Waist Circumference

The mean before treatment for waist circumference was 33.59 and the mean after treatment was 31.62. When Vyayama or physical activity was induced in these students, it helped in the reduction of weight. In the present study, reduced central adiposity was primarily noted. A systematic review and meta-analysis on the effects of exercise provide evidence that exercise training, tends to have superior effects on reducing visceral adipose tissue compared with diet interventions in overweight and obese subjects.[5]

Physical Activity

Classroom Time, Study Time after School, Sports Time in School, Physical Training Time in School-

As the classroom time, school time tables, activities in the school were dependent on the school schedule, which was the same throughout the study, hence the duration for the classroom time, sports time in school, physical training in school remains the same before and after the study.

After School Playtime

Due to the daily practice of *vyayama*, there was an increase in the after school playtime by about 30-40 minutes per day.

Total Sports- Physical Activity Time

Similarly, as the students felt that their body is light, cleansed and resistant, therefore the total physical activity time or sports time increased by around 50-60 minutes on an average per week.

***Total Time Spend in Television, Computers, or* Mobile *Games*-**

Due to increase in the physical activity and playtime, and also counselling was done to the students as well as their parents about the sedentary lifestyle, prolonged use of television, mobile gaming, use of computers for longer duration, etc, it was noted that there was reduced time spent in such activities.

Chala Spik Stana* and *Udara

The mean BT and mean AT are 1.767 and 0.733 respectively and the mean difference is 1.034.

During the course of treatment, *vyayama* showed 41.48% improvement in *chaltwa* of *spik stana* and *udara*. Due to the reduction in waist circumference, the reduction in *chala spik stana* and *udara* can also be seen. *Acharya Sushruta* has stated in *Chikitsa sthana* chapter 24 *quotation* 44 that there is nothing equal to *yayama* that can reduce the bulkiness of the body.

Ati kshuda

The mean BT and mean AT are 2.0167 and 1.3833 respectively and the mean difference is 0.6334. During the course of treatment, *Vyayama* showed 31.40% improvement in *atikshuda*. *vyayama* helps in normalizing the *Agni* thereby improves the digestive system of the body which helped in the reduction of the symptoms of *atikshuda*. *Acharya Sushruta* has mentioned in chikitsa sthana 24th chapter 40th *quotation* that *vyayama* improves the complexion and digestive power. Further stating that if physical exercise is indulged daily, even the food which is unwholesome, overcooked or undercooked is digested properly without causing any bad effect.

CONCLUSION

Obesity in adolescents and children has risen to significant levels globally with serious public health consequences. Unless this epidemic is contained at a war footing, the implications of this global phenomenon on future generations will be serious. *Vyayama* is explained in the management of *Atisthaulya* (Obesity) in *Ayurvedic* classics, which is helpful in providing lightness to the body, gives stability, alleviates *dosha* (kapha), enhances the *agni*, nourishes the body, which overall is useful in the management of obesity. The present study proves that *Vyayama* plays an important role in the management of childhood obesity if practiced daily, which would also help in preventing the complications of obesity in near future. The

reversibility of this disease with suitable intervention strategies should be seen as an opportunity and efforts pursued with vigor.

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