


## Assessment of Energy Expenditure among Obese and Non-Obese Children in National Capital Territory of Delhi

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Sir,

The etiology of obesity is multi-factorial in origin. The lack of physical activity has been considered as one of the important pre-disposing factor. Limited data is available on physical activity level (PAL) amongst obese and non-obese children. Hence, we conducted a school based study on assessment of PAL amongst obese and non-

obese children in the national capital territory of Delhi in the year 2006-07. A total of 16,595 children in the age group 6-17 years were surveyed to assess the prevalence of obesity. The findings of this large survey have been published earlier.<sup>1</sup> Obese children were identified by utilizing body mass index based International Obesity Task Force classification. A total of 493 obese children were identified in the study. 451 children have given the consent and thus included in the study. PALs were compared between obese children (451 Cases) and non-obese children (451 Controls). The groups were matched for their age ( $\pm 2$  years), sex and socio-economic status. The methodology used for assessment of PAL was as follows:

- i) Each subject was administered with an oral questionnaire in which 24 h of a day were divided into 48 slots of 30 min each.
- ii) Subject was enquired about the type of physical activity under taken by him/her in each 30 min time slot during last 24 h.
- iii) The type of physical activities were divided into three categories
  - Light,
  - Moderate,
  - Heavy as per the published literature.<sup>2</sup>
- iv) Each of the three types of physical activities (light, moderate and heavy) has specific metabolic

Age (years)	BMR (kcal/day)
<b>Males</b>	
3-10	Weight of a child in kg $\times$ 22.706+504.3
10-18	Weight of a child in kg $\times$ 17.686+658.2
<b>Females</b>	
3-10	Weight of a child in kg $\times$ 20.315+485.9
10-18	Weight of a child in kg $\times$ 13.384+692.6

equivalent values; light physical activity (PA) (less than 3.5 Kcal/min), moderate PA (3.5-7.0 Kcal/min), and heavy PA (more than 7.0 Kcal/min).<sup>2</sup>

- v) The basal metabolic rate (BMR) of each subject for 24 h was calculated using the FAO-WHO equation given for each age group. The following equations were used for estimating BMR from body weight \* in children.<sup>3</sup>
- vi) The BMR per minute of each subject was calculated by dividing BMR of a subject by a figure of 1440 (24 h $\times$ 60 = 1440 min). BMR per minute of a subject=BMR/1440.
- vii) The time spent on each of the physical activity by the subject was multiplied with the metabolic

**Table 1: Distribution of obese cases and matched controls according to their (PAL value) during last 24 h (on week days)**

Age group (years)	Mean PAL value $\pm$ SD (obese cases) (n=451)	Mean PAL value $\pm$ SD (controls) (n=451)	P value
6-8	1.2 $\pm$ 0.23	1.4 $\pm$ 0.18	0.001*
9-11	1.3 $\pm$ 0.19	1.5 $\pm$ 0.19	0.001*
12-14	1.3 $\pm$ 0.23	1.5 $\pm$ 0.53	0.003*
15-17	1.3 $\pm$ 0.18	1.4 $\pm$ 0.20	0.001*

\*Significant at 5% level of significance utilizing student t-test. Case - Obese cases, Control - Normal weight control, SD - Standard deviation, PAL - Physical activity level

equivalent (MET) value for that physical activity and calorie expenditure on different physical activities under taken by the subject was calculated.

- viii) The total energy expenditure (TEE) done by the subject on physical activities in 24 h was multiplied by BMR per minute and the TEE of the subject was calculated for the 24 h.
- ix) The TEE value obtained was divided by BMR of

Type of life-style	PAL values
Sedentary life-style	Less than 1.4
Low physically active life-style	1.4-1.54
Limited physically active life-style	1.55-1.60
Moderate physically active life-style	1.6-1.74
Physically active life-style	1.75 and above

the subject (as calculated in step 5) and PAL value was calculated.

The PAL value indicates the energy expenditure and is a composite index of physical activity patterns in a subject. The PAL values have been categorized in five classes. Each class indicates the type of life-style (physical activity pattern) of the subject.<sup>2</sup>

The distribution of cases and controls according to mean PAL value in different age groups, i.e., 6-8, 9-11, 12-14 and 15-17 has been given in Table 1 and it was observed that in all the age groups the mean PAL value for controls (non-obese) was high eras compared to cases (obese).

Similar findings have been reported in an earlier study conducted in China. Other investigators also reported that obese children had lower levels of physical activity and were less physically active as compared with non-obese children.<sup>4-7</sup>

In the present study, the TEE was significantly higher

among controls (non-obese) as compared to cases (obese).

The findings of the present study suggest that there is a need of emphasizing among school children to increase their PALs, which possibly may have a role in causation of obesity.

**\*Umesh Kapil<sup>1</sup>, Ajeet Singh Bhadoria<sup>2</sup>**

<sup>1</sup>Professor Public Health Nutrition, <sup>2</sup>Research Officer,  
Department of Human Nutrition Unit,  
All India Institute of Medical Sciences,  
New Delhi, India

**\*Corresponding Author:** Dr. Umesh Kapil,  
Department of Human Nutrition Unit, All India Institute of Medical  
Sciences, Ansari Nagar, New Delhi - 110 029, India.  
E-mail: umeshkapil@yahoo.com

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