

TIME USE PATTERNS IN CHILDREN WITH AND WITHOUT CHILDHOOD OBESITY**RAJI ROQEEB BABATUNDE*, SUMITA REGE, SHASHIDHAR CHAVAN**

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ABSTRACT**Objective:** The aim of the study was to compare the daily time use patterns of children with and without childhood overweight and obesity.**Methods:** Participants from schools in the Udupi district within the age group of 8–15 years were recruited. These children's body mass index was measured to categorize them into obese and non-obese group. Information about activity participation was then collected from parent and their children using a week-long 24 hr time diary. Data pertaining to time spent on play participation (active) and other daily activities were extracted from the log diaries to gain an understanding of the activity participation for children with and without obesity.**Result:** The results indicate that, for play activities, miscellaneous activities and sleep, a statistically significant mean difference existed for the time spent in each activity between the two groups with the non-obese group having higher values in each. However, participants in the obese group have higher value regarding the time spent in sedentary behaviours.**Conclusion:** The findings from this study showed that time use patterns in children with and without childhood obesity differs.**Keywords:** Childhood obesity, Play, Sedentary behaviors, Participation.© 2023 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>) DOI: <http://dx.doi.org/10.22159/ajpcr.2023v16i1.46344>. Journal homepage: <https://innovareacademics.in/journals/index.php/ajpcr>**INTRODUCTION**

It has been observed that the proportion of children with normal body mass index (BMI) is decreasing across the globe and prevalence of childhood obesity is increasing [1,2]. Although the causes for these changes among children's BMI are not fully understood [3], one hypothesized contributor is more sedentary behavior and less active participation in play [4,5]. Many studies have found that higher amounts of sedentary behaviors (such as television viewing) in the daily time use patterns of school aged children are correlated with increase in their BMI [6-9]. The American Psychological Association recommends that children and adolescents have no more than 2 h of screen time (i.e., TV, DVDs, video games, or cell phones) per day as a preventive measure against childhood obesity [10], but a recent conclusion showed that children aged 8–12 years spend an average 6 h per day in sedentary behaviors [11]. Furthermore, the transition from childhood to adolescence appears to be a period during which active participation in play declines, with the end of primary school (10–11 years) being a critical period [12]. Sánchez-López *et al.* [13] emphasized that this decline in active participation in play in these children is associated with increase in their BMI. This is because, children expend high calories of energy through active participation in play [14].

METHODS**Aim of the study**

The aim of the study was to compare the daily time use patterns of children with and without childhood overweight and obesity.

Study design

A cross-sectional study design was used in this study to see whether variations in the daily time use pattern contributes to body weight status of these children.

Settings

Primary school children between the age of 8–15 years who are English speaking with BMI-5percentile and above according to the standard

BMI chart based on child age and sex who are not physically challenged/known case of metabolic/genetic disorders/any developmental disabilities, based on school/parent report.

Instruments used*Time diary*

This time diary consists of a 7 day activity time chart with each day having 24 columns. Each column was divided into three parts. First part was for the name of the activity performed with activity written at the top of the allotted space. The second part was for the starting time of the activity (which was denoted by "S" at the top of the allotted space) and the third part was the time the activity ended (which was denoted by "E" at the top of the allotted space within the column).

Weighing scale

A weighing scale was used to measure the participants' weight. It is a device that is used to determine weight. Weighing scales can be divided into two primary types: Spring scales and balances. Balances are the oldest type of weighing device and were used in this study due to its accuracy in measuring weight.

Measuring tape

This was used to measure the participant's heights. It is a flexible tool used to measure height, length, size, or distance. Each participants stood by the wall, the height was marked and at the head top of each participants then the height of the spot was taken accordingly.

Standard BMI chart

This chart was as per the India norms for measuring BMI in children. There was separate sheets for both males and females. The age range for the BMI chart is from 5 to 19 years for both genders. The chart consisted of graph lines in which the BMI was plotted against age. The lines representing the centile run across the chart with the lowest line indicating the third centile and the highest line representing the 97th centile. BMI value located at 85th centile and above on the sheet indicates obese and those values below 85th and above 5th centile were

Table 1: Characteristics for activity categorization

Play activities	Sedentary behaviors	Miscellaneous activities
Activities included under play in each group were unstructured fun activities (such as run and chase) with spontaneous bursts of energy more than 1.5 MET which take place during free time [16]. It can be alone or with friends and family [17].	Sedentary behavior category was collated from the time diary based on the definition given by Tremblay <i>et al.</i> [18], as behaviors characterized by energy expenditure ≤ 1.5 METs while in a sitting or reclining posture (for example, reading novel in sitting or recline position).	Miscellaneous category includes those activities that neither met the criteria for sedentary activities nor play with the exception of sleep. This include; ADL (such as bathing and brushing), IADL (such shopping, and ironing), standing waiting for bus.

Table 2: Demographic data and time pattern ranges for both obese and non-obese group

Group	Non-obese	Obese
Demographic data		
Age (in years)	8-15	8-15
Height (in cm)	124-174	129-172
Weight (in kg)	30-63	37-95
BMI (in kg/m ²)	15.5-26.5	21.5-36.5
Time spent in Play (in hours/week)	6-20	3-15
Time spent in Sedentary beh. (in hours/week)	48-75	69-90
Time spent in Miscellaneous act. (in hours/week)	8-20	7-3
Time spent in Sleep (in hours/week)	66-89	62-82

considered normal body weight with regard to age. There was separate sheet for each gender [15].

Sample size

A purposive sample of 128 children within the age of 8-15 years was involved in the study. The sample size was determined by taking the level of significance at 5% and power of the study being 80% base on statistical analysis of obese children. The formula used is,

$$n = \frac{2(Z_{1-\alpha/2} + Z_{1-\beta})^2 \sigma^2}{d^2}$$

Procedure

Ethical permission was obtained from the Institution Ethical Committee of Kasturba Medical College (KMC). Furthermore, permission from concerned school authorities was obtained then participants were recruited. The study criteria and protocol were explained to the participants including their teachers. Written informed consent was taken from students between the ages of 12 and 15 years. Students between the ages of 8 and 11 years gave informed consent only through their parents after their interest to participate in the study was affirmed. Participants classes (3rd to 10th standards) who met the selection criteria were recruited. Participants for the non-obese group were recruited from two out of the five schools involved with 40 participants and 24 participants, respectively. For the obese group, 18 participants were recruited from one of the schools, 15 participants each from two schools, 10 participants from one of the schools, and 6 participants from the fifth school. This was done with the help of the student affairs in-charge from each school. Participants' weight and height were taken to calculate their BMI. Those with BMI at 85th centile and above on the BMI sheet were placed in obese group and those participants with BMI between 84th and 5th centile were placed in non-obese group. Participants for both groups were selected without gender differentiation. The procedure of filling the time diary was explained to both groups through verbal instructions. A sample of already filled time diary was used to explain the procedure. A copy of the diary along with the researcher's contact was given to each participant in case of any clarification or verification from the parents. Follow-up was done by visiting the involved schools 3 times during the period of filling the diary. Phone calls from the participants or their parents were received regarding

the study and the procedure for filling the diary which was clarified by the researcher. Appointments were made through phone call in each school for parents who requested to meet for further clarification regarding the study. The time diary was collected back after 1 week duration. Time was extended for those participants who have completed the filling but forgot to bring the diary from home and those who are unable to complete the filling of the diary within 1 week duration. The process of recruiting and collecting data took about one and half to 2 weeks in each school and the whole process of data collection took about 3 months.

Data analysis

All activities noted in the time diary were grouped into four categories, namely, play activities, sedentary behavior, miscellaneous activities, and sleep. The characteristics for each activity are given in Table 1.

A compendium of physical activities [19] was partly used in justifying activities ≤ 1.5 METs. Sleep was put into the fourth category (including sleep during the day). Data gathered for each category were entered into an excel sheet with the non-obese group in the first sheet and obese group in the second sheet which was later transferred into SPSS 26.0 version. Each sheets for the excel computation were divided into nine columns with the first column for serial order, the second column for gender, the third column for participant's age, the fourth column for BMI values, the fifth column for centile range of the participants, the sixth column for number of hours participants spent in play, the seventh column for number of hours spent in sedentary behaviours, the eighth column for number of hours spent in miscellaneous activity, and the ninth column for number of hours spent for sleep. All numbers of hours entered for each participant in each category were the total number of hours spent in a week for each activity. An independent t test was used to compare between the time in hours spent in play, sedentary behaviors, miscellaneous activities, and sleep of children with and without childhood obesity. Further analysis was done by clarifying the association of age and gender to both groups. Chi-square test was conducted to evaluate for any association between the two groups regarding gender.

RESULTS

Table 2 above showed ranges in demographic data of the participants.

Time spent (in hours) in sedentary behaviors, play activity, miscellaneous activity, and sleep by non-obese and obese group

As shown in table Table 3, The results indicate that, for play activities, miscellaneous activities and sleep, a statistically significant mean difference existed for the time spent (number of hours) in each activity (play, sedentary behaviors, and miscellaneous activities) per week between the two groups with the non-obese group having higher values in each. Regarding the time (number of hours) spent per week in sedentary behaviors, values indicate that the participants in the obese group have higher value with the p-value ($p=0.000$) showing that, there is a statistically significant difference in means when comparing the values for the two groups.

Contribution of age to time pattern in children with and without childhood obesity

An independent sample t-test was conducted to know if there was a statistical difference among the two groups based on age. Result of

Table 3: Result of t-test and descriptive statistics for the time spent (hours) in sedentary behaviour, play activity, miscellaneous activity, and sleep by non-obese and obese group 4

Outcome	Group						95%CI for Mean			
	Non-Obese			Obese			Difference			
	M	SD	n	M	SD	n	t		df	
Play activity	14.88	4.041	64	7.58	2.899	64	6.066	8.521	11.736*	126
Sedentary beh	64.33	7.262	64	82.69	4.639	64	-20.491	-16.228	17.045	126
Sleep	75.44	6.052	64	67.16	4.036	64	6.482	10.081	9.107	126
Miscellaneous	13.36	2.675	64	10.58	1.688	64	1.999	3.564	7.034	126

*p<0.05

the test shown very less difference between the average mean age of the non-obese group (M=13.19, SD=1.097) and obese group (M=12.67 SD=1.533) As a result, the p value was not considered and age is not regarded significant factor between the two groups.

Gender contribution to time pattern in children with and without childhood obese

The test which was computed in the Table 4 suggested that gender has no contribution to any of the groups.

DISCUSSION

The primary purpose of this present study was to explore the difference in the time spent in play by children with and without childhood obesity and to identify if there is a difference in the time these children spent when participating in sedentary activities using time diary as a means of collecting this information. Findings from this study were collated through the use of time diary which recorded different activities in which each student engaged themselves for a week and the exact time spent on each activities. The use of time diary in the process of collating data for the time use pattern in this study was supported by a study [20].

In this study, we found that children who are not obese spent more time per week to actively participate in play activities than children who are obese. This finding is similar to Sánchez-López *et al.* [13] and Janssen [21] studies in which they found similar results and have gone to further recommend that spending more time actively participating in play among children might be an effective means to fight childhood overweight and obesity.

As hypothesized in this study that children who are obese tend to spend lesser time in play and more time in sedentary behaviors. We compared the time spent in sedentary behaviors among the two groups. Our findings showed that children who are obese spend more time weekly in sedentary behaviors than non-obese children. This might be as a result of lesser energy which is said to be expended during these waking activities. We also found that this view was similar by the findings from the studies [22,23] on sedentary behaviors in children with obesity which found that these children spent more time in sedentary behaviors than other activities. As a result, the studies concluded that there is positive correlation between sedentary behavior and childhood obesity.

In an effort to determine whether there is difference in the hours spent weekly on other activities named miscellaneous activities which are neither play activities nor sedentary behaviors. We found that non-obese children spent more time in miscellaneous activities than obese children. This outcome correlates with the findings from a study done by Fonseca *et al.* [24] which concluded that any form of activity in children which required higher levels of energy expenditure including home task activities as computed in the compendium of physical activities [19] can help to reduce body weight.

Furthermore, we compared the time spent in sleep between the two groups as sleep is considered as activity which did not fit into the categories of activity mentioned earlier. Result from this present

Table 4: Result of Chi-square test and descriptive statistics for sex by non-obese and obese group

Gender	Group	
	Non-obese	Obese
Male	26 (46.4%)	30 (53.6%)
Female	38 (52.8%)	34 (47.2%)

$\chi^2=0.508$, df=1. Number in parentheses indicate percentages *p>0.05 (0.476)

study showed that the non-obese children spent more time on sleep in comparison with obese children. This finding regarding sleep is similar with the result from the study conducted by Li [25] which also found a strong correlation between shorter duration of sleep and increase in body weight among children and concluded that short sleep might be one of the contributing factors to childhood obesity.

Shah *et al.* [26] showed that childhood obesity is more higher in boys than girls, Brazo-Sayavera *et al.* [27] found that girls are more involved in sedentary activities than boys hence higher childhood obesity in girls. Therefore, we sought to evaluate presence of any correlations between gender differences and activity performance in obese children. Our findings show that gender has no association to both groups. Variations in between their findings and ours might be attributed to methodological differences. Moreover, age was seen as a factor which determined how often children will engage in play activities [28]. Our findings to see the correlation between age and the two groups showed very less differences between the two groups. As a result, age was not considered to have any association with both obese and non-obese group. The age of the participants in the study ranges from 8 to 15years. Although studies [16,29] have reported that children from age 10 upward tends to decrease in active participation in play and spend more time in sedentary activities, our findings were in contrast to these. The difference in these present study findings as compare to the previous study might likely be as result of difference in objectives of this present study.

CONCLUSION

As the aim of this study was to see whether the time use pattern in children with and without childhood obesity differ, we conclude by saying that there is a difference in the time use pattern in daily activities among these children and this variation might be one of the contributing factors to childhood obesity.

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AUTHORS CONTRIBUTION

Raji Roqeeb Babatunde: He is the primary Author. Responsible for the research idea, the study procedures (methodology) and the writing of the research work.

Dr. Sumita Rege: The main supervisor for the study. Responsible for the modification of the research topic and guided at each stage of the study. Also responsible correction and editing of the study writing.

Dr. Shashidhar Chavan: Coguide for the study. Contribute in the modification of the research topic and coguided at each stage of the study. Also responsible for correction, suggestion during the study writing.

CONFLICTS OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

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