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CO-RELATION BETWEEN PHYSICAL ACTIVITY AND BODY COMPOSITION IN YOUNG CHILDREN

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ABSTRACT

In today's world, the number of children that are out of shape and sedentary are increasing rapidly. There is a decrease in the endurance and strength capabilities of the young children due to more time spent using technology, busy working parents, safety concerns and lack of places to play. Aim of the study was to assess the physical activity pattern of children aged 7 to 9 years. 702 children aged 7 to 9 years were selected by purposive sampling from nine different schools of Nashik city. They were studying in standard 2nd, 3rd and 4th. Their height, weight and waist circumference were measured using standard procedures. BMI and Waist to Height Ratio were calculated. A questionnaire was given to them to elicit information regarding the physical activity they performed throughout the day. The data was analyzed using SPSS version 16. 13.1 % of the children were at high risk of becoming obese in future, if they continued to lead a sedentary life. 34 % of the entire sample did not have physical training class in their time table. 72.5 % of the children were not involved in any kind of indoor games. 37.7 % children did not play any outdoor games. Children lead a sedentary lifestyle with lack of physical activity appropriate for age. The sedentary lifestyles of children have been attributed mainly to television viewing, computer games, over emphasis on academic excellence, unscientific urban planning and ever increasing automated transport. This problem needs intervention at School, Parents and Community level.

Key Words: physical activity, sedentary activity, indoor games, outdoor games, structured games.

INTRODUCTION

"Active Living for all" is recognized as a worldwide challenge by the World Health Organization. As highlighted in the World Health report in 1997, physical inactivity has been shown to be an independent risk factor for lifestyle related diseases such as obesity and cardiovascular diseases. Establishing physical activity during early years of life is important because habits and attitudes towards physical activity developed during childhood are assumed to continue into adulthood (Eddie *et.al.,* 2003).

Adult health appears to be related with childhood physical activity and physical fitness (Kemper et.al., 2001 and Twisk et.al., 1997) and there is a great deal of evidence of the close relationship between health status and childhood physical fitness. The amount of physical activity at an early age is a factor that would prevent the prevalence of sedentary related diseases in adults (Warburton *et.al.,* 2006).

DEFINITION OF PHYSICAL ACTIVITY

According to World Health Organization (WHO), physical activity is defined as any bodily movement produced by skeletal a muscle that requires energy expenditure. Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities (www.who.int). Less is known however, about children's physical activity patterns. Physical activity is a pre-requisite for optimal growth and development in children and is associated with a range of health benefits. Further, physical activity via play, leisure and recreational activities, provides opportunities for children to develop their sensorimotor, cognitive and socio-emotional capacities and promotes a sense of psychological well-being. The study aimed at examining the physical activity pattern of children. The age group selected for the study was 7 to 9 years, as this is the age when growth is slow and steady and they can understand simple instructions.

MATERIAL AND METHOD

PARTICIPANTS

The study was carried out in nine schools in Nashik city. The schools were selected due to easy approachability, good response, co-operation from the authorities and ease of communication. A total of 702 students were selected by purposive sampling (351 girls and 351 boys) aged between 7 to 9 years. They were studying in standard 2nd, 3rd, and 4th. The following anthropometric measurements were taken:

HEIGHT

It was measured to the nearest 0.01 m using standard stadiometer.

WEIGHT

Was assessed to the nearest 0.1 kg using a certified electronic scale (Avon Scale). The body mass index (BMI) was calculated as Kg/m^2.

WAIST

Girth was taken at the waist using fibre glass tape. The waist - to – Height ratio was calculated as waist / Height.

The results obtained were compared to the WHO standards for age. To study the physical activity of children, a questionnaire was given to them to elicit information regarding their activities throughout their waking hours. All the activities which the child performed from the time he got up in the morning to the time he/she went to sleep at night were recorded by asking questions regarding their daily activity schedule.

STATISTICAL ANALYSIS

Statistical analysis was done by using SPSS software version 16.0. Percentages, means, frequencies, minimum to maximum range were calculated for all the parameters understudy. Pearson and Spearman correlations were applied to the data for finding associations.

RESULTS AND DISCUSSION

Table no. 1.1 shows the distribution of Children According to Gender and Age. Data on gender wise distribution shows equal number of children of both sexes (n=351 girls and n= 351 boys). Thus the girls to boy's ratio were 1:1. The total sample size was 702 children. The children were also distributed age wise as observed from table 1.1. The maximum number of children were observed in 9 years age group (n= 154 girls) (n= 157 boys). Comparatively the number of children in 7 years were less (n=91 girls) (n= 85 boys).

Table no. 1.1 Distribution of Children According to Gender and Age

S. No	Criterion	Girls (n=351)	Boys (n=351)	Total (n=702)
1.	Sex Wise	351	351	702
2.	Age Wise			
a.	7 years	91	85	176
b.	8 years	106	109	215
c.	9 years	154	157	311

Results presented in table 1.2 shows that the mean height of girls aged 7 years is 1.21 m. Boys on the contrary show a slightly more mean height of 1.23 m. At 8 years both the sexes show similar height (1.25m). At 9 years of age the girls have a mean height of 1.28 m, and boys have a mean height of 1.29 m. Observations from table reflect that the mean weight of 7 year old boys is more (23.97 kg) than the mean weight of girls of the same age (22.53 kg). The girls of 8 year age have put on 2.81 kg weight in one year (22.53 kg at 7 years, 25.34 kg at 8 year), whereas the 8 year old boys have put on 1.11 kg during the same period (23.97 kg at 7 year and 25.08 kg at 8 year). The increment in mean weight of girls of 9 year is more (1.90kg) than that of boys of the same age (1.44 kg). Over a period of three years (7 to 9 year) the girls have put on 4.71kg, while the boys have put on 2.56 kg weight during the same period.

Table No 1.2 Mean Height, Weight and BMI of Children Distributed Age wise and Sex wise

S.No	Age Years	Mean Standard Deviation	Girls			Boys		
			Height (m)	Weight (kg)	BMI	Height (m)	Weight (kg)	BMI
1.	7	M	1.21	22.53	15.18	1.23	23.97	15.57
		SD	.07	4.97	2.04	.07	5.63	2.53
2.	8	M	1.25	25.34	15.94	1.25	25.08	15.64
		SD	.08	6.45	2.73	.08	6.35	2.67
3.	9	M	1.28	27.24	16.28	1.29	26.53	15.71
		SD	.08	8.38	3.63	.07	7.00	2.76

When the children were distributed sex wise, it was observed that the 7 year old girls had a slightly lower mean BMI (15.18) as compared to the boys (15.57) The 8 year old girls have shown a greater increment in the mean BMI (0.76) than the boys (0.07). The increment in the mean BMI of 9 year old girls is more (0.34) when compared to the boys (0.07) of the same age. From table 1.3 it is observed that 13.1 % of the children are at high risk of becoming obese in future, if they continue to lead a sedentary life. And on the other hand 23.4 % of the children are very lean with a BMI of less than 13.4. These children are also at risk as there immunity will be low and they could contact many infectious diseases, leading to poor health. However majority of the children were in the Healthy Fitness Zone.

Table No 1.3 BMI Categories of children

Category	BMI	Frequency	Percent
High risk	>=18.3	92	13.1
Some risk	>=17.6	19	2.7
HFZ	17.5 – 13.5	427	60.8
Very lean	<=13.4	164	23.4
Total		702	100.0

From table 1.4 it is seen that 10.1 % of the children were having a high Waist to Height Ratio (normal being 0.5) which is also an indice to predict the risk of obesity. With lack of outdoor games, children tend to spend time on sedentary activities like watching television, playing at the computer or mobile games. Though 89.9 % of the children have a normal Waist to Height Ratio.

Table No. 1.4 Waist to Height Ratio

Category	Frequency	Percent
High	71	10.1
Normal	631	89.9
Total	702	100.0

To study the children's activity pattern, a number of parameters were observed. The results are discussed below. Fig.1.1 shows how the children commute to school. 161 children come to school by school bus, 212 come by rickshaw, only 2 children come by cycle, 96 children's parents drop them to school (by two or four wheeler) and 229 come to the school walking. A report in urban transport in India highlights the problems of walk-ability and road safety, (Ministry of urban development 2008), this has implications for understanding choices of transport to and from school. Fig. 1.2 shows the activity of the children during physical training Class (Frequency).34.0% (n=234) do not have physical training class in their time table, 37.0% (n=265) children regularly play sports during the physical training class, while 12.0% (n=84) do not play sports at all and 17.0 % (n=119) sometimes play sports during that time.

Fig.1.3 shows the activities of the children during the recess time. Children are engaged in some of the following activities–completing their home-work or class work (n=107), playing on the ground with friends (n=395), taking rest and doing nothing (n=232), recess time is not sufficient to finish food (n=30), and any other (n=4). Boys are typically more physically active than girls, but schools have the potential to promote health related physical activity for all children. Boys and girls had similar activity levels during physical education classes, but boys were significantly more active than girls during recess (Sarkin et.al., 1997).

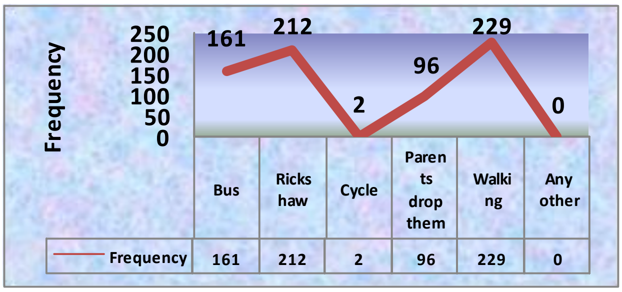

Fig 1.1 Mode of Commuting to School (Frequency)

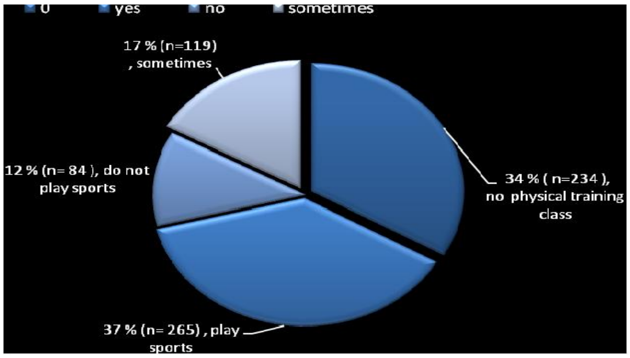

Fig. 1.2 Activity of the Children during Physical Training Class (Frequency)

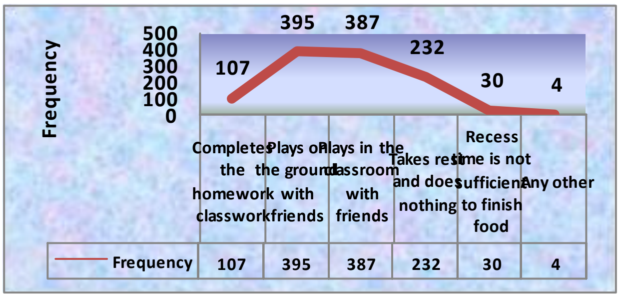

Fig 1.3 Recess Time Activities of Children (Frequency)

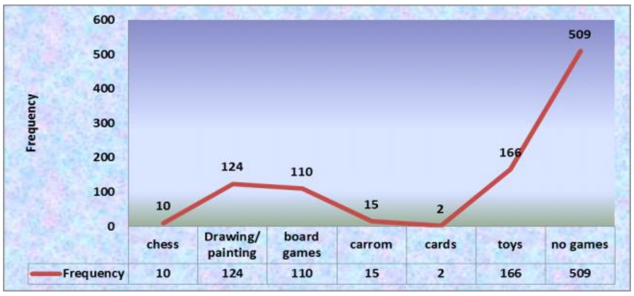

Fig 1.4 Type of Indoor Play of Children (Frequency)

During recess, children can be active on a daily basis, making it an important school environmental factor for the promotion of health related physical activity. Promoting physical activity through game equipment provision during recess periods can contribute to reach the daily activity levels recommended for good health (Verstraete et.al., 2006). The frequency of type, time and frequency of play (indoor, outdoor, and structured) was also studied. The results are represented in figures. Fig. 1.4 reveals the result of type of indoor games played by the children. Majority (n=509, 72.50 %) of the children do not play any indoor games. Those who play indoor games either draw or do painting (n=124), play board games (n=110), play with toys (n=166), play carom (n=15), chess (n=10). Fig.1.5 shows the duration of indoor games. 84 children (12.0%) play indoor games for 30 min, 72 children (10.3%) play for more than 30 min but less than one hour and 40 children (5.7%) play indoor games for more than one hour. The frequency of playing indoor games is seen in fig. 1.6. 16.0% (n=110) play for four times in a week and 12.0% (n=83) play for five times in a week. Majority of the children (72.0%, n=509) do not play indoor games.

The type of outdoor games played by the children is seen in fig.1.7. Majority of the children (425) play chase, followed by hide and seek (n=315), cycling (n=137), lingocha (n=137), cricket (128), other games (142). Few also play badminton (n=21), skating (n=65). 264 children do not play any type of outdoor games. Fig. 1.8 reveals the duration of outdoor play. 29.0% (n=204) play for more than one hour, 22.0% (n=153) play outdoor games for more than 30 min but less than one hour, while 11.0% (n=80) play them for 30 min. Rest 38.0% (n=265) do not play any outdoor games. Fig 1.9 shows the frequency of outdoor play. With regards to frequency of playing outdoor games 199 children (28.3%) play outdoor games six times in a week, 163 children (23.2%) play for five times in a week and 74 children (10.5%) play outdoor games seven times in a week. The children's active / structured play involvement is shown in fig 1.10. A large number of children (n=446, 63.53 %) do not play any structured or active games. The most preferred structured activities are swimming (n=97), basketball (n=61), dancing (n=36), karate (n=31). Few play badminton (n=10), football (n=14), skating (n=21) and chess (n=2).

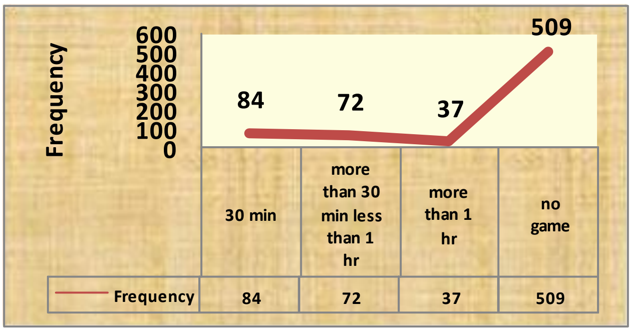

Fig. 1.5 Duration of Indoor Games (Frequency)

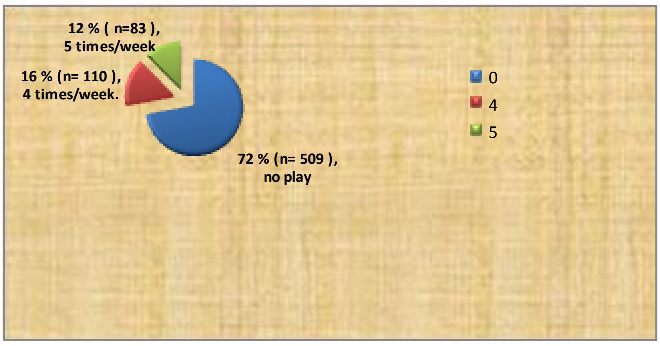

Fig. 1.6 Frequency of Indoor Games

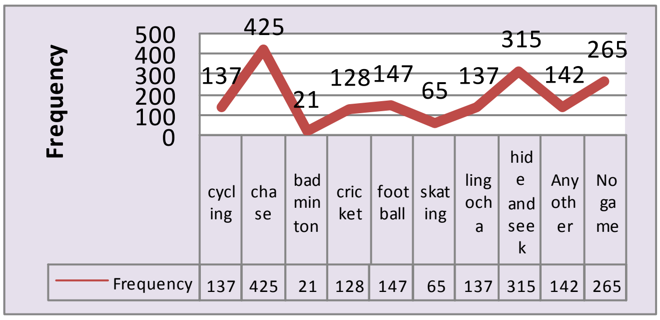

Fig 1.7 Type of Outdoor Play (Frequency)

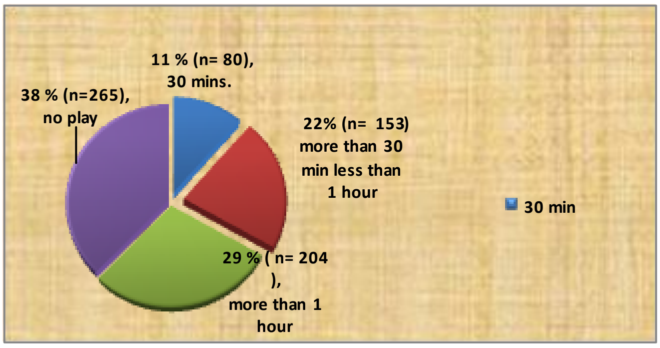

Fig 1.8 Duration of Outdoor Play (Frequency)

Fig.1.11 shows the duration of the structured activity. 217 children (30.9%) play for one hour, 37 children (5.3%) play for more than one hour and 446 children (63.5%) do not play any structured games.

Frequency of structured play is seen in fig. 1.12. 194 children (27.6%) are engaged in the structured activity for five days in a week, 40 children (5.7%) for three days in a week. 19 children (2.7%) play structured games six times in a week. 446 children (64.0%) do not play any games. The time spent by the children in watching television is shown in fig. 1.13. 274 children (39.0%) watch television for 60 minutes / day. 186 children (26.5%) sit in front of the "idiot box" for more than 90 minutes / day, 108 children (15.4%) watch television for 90 minutes / day and only 25 children (3.6%) do not watch television.

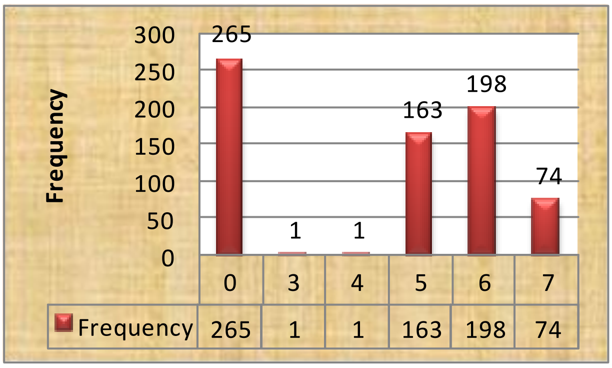

Fig 1.9 Frequency of Outdoor Play

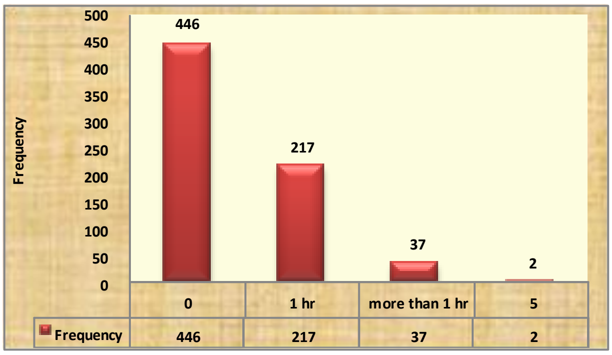

Fig 1.11 Duration of Structured Play (Frequency

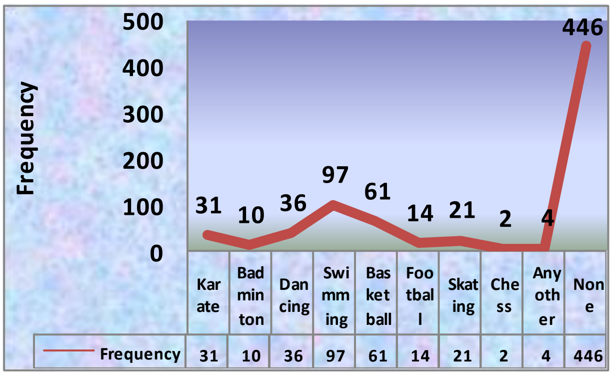

Fig. 1.10 Type of Structured Play (Frequency)

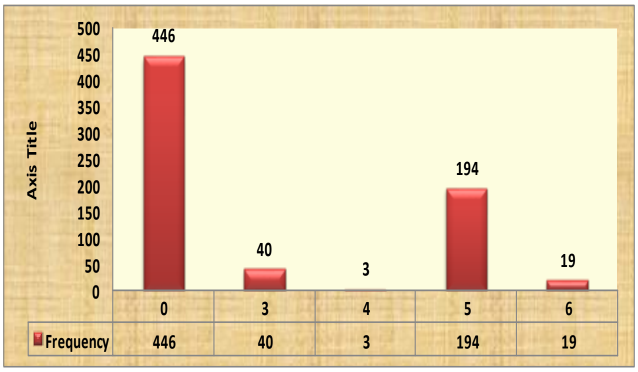

Fig 1.12 Frequency of Structured Play

Table No 1. 5 Coefficient of Co-relations between Physical Activity and Body Composition Assessed in Children (n= 702)

S. No.	Parameters	'r'	'p'	Result
1	Weight (Kg) Vs Waist to Height Ratio	.625	.000	**Correlation is significant at the 0.01 level (2-tailed).
2	BMI Vs Waist to Height Ratio	.741	.000	**Correlation is significant at the 0.01 level (2-tailed).
3	Duration of outdoor games Vs Waist to Height Ratio	-.146	.000	**Correlation is significant at the 0.01 level (2-tailed).
4	Frequency of outdoor games Vs Waist to Height Ratio	.284	.000	**Correlation is significant at the 0.01 level (2-tailed).

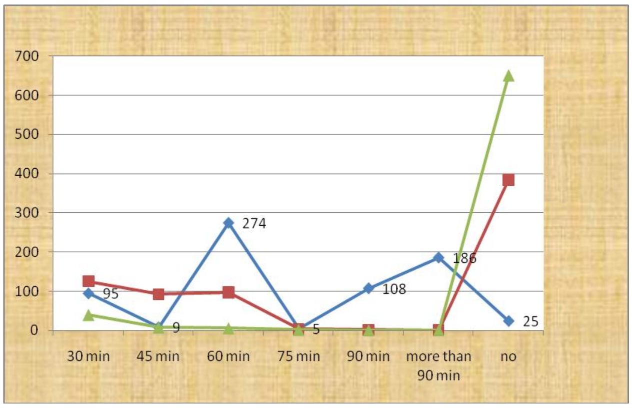

Fig. 1.13 Time Spent in Leisure Activities (Frequency)

The recent trend is that school children concentrate more on academics and are involved in less of sports and activities. Leisure hours are spent in watching television or playing computer / video games, thus explaining the sedentary lifestyle of today's school children. These findings are consistent with study done by Marwaha RK (2006). Table 1.5 reveals the coefficient of co-relations between physical activity and body composition assessed in children (n= 702). Active play makes a significant contribution to children's physical activity and could play an important part in the health of the future generations. Time spent outdoors is a consistent predictors of children's physical activity (Sallis, 2000), and physical activity levels are greater out of school than during school (Gidlow et.al., 2008). Unstructured outdoor physical activity in children's free time, ("active play") could be a major contributor to total physical activity levels (Veitch et.al., 2008). Active play is also an important source of health-enhancing activity for children (Rowan et.al., 2010).

The above table shows that, the Waist to Height Ratio shows a weak negative but highly significant relationship to duration of outdoor play (r= -.146, P=.000). The frequency of outdoor play, that is, the number of times the child plays the outdoor games in a week shows a weak yet highly significant co-relation to Waist to Height Ratio (r=.284, P=.000). The above results are similar to those obtained by Ara I 2006, Ruiz JR 2006, Tokmakidis SP et al 2006. A highly positive and highly significant co-relation exists between weight and Waist to Height Ratio (r=.625, P=.000). As expected there is a highly positive and highly significant co-relation between BMI and Waist to Height ratio (r=.741, P=.000).

CONCLUSION

A rapid demographic, nutritional and epidemiological transition has led to changes in lifestyles and dietary behaviors. Physical activity is our evolutionary heritage.

- Over a period of three years (7 to 9 years) the girls have increased by 7 cm in height while the boys had gained 6 cm during the same period.
- Over a period of three years (7 to 9 years) the girls had put on 4.71 kg, while the boys had gained 2.56 kg during the same period.
- Mean BMI gender wise, the total increment in the three years (7, 8 and 9 years) among the girls is more (1.10) than the increment in mean BMI of the boys (0.14) during the same three year period.
- 34 % of the entire sample did not have physical training class in their time table.
- The study also showed that 72.5 % of the children were not involved in any kind of indoor games.
- 37.7 % do not play any outdoor games.
- A large number of children do not play any structured games (63.53 %).

A decrease in physical fitness causes a low physical activity which again causes low physical fitness. This is a vicious cycle and therefore the right direction at the right time can be a positive asset in molding a child who is physically healthy and fit and mentally sound.

RECOMMENDATIONS

- Every day the child should go for walks, play outside, help with housework and indulge in free play.
- He/she must dance, play ball and ride bike often.
- Sometimes he/she can go for swimming, swinging, and playing in the park. These activities may not be immediately available due to equipment or facility needs.
- Limit low movement activities like watching television, movies, using computer and playing computer games.

Gabriela Mistral has rightly stated that "We are guilty of many errors and many faults, but our worst crime is abandoning the children, neglecting the foundation of life. Many of the things can wait. The child cannot. Right now is the time his bones are being formed, his blood is being made and his senses are being developed. To him we cannot answer "tomorrow". His name is "today".

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