

Original Article

Physical fitness in rural children compared with urban children in Turkey

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Abstract

Background: In a crowded modern world it is vital that the promotion of sport and exercise should be compatible with environmental and public health outcomes. This study aims to investigate the effects of environmental factors, lifestyle and leisure time activities on physical fitness in rural and urban children.

Methods: A cross-sectional observational study of 98 rural and 74 urban healthy children (aged 9–11 years) was conducted in Turkey. A questionnaire was used in collecting information about the children's physical activity habits and their school's facilities. The physical fitness of children was evaluated with EUROFIT test battery.

Results: The rural children preferred to play football and volleyball while the urban children had a tendency to prefer indoor sports. The percent of urban children not involved in any sports activity was 35%, while this rate was 30.6% for rural children. It was also found that the urban children watched TV more than the rural children (13.4 ± 2.7 h/week, 10.9 ± 2.7 h/week, respectively). The results showed that body mass index and skinfolds thickness were higher in the urban children ($P < 0.05$). There were no significant differences in the hip–waist ratio or the hip and waist circumference between the two groups. In cardiopulmonary and motor fitness, no difference was found between the two groups. In contrast, flexibility and muscle endurance were significantly higher in the rural children.

Conclusion: The children living in the urban areas were more inactive and obese, which resulted in a decrease in their flexibility and muscle endurance fitness.

Key words children, environmental factors, physical fitness.

Many factors are associated with adopting and maintaining a physically active lifestyle, such as socioeconomic status, cultural influences, lifestyle, environmental factors, and health status.^{1–5} Nowadays, children and youth find watching television or playing video games more desirable and easier than physically participating in activities themselves.^{6–9} Even our school systems, because of limited financial resources, have contributed to a sedentary lifestyle by devoting fewer resources to physical activity instructions, playgrounds, and after-school sports programs. In addition, it is known that urban life brings a more inactive lifestyle rather than rural life.⁶

Physical education is one of the few subjects which all children are required to do at school. To be physically fit

is not just a help to sport and physical education, it is also a major factor in leading a happier and fuller life.^{10–12} For the individual child, being fit can help to develop a positive attitude to the body, can enable the child to achieve a self-awareness of his or her physical state, and thus, become better motivated to maintain or improve individual fitness.^{13–16}

This study was designed to examine the lifestyle, leisure time activities, and physical fitness level differences between rural and urban children. Also, this study aimed to evaluate the effects of two different regions, which had urban and rural characteristics, on physical fitness.

Methods

Subjects

The study included 172 children, aged 9–11 years, attending the 3rd and 4th classes of two primary schools in two

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Table 1 The questionnaire used to evaluate the school's, parent's and children's information

1. School's information		
A. Period of Physical education lesson (hour per week)	Yes [†]	No [†]
B. Covered sport room	Yes	No
C. Balls	Yes	No
D. Basketball basket	Yes	No
E. Volleyball field	Yes	No
F. Football field	Yes	No
G. Gymnasium	Yes	No
2. Parent's information		
H. Mother's occupational condition	Yes	No
I. Father's occupational condition	Yes	No
J. Parent's support	Yes	No
3. Children's leisure time activity		
K. Reading book	Yes	No
L. Playing Computer	Yes	No
M. Playing game outside	Yes	No
N. Sports (which one?)	Yes	No
O. Watching TV (Hours per week)	Yes	No

[†]Schools, parents and children were requested to indicate Yes or No next to each query.

different regions which had urban and rural characteristics. While the total number of the urban group was 74, 42 of those were girls and 32 were boys; the total number of the rural group was 98, 44 of whom were girls and 54 boys. Schools, which had a moderate economic level and the same socioeconomic status, were randomly selected from the list of schools that are determined by the Turkish Educational Ministry. Socioeconomic status was determined by the parent's economic income and education levels. Permission was taken from related Provincial Educational Directorates for the research. Prior to the study, a signed consent was obtained from the parents of the children.

Outcome measurements

Variables related to physical activity and fitness

A questionnaire was used to collect information about each subject's physical activity habits and the school's facilities (covered sport room, balls, basketball basket, volleyball and football field, gymnasium). This questionnaire consisted of three parts. The first part was completed by the subject's teachers and provided information concerning the school's physical education (PE) program in which the subjects participated. The variables assessed are listed in Table 1 (Variables A through G).

The subjects' parents completed a second and third part. Included in these parts were questions concerning the child's participation in physical activities in various community-based settings. Parents were also asked the hours per week spent by the child in watching television, playing computer games, and other activities (Table 1, Variables H-O).

Procedure

The children were oriented to the testing procedures by the physiotherapist well in advance of the scheduled test date. The same physiotherapist performed all tests. In both schools, parents were interviewed by telephone at baseline. Children with any musculoskeletal or cardiopulmonary abnormalities were excluded from the study. There were two children with musculoskeletal abnormality in the rural group, but there were no children with abnormalities in the urban group.

Physical fitness measures

The physical fitness of the children was evaluated with the EUROFIT test battery, which is designed for assessment of health-related fitness in children and adults.¹³ EUROFIT for children is designed to be practical and applicable under conditions available in ordinary communities. Participating children completed a four-item test battery that measured body composition, cardiopulmonary fitness, motor fitness, and musculoskeletal fitness.

Body composition

For the skinfold thickness measurement, Holtain Calliper with 0.2 mm spaces was used and the measurements were applied on the right side of the body. Measurement sites used were triceps, subscapular and supriliac.¹³ The following formula was used to estimate percentage body fat (%BF) from three skinfold thickness measurements.

$$\%BF = 0.39 \text{ age} + 1.46 \text{ body mass index (BMI)} + \text{intercept}$$

When the intercept is +1.71 for girls and -2.23 for boys.¹³

Cardiopulmonary fitness

Cardiopulmonary fitness was measured using the 20 m shuttle run test (20-MST). The test began at a slow running pace (8 km/h) and ended when the subject could no longer sustain the pace. Children ran a 20 m piste, there and back continuously (one-foot touching the end-line) in accordance with a pace dictated by a sound signal. The running speed was increased every 1 min by 0.5 km/h. The subject should be required to stop if on two consecutive laps he/she failed to reach a line 3 m from the end of the piste or felt undue distress. The length of test was recorded as a lap.¹³

Motor fitness

In the assessment of motor fitness, the *Flamingo balance test* was used. In this test, general balance was evaluated as an ability to balance on one leg on a flat firm surface with eyes open (60 s) and closed (30 s). The clock was started as soon as the child achieved balance. If the child lost balance, he or she was unable for this test.¹³

Musculoskeletal fitness

In order to assess flexibility sit and reach, side bending of the trunk test were used. For sit and reach a child was recommended to sit keeping his/her knees straight and reach forward as far as possible from a seated position. The score was determined by the farthest position the child reached on scale with his/her fingertips.¹³

For a side-bending test the child stood upright against a wall on two parallel lines at right angles to the wall and 15 cm apart. Arms were held straight against the sides of the body. The position of the middle finger on each side was marked with a horizontal line on the lateral thigh. The subject was then asked to bend sideways as far as possible while maintaining contact between the back and wall.¹³

For strength the vertical jump test was used in order to measure the lower extremity muscle strength. The child was expected to jump as high as possible at a 20 cm distance from the wall while the distance jumped was measured.¹³

For endurance, a bent arm hang and sit ups test were used in order to measure muscle endurance. The bent arm hang test required maintaining a bent arm position while hanging from a bar. A round horizontal bar, diameter 2.5 cm, was set so that the child, when standing below it, can reach it without jumping. The child stood under the bar with hands in a forward grip on the bar at shoulder width. The time was started the moment the child's chin went above the bar and was let go. The number of hanging by the arms in 30 s was recorded.¹³

For sit-ups the maximum number of sit-ups achieved in 30 s was recorded.¹³

Statistical analysis

Mean values and standard deviation were calculated for physical features, body composition, physical fitness and watching TV. Statistical differences were determined using two-tailed *t*-test. χ^2 test was used for categorical variables (questionnaire variables and balance test results). Pearson's correlation analysis was used to correlate television watching and body composition. Comparisons were considered significant at a *P*-value of 0.05 or less.

Results

Both schools had the same characteristics (covered sport room, balls, basketball basket, volleyball and football field, gymnasium, and PE curriculum) regarding their physical education opportunities and programs.

When the sports activity types preferred out of school is considered, it was found that the children living in rural regions preferred to play soccer and volleyball more, while the children living in the urban regions had a tendency to prefer indoor sports. It was found that the percent of urban children not involved in any kind of sports activity was 35.1%, while this rate was 30.6% for rural children. And it was found that the urban children had a better habit of reading, while there is no significant difference found between the groups regarding the computer game playing habits (Table 2).

Watching TV per week was also evaluated and it was found that the television watching hours in urban children was longer than that in the rural children (Table 2).

BMI and skinfolds thickness values were significantly higher in urban children whereas there were no significant differences in waist and hip circumference, waist to hip ratio, and %BF between the two groups (Table 3).

When the correlation was investigated between TV watching time and weight, BMI, skinfold thickness, waist to hip ratio and %BF, it was seen that there was a strong correlation between TV watching time and BMI, triceps skinfolds. Also it was seen that there was moderate correlation between TV watching time and weight, subscapular and suprailiac skinfold thickness. There was no correlation between TV watching time and %BF and waist to hip ratio (Table 4).

No significant differences were found in the cardiopulmonary and motor fitness between the two groups (Table 5). In contrast, flexibility and muscle endurance (dynamic sit-up) were significantly higher in the rural group.

Discussion

Physical inactivity, which is essentially quitting the habit of exercise, brings out many problems by threatening or limiting

Table 2 The distribution of children's sports activities, leisure time activities, and television watching

	Urban group (n = 74)	Rural group (n = 98)	P-value [†]
Sports activities			
None (%)	35.1	30.6	NS
Football (%)	16.2	38.8	< 0.05
Volleyball (%)	8.1	20.4	NS
Basketball (%)	8.1	4.1	NS
Football + volleyball (%)	2.7	4.1	< 0.05
Football + basketball (%)	21.6	2.0	< 0.05
Football + basketball + volleyball (%)	2.7	–	< 0.05
Volleyball + basketball (%)	2.7	–	
Ballet (%)	2.7	–	
Leisure time activities			
Playing games (%)	44.9	70.3	< 0.05
Using computer (%)	35.1	32.7	NS
Reading book (%)	97.3	53.1	< 0.05
Television watching			
Television watching (h/week; mean ± SD)	13.43 ± 2.7	10.94 ± 2.7	< 0.05

[†]P-values were determined by χ^2 test and Student's *t*-test.

NS, not significant.

Table 3 The comparison of the body composition values

	Urban group (n = 74)	Rural group (n = 98)	P-value [†]
Age (year)	9.6 ± 0.7	9.7 ± 0.7	NS
Height (cm)	135.4 ± 7.5	132.5 ± 5.6	< 0.05
Weight (kg)	31.2 ± 5.7	26.4 ± 4.2	< 0.05
Triceps skinfold thickness (mm)	8.7 ± 3.2	7.1 ± 1.4	< 0.05
Subscapular skinfold thickness (mm)	5.7 ± 2.6	4.8 ± 1.2	< 0.05
Subrailiac skinfold thickness (mm)	5.2 ± 2.7	3.9 ± 1.2	< 0.05
Waist circumference (cm)	62.1 ± 4.6	62.8 ± 4.7	NS
Hip circumference (cm)	70.9 ± 5.5	70.4 ± 4.6	NS
Waist to hip ratio (cm)	0.87 ± 4.2	0.89 ± 4.9	NS
%BF	28.5 ± 3.8	25.2 ± 2.8	NS

[†]P-values were determined by Student's *t*-test. Values are mean ± SD.

NS, not significant; %BF, percentage of body fat.

Table 4 Pearson's correlation analysis between pain and range of motion

	TV watching	
	R	P
Weight (kg)	0.261	< 0.05
BMI (kg/m ²)	0.396	< 0.05
Triceps skinfold thickness (mm)	0.310	< 0.05
Subscapular skinfold thickness (mm)	0.253	< 0.05
Subrailiac skinfold thickness (mm)	0.231	< 0.05
Waist to hip ratio (cm)	0.098	NS
%BF	0.081	NS

BMI, body mass index; %BF, percentage of body fat.

a healthy life. Health and physical fitness is parallel with a good life.^{1,2,17}

This issue has been of great concern in recent years and it is a known fact that modern technology results in a sedentary lifestyle.^{1–6,17,18} It has been reported in recent studies that environmental factors, lifestyles, diet, family structure, cultural differences, and several other factors are closely related with physical fitness and physical activity. There are also contrary opinions about the environmental and cultural factors.^{17–21} While some researchers report that children living in rural areas are more inactive, it is also emphasized in other reports that urban life leads to an inactive generation.^{6,22} It is impossible for us to compare the conditions in our country, as there are few subject studies within the national literature.

Table 5 Comparison of the cardiopulmonary fitness, flexibility, muscle strength and endurance, and balance test results

	Urban group (n = 74)	Rural group (n = 98)	P-value [†]
Cardiopulmonary fitness			
20 m shuttle test (laps)	12.8 ± 1.9	12.6 ± 1.2	NS
Flexibility			
Sit and reach (cm)	12.4 ± 3.4	15.4 ± 3.9	< 0.05
Side bending (cm)			
Right	30.8 ± 3.5	33.5 ± 3.9	
Left	30.8 ± 3.9	33.6 ± 3.5	< 0.05
Muscle strength and endurance			
Dynamic sit-up (number/30 s)	22.9 ± 12.6	34.0 ± 22.3	< 0.05
Vertical jump (cm)	17.3 ± 4.7	20.4 ± 3.9	NS
Bent arm hang (number/30)	20.8 ± 4.7	17.1 ± 4.7	NS
Balance test results			
Eyes open (60 s; %)			
Yes	91.9	98.0	
No	8.1	2.0	NS
Eyes closed (30 s; %)			
Yes	73.0	63.3	
No	27.0	36.7	NS

[†]P-values were determined by Student's *t*-test and χ^2 test. Values are mean ± SD.

There is certainly a close relationship between socioeconomic status, physical development and physical fitness.^{5,7} This study was carried out in two schools which have the same socioeconomic status so that we could evaluate the effects of environmental factors on physical fitness only.

As a result of the industrialized urban life, school children tend to spend much of their spare time with inactive habits such as reading, playing computer games or watching TV.^{4,6,8,11,23,24} Children especially of working parents spend their time at home and avoid playing outside after school. Physical activity level, acquired during infancy, continues to be effective during adolescence years and more likely becomes a permanent habit of adulthood.^{23,24}

In our study, TV watching habits of the children were evaluated on a weekly basis and it was found that children living in urban areas spent more time watching TV compared with the children living in rural areas. In this study it was seen that there was strong and moderate correlation between the TV watching time and body composition. The levels of BMI and skinfold measurements of urban children were found higher than the rural children. These findings are similar with the findings in the literature.^{19–21}

It was found in this study that the parents of children living in urban and rural areas do not have a regular exercise habit. The working mothers' ratio was higher for the children living in urban areas than the rural. But it was seen that neither urban nor rural parents take an interest in their children's physical activity. These results emphasize that our society is not sufficiently concerned with exercise and physical activity issues. Our study has made it clear that the children living in urban areas spend most of their time at

home as they have less chance to play outside. The most striking difference of the children living in rural areas is that they have the chance to play more comfortably outside. Our study re-emphasizes the effects of environmental differences on physical fitness. Another significant finding in this study was that computer usage and playing rates of the children of both groups are very close. Spending time in Internet cafes and using computers is not only more likely in urban areas but also in rural areas, which results in children's tendency to be more sedentary.

Physical activity prevents critical diseases such as cardiovascular problems, diabetes and cancer, and increases musculoskeletal system fitness and flexibility, which improves posture and motor capabilities.^{25–29} During our study, there was no significant difference between cardiopulmonary and motor fitness parameters in both groups, while it has been found that the children who live in rural areas and who are more active have better flexibility. Muscle strength and endurance determination tests revealed that the children living in rural areas have better muscle endurance.

Our study was aimed at children with the same socioeconomic status, called middle-class in Turkey. However, the population of children whose socioeconomic status is upper and lower middle-class is high. Therefore, we think that this study should also be carried out for children with different socioeconomic statuses living both in rural and urban areas, and that the reflections of increases or decreases in socioeconomic status should also be evaluated.

As a result, it is clear that primarily urban populations in the world, as well as in Turkey, have a sedentary lifestyle, void of exercise. However, the professional authorities suggest

that exercise conscience be increased starting from infancy in order to reach a good physical fitness level. We think that physical education teachers and health workers at schools, as well as parents, play an important role in this issue.

Conclusion

It has been found through our study, carried out on the evaluation of physical fitness and in two different regions, that children living in urban areas are more inactive and obese, which results in a decrease in their flexibility. The most significant finding related to the children living in rural areas is that they have a greater tendency towards active sports and they spend less time watching TV. Our study has emphasized once more that environmental differences can have an effect upon physical fitness.

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