Television Viewing and its Effect on Physical Health of Schoolage Children

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Obesity is an increasing health problem all over the world. In addition to genetic and many environmental factors, television is also thought to be a risk factor. This study examined the effects of television viewing on obesity and other physical complaints among Turkish children. From two different socioeconomic class primary schools, 886 second- and third-grade children were visited at their schools, and their weight, height and triceps skin fold thickness (TST) were measured and body mass index (BMI) calculated. Television viewing behavior of the children, parental weight and height, and physical complaints of children were investigated by a questionnaire sent to parents. A subgroup of children was also called to the hospital, and their blood lipid profile and visual acuity were measured. According to the questionnaires, children were found to watch television 2.1 ± 1.2 hours/day (hr/d) during the weekdays, 3.4 ± 2.1 hr/d at the weekend and 2.5 ± 1.3 hr/d generally. Children were also grouped according to the amount of time they watch television. Group 1 (n=298) children watched television less than 2 hr/d, Group 2 (n=323) watched 2-4 hr/d, and Group 3 (n=68) more than 4 hr/d. The prevalence of obesity was 10.9% according to BMI, 11.8% according to TST and 6.4% according to both criteria. Obese girls were found to watch television longer than their peers (2.9 ± 1.2 hr/d vs 2.3 ± 1.3 hr/d, respectively, p=0.034), but no other relation was found between television viewing and obesity. Headache, back pain, eye symptoms and sleep problems were found to be more often among children who watched television longer (p<0.05).

It was concluded that television viewing is related to many physical complaints, which may have lifelong consequences (obesity). Thus, pediatricians should give appropriate guidance to families about television habits and health consequences.

Key words: television, children, obesity, health.

Nowadays watching television is an important part of daily life. After sleep, it is the activity that takes the greatest part of our children's time[1]. Because children are so intensely subjected to television, possible health effects is an important topic of investigation. The most well known and studied physical effect is obesity. Both decreased energy expenditure and increased intake of energy by eating "junk food" while watching television increase the risk of obesity[2-8]. Also television viewing has been related to an increased risk of hypercholesterolemia[9], hypertension[10], back pain[11], and eye[12] and sleep problems[13]. Although there are several studies about television viewing and health, still there is no consensus about the results.

The effect of television on health is difficult to generalize due to sociocultural differences among television-viewing habits, television programs and child-rearing activities. As far as we know, the effects of television viewing on obesity and other health problems have not been studied previously in Turkey. The aim of this study was to examine the effect of television viewing on obesity and some other physical health parameters among school age children.

Material and Methods

This study was performed in two primary schools in Ankara. Subjects were 886 second and third grade students, 472 from low-income and 414 from high-income primary schools. Students were visited at their school and their weight, height and triceps skin fold thickness (TST) were measured. Weight was measured with a standard portable scale, with children wearing their standard school clothes and without shoes. Height was measured with standard measuring tape, children without shoes and with heels together. TST was measured with a calliper, and the tips of the acromial process and the olecranon were palpated and a point halfway between marked on the skin. The skin fold was picked up over the posterior surface of the triceps muscle on a vertical line passing upward from the olecranon in the axis of the limb, and the calliper jaws were applied at the marked level[14]. Obesity was defined as body mass index (BMI) (weight divided by height square) being over 95 percentile and TST being over 85 percentile for the age group[15].

A questionnaire was sent to the parents of the students. The questionnaire included questions on the parents' weight and height, the child's and their parents' television viewing habits, and the time the child spent watching television versus other daily activities. There were also questions about television advertisements: whether the child wanted the products advertised, what kind of products he wanted most and whether the parents bought them. Parents were also asked whether their children had symptoms like headaches, back pain, eye strain or sleep problems and whether they used eyeglasses.

To assess the physical activity of the child, we inquired as to the number of vigorous exercises the child performs in a week. Children who performed three or more were defined as 'active' and those who performed less than three activities were defined as 'not active enough'[8].

According to the television viewing time reported in the questionnaires, children were separated into three groups: Group 1, children watching television two hours or less; Group 2, children watching more than two but less than four hours; and Group 3, children watching more than four hours a day. Thirty children from each group were called for further examination at the hospital. Their parents' weight and height were measured. Physical examination of the child was performed and blood pressure measured. Visual acuity was assessed by a Snellen visual acuity chart. Blood was taken for very low-density lipoprotein (VLDL), low-density lipoprotein (LDL), high-density lipoprotein (HDL) and triglyceride assessment. Parents were also given a diary containing seven pages, each for one specific day of the week. Days were divided into hours. Parents were requested to note what the child was doing each hour of the day.

The data was analyzed by Student's t test, χ^2 test and one way ANOVA test. Correlations were tested by Pearson's test. The tests were performed by using SPSS v9.0 program.

Results

Parents of 886 students (445 female, 441 male), 472 from low and 414 from high socioeconomic class schools, answered the questionnaires. Mean age of the students was 7.95 ± 0.77 years (Table I).

Of the parents, 689 answered the question about their child's television viewing time; 298 children (47%) were included in Group 1, 323 (46.9%) in Group 2 and only 68 (9.1%) in Group 3. Mean daily viewing time was 2.1 ± 1.2 hours during the week, 3.4 ± 2.1 hours on weekends and 2.5 ± 1.3 hours overall (Table II). It was found that older children spent more time watching television ($r=0.11$, $p=0.005$). Boys seemed to spend more time watching television during the weekdays but this difference disappeared on weekend. Television viewing time did not differ between high and low income groups (Table III).

Of 886 children, 100 were found to be obese (10.9%) when defined as BMI being over 95th percentile, and 109 were found to be obese (11.8%) when defined as TST being over 85th percentile. Sixty children (6.4%) satisfied both criteria. Obesity was found to be more prevalent among boys than girls and among students of high socioeconomic class school than of their low income peers (Table IV).

Mean television viewing time of obese and nonobese children was not different (Table V). Obesity prevalence among groups that were separated according to television viewing time

Table I. Age, gender and socioeconomic status of children

	Group 1 (n=298)	Group 2 (n=323)	Group 3 (n=68)	p
Age	7.9 ± 0.7	8.1 ± 0.8	7.9 ± 0.7	<0.001*
Female/Male	1.2	0.8	1.1	0.048†
Low/High income	0.9	0.9	0.7	0.756

* The difference was between Group 1 and Group 2, and between Group 2 and Group 3.
† The difference was between Group 1 and 2.

Table II. Time allocated for daily activities (hours/day)

	Watching television	Studying	Reading	Playing	Helping parents	Video games
Weekdays	2.1 ± 1.2	2.3 ± 1.7	0.7 ± 0.7	1.8 ± 1.2	0.2 ± 0.4	0.2 ± 0.5
Weekends	3.4 ± 2.1	2.9 ± 1.5	1.1 ± 0.8	3.4 ± 1.8	0.3 ± 0.6	0.3 ± 0.7
Daily	2.5 ± 1.3	2.4 ± 1.4	0.8 ± 0.6	2.3 ± 1.1	0.2 ± 0.4	02 ± 0.5

Table III. Mean television viewing time (hours/day) of children according to socioeconomic status and gender

		Weekdays	Weekend	Daily
High income	(n=415)	2.0 ± 1.3	3.2 ± 1.9	2.4 ± 1.3
Low income	(n=470)	2.1 ± 1.2	3.4 ± 2.0	2.5 ± 1.2
p		0.142	0.363	0.197
Girls	(n=444)	2.0 ± 1.2	3.3 ± 2.1	2.4 ± 1.3
Boys	(n=441)	2.2 ± 1.2	3.3 ± 1.8	2.5 ± 1.2
p		0.061	0.984	0.262

Table IV. Obesity according to socioeconomic status and gender

		BMI > 95 p		TST > 85 p		Both criteria satisfied	
		n	%	n	%	n	%
High income	(n=415)	53	12.9	60	14.6	37	9.0
Low income	(n=470)	43	9.2	43	9.3	19	4.1
p		0.104		0.020		0.004	
Girls	(n=444)	37	8.2	30	6.7	20	4.4
Boys	(n=441)	63	13.9	79	17.7	40	9.0
p		0.009		<0.0001		0.005	

BMI: body mass index; TST: triceps skinfold thickness.

Table V. Mean television viewing time (hours/day) of obese and nonobese children

	Normal	Obese	p
According to BMI	2.4 ± 1.3	2.5 ± 1.2	0.618
According to TST	2.4 ± 1.2	2.6 ± 1.3	0.289
Both criteria satisfied	2.4 ± 1.3	2.5 ± 1.2	0.795

BMI: body mass index; TST: triceps skinfold thickness.

was also not found to be different (Table VI).

Because both television viewing time and obesity prevalence was significantly different between boys and girls, the relation between television and obesity was also examined among these two groups. Among girls, mean daily television viewing time of children was found to be longer for obese girls, but this difference was not present for boys (Table VII).

Snacking while watching television was found to be more often among obese children (56.7% of obese [51/90] and 40.1% of nonobese children [285/713], p=0.003).

According to the questionnaire results, 64.6% (488/756) of children demanded the products that were advertised on television; 37% (159/430) preferred toys, 21.4% (92/430) preferred sweet food and 24.4% (105/430) demanded both toys and food. The total percent of children demanding food products was 61.9% and only 0.7% (3/430) of this was for nutritious food such as yogurt. Of the parents, 73.8% (596/808) reported that they bought these products sometimes and 3.8% (31/808) bought them frequently. Obesity according to TST was found to be more often among children of parents who bought the products their children demanded (12.5% [78/623] compared with 6.7% [12/179], respectively, p=0.031). Mean daily television viewing time of children who demanded the adversited products was found to be higher than of their peers (2.5 ± 1.2 hours and 2.3 ± 1.2 hours, respectively, p=0.011). Mean daily viewing time was also longer for children who demanded food products (not the nutritious ones) (2.8 ± 1.3 hours and 2.4 ± 1.9 hours, respectively, p=0.035).

The mean number of vigorous physical activities performed by children was found to be 2.7 ± 2.4 times per week; 42.8% (295/690) of children were classified as 'active' (performed 3 or more vigorous activities per week). Boys were found to be more active than girls. Their mean number of activities was 3.4 ± 2.5 times per week versus 2.1 ± 2.2 times per week for girls (p<0.001). Mean number of physical activities was found to have a weak positive correlation with obesity (according to BMI, p=0.002 and r=0.119, according to TST, p=0.001 and r=0.122, according to both criteria p<0.0001 and r=0.137), and being 'active' was found to be more often among children who were obese according to both criteria. The mean television viewing time of children who were and were not 'active' enough did not differ (2.5 ± 1.3 hours/day and 2.5 ± 1.2 hours/day, respectively, p>0.05). There was also not any difference in the mean number of vigorous physical activities performed weekly between groups of children that were separated according to television viewing time (2.8 ± 2.4

Table VI. Obesity frequency among groups separated according to television viewing time

	Group 1 n=298		Group 2 n=323		Group 3 n=68		
	n	%	n	%	n	%	p
BMI > 95th percentile	30	10.1	39	12.1	6	8.8	0.603
TST > 85th percentile	33	11.1	37	11.6	9	13.2	0.887
Both criteria satisfied	19	6.4	23	7.2	4	5.9	0.883

BMI: body mass index; TST: triceps skinfold thickness.

Table VII. Mean television viewing time (hours/day) of obese and nonobese boys and girls

	BMI			TST			Both criteria		
	Normal	Obese	p	Normal	Obese	p	Normal	Obese	p
Boys	n=304	n=46		n=287	n=59		n=316	n=30	
	2.5 ± 1.2	2.3 ± 1.1	0.183	2.5 ± 1.2	2.4 ± 1.2	0.613	2.5 ± 1.2	2.1 ± 1.0	0.068
Girls	n=313	n=29		n=322	n=20		n=326	n=16	
	2.3 ± 1.3	2.9 ± 1.2	0.034	2.3 ± 1.3	3.0 ± 1.3	0.029	2.3 ± 1.3	3.2 ± 1.3	0.021

BMI: body mass index; TST: triceps skinfold thickness.

times for Group 1, 2.7 ± 2.4 times for Group 2 and 2.9 ± 2.4 times for Group 3, p>0.05).

Forty percent of the parents reported that their children had headache sometimes and 5.7% had this complaint often. Children with reported headaches were found to have longer television viewing times on weekdays and in general (p=0.016 and p=0.010) (Table VIII).

Back pain was reported to be present for 20.6% of the children; these children had television viewing times longer than those who did not have this complaint on weekdays and in general (p=0.040 and p=0.041) (Table VIII). Back pain was found more often among children who watched television more than two hours: 17.1% (51/298) of the children who watched less than two hours had back pain compared with 66.3 (201/596) of the children who watched television longer (p=0.018).

Thirty-three percent of the children were reported to have complaints about their eyes sometimes and 3.2% were reported to have such complaints often. The group who had such complaints was found to have longer television viewing times than their peers on weekdays, weekends and in general (p=0.001, p=0.012 and p=0.008) (Table VIII). Eye complaints were more often in children in Group 3 than in those in Groups 1 and 2 (p=0.006 and p=0.018) (Table IX)

Eyeglasses were used by 10.9% of the children. The frequency of having glasses was not found to be different between groups according to television viewing time (Table IX) nor was television viewing time of children who had or did not have glasses (Table VIII).

Sleep problems were reported by 14.8% of parents. Nine percent had difficulty with sleep onset (73/807), 3.5% had nightmares (28/807), 1.5% had night waking (12/807), 0.4% had somnambulism (3/807) and 0.4% had other problems (3/807). Children who had sleep problems were found to watch television longer than their peers on weekdays, weekends and in general (p=0.009, p=0.001 and p=0.039) (Table VIII). Sleep problems were found to be more often among children from Groups 2 and 3 than Group 1 (p=0.024, p=0.040) (Table IX). Children who watched television later than 21:00 had sleep problems more often (36.7% [120/327]) than their peers (15.6% [86/567]) (p<0.0001). Children who had a television set in their bedroom were also found to have more sleep problems than other children (24%[25/104] compared with 13.8% [97/703]) (p=0.007).

Table VIII. Television viewing times (hours/day) of children according to physical complaints

			Television viewing time		
		n	Weekdays	Weekends	Daily
Headache	+	324	2.6 ± 1.3	3.4 ± 2.0	2.2 ± 1.3
	–	365	2.3 ± 1.2	3.2 ± 2.0	2.1 ± 1.0
	p		0.016	0.162	0.010
Back pain	+	139	2.6 ± 1.4	3.5 ± 2.1	2.3 ± 1.4
	–	550	2.4 ± 1.2	3.3 ± 2.0	2.0 ± 1.2
	p		0.040	0.198	0.041
Eye complaints	+	247	2.6 ± 1.3	3.6 ± 2.2	2.2 ± 1.2
	–	442	2.3 ± 1.2	3.2 ± 1.8	2.0 ± 1.2
	P		0.001	0.012	0.008
Using eye glasses	+	81	2.3 ± 1.7	3.1 ± 1.7	2.5 ± 1.4
	–	608	2.1 ± 1.1	3.3 ± 2.0	2.4 ± 1.2
	p		0.109	0.325	0.477
Sleep problems	+	111	2.8 ± 1.5	4.0 ± 2.3	2.4 ± 1.5
	–	578	2.4 ± 1.2	3.2 ± 1.9	2.0 ± 1.1
	p		0.009	0.001	0.039

+ : child with complaint
– : child without complaint

Table IX. Physical complaints among groups according to television viewing times

	Group 1 n=298	Group 2 n=323	Group 3 n=68	p
Headache	134 (45.0)	150 (46.4)	40 (58.8)	0.113
Back pain	51 (17.1)	68 (21.1)	20 (29.4)	0.064
Eye complaints	98 (32.9)	114 (35.3)	35 (51.5)	0.017*
Using eye glasses	37 (12.6)	34 (10.6)	10 (14.7)	0.558
Sleep problems	36 (12.1)	59 (18.3)	16 (23.5)	0.006†

* The difference is between Group 2 and Group 3 (p=0.018) and between Group 1 and Group 3 (p=0.006).
† The difference is between Group 1 and Group 2 (p=0.04) and between Group 1 and Group 3 (p=0.024).

Thirty children from each group were called for examination at the hospital. Thirty children from Group 1, 29 children from Group 2 and 25 children from Group 3 came for the examination. Parents of these children were given a one week diary. According to the diaries, mean television viewing time was 2.5 ± 1.3 hours/day. The television viewing times reported in the questionnaires and in the diaries were compared and they were found to show good correlation ($p<0.001$ and $r=0.6$).

The children's as well as their parents' weight and height were measured again. Mean television viewing time of obese (2.2 ± 1.1 h/d) and nonobese children (2.5 ± 1.3 h/d) assessed from diaries did not show a significant difference ($p>0.05$). The frequency of being obese was also not different between groups separated according to television viewing time.

Visual acuity of children was assessed using a Snellen visual acuity chart. Frequency of visual problems was not found to be different between groups according to television viewing time, and the mean television viewing times of children who did or did not have problems were similar. We could not find any correlation between distance from the television set and presence of visual problems (Table X).

Arterial blood pressure was measured for each child at the hospital. Mean systolic blood pressure was 99.9 ± 11.1 mmHg, and mean diastolic blood pressure was 67.2 ± 9.8 mmHg. Of the children, 11.4% (9/77) had systolic blood pressure and 22.1% (17/77) had diastolic blood pressure over 95th percentile for their age group. Mean television viewing time of these children was not different from their peers whose blood pressures were normal (2.4 ± 1.3 h for children who had normal systolic blood pressure, 2.7 ± 1.5 h for children who had high systolic blood pressure, 2.4 ± 1.2 h for children who had normal diastolic blood pressure, 2.7 ± 1.7 h for children who had high diastolic blood pressure, $p>0.05$). Mean blood pressures of children from groups that were separated according to television viewing time also did not show any difference (98.7 ± 13.0/66.4 ± 14.6 mmHg for Group 1, 99.8 ± 10.6/65.8 ± 10.0 mmHg for Group 2 and 99.5 ± 13.1/66.3 ± 12.5 mmHg for Group 3, $p>0.05$). There was no correlation with television viewing time and blood pressure measurements.

Blood lipid profiles were assessed for children who were examined at the hospital. Mean serum lipid levels were: cholesterol (ch) 16.3 ± 26.3 mg/dl, triglyceride (tg) 108.5 ± 68.9 mg/dl, HDL 52.6 ± 11.7 mg/dl, LDL 87.6 ± 22.1 mg/dl and VLDL 21.9 ± 13.9 mg/dl. BMI was found to be positively correlated with ch, tg and VLDL levels ($r=0.33$ and $p=0.008$, $r=0.48$ and $p<0.0001$, $r=0.48$ and $p<0.0001$, respectively). Systolic blood pressures also had a weak positive correlation with ch, tg and VLDL ($r=0.36$ and $p=0.005$, respectively). A similar correlation was present for diastolic blood pressure ($r=0.30$ and $p=0.018$, $r=0.38$ and $p=0.002$, and $r=0.37$ and $p=0.003$, respectively). Television viewing time did not have any correlation with any of these blood lipid measurements. There was no difference in mean levels of blood lipids between groups that were separated according to television viewing time ($p>0.05$) (Table XI).

Discussion

Television, as an important part of our lives, is affecting our children in many ways. It is taking the time children should spend with other activities, creating instead a sedentary lifestyle.

Table X. Mean television viewing times (hours/day) and viewing distances (meters) according to visual problems

Visual problems	Present n=87	Not present n=712	p
Viewing time	2.5 ± 1.5	2.5 ± 1.3	0.967
Viewing distance	2.5 ± 0.9	2.5 ± 1.1	0.849

Table XI. Mean blood lipid levels (mg/dl) of children from groups according to television viewing time

	Group 1	Group 2	Group 3	p
Cholesterol	155.5 ± 26.2	166.9 ± 27.6	155.8 ± 17.5	0.249
Triglyceride	105.8 ± 58.5	120.4 ± 86.3	85.4 ± 34.4	0.442
HDL	52.6 ± 12.4	51.7 ± 10.8	54.1 ± 14.2	0.878
LDL	81.7 ± 18.6	92.6 ± 23.8	84.6 ± 23.1	0.182
VLDL	21.2 ± 11.7	24.5 ± 17.4	17.0 ± 6.9	0.393

HDL: high-density lipoprotein; LDL: low-density lipoprotein; VLDL: very low-density lipoprotein.

The effect of television viewing on obesity is a fact of debate. Dietz et al.[2], studying over 6,000 children, suggested that the prevalence of obesity increases by approximately 2% for each additional hour of television viewing per day. Most of the studies support the hypothesis that television causes obesity but these studies widely differ in their method of gathering anthropometric data (some use only the data from questionnaires), in their definition of obesity, and in their means of acquiring information about television viewing time[2-7]. To our knowledge, there is no report about the effect of television viewing on obesity among Turkish children.

The two well known studies that found no relationship between television and obesity have important special methodological features. One of them is the study of Robinson et al.[16], in which the researchers had the chance to examine 279 children at 7, 14 and 24 months of the study and who did not find a meaningful association between adiposity and television viewing. The other study performed by DuRant et al.[17], was special in that it did not rely on self reporting but rather collected data about television viewing by observing the children in their houses.

In our study, the anthropometric data was obtained by measurement, and obesity was defined using BMI and TST, which are reported to be correlated to direct measures of body fat. Information about television viewing time was obtained via questionnaires and diaries. Diaries are reported to give results similar to that obtained by video recordings of the family and are more reliable than questionnaires[18]. We could not determine a relation between television viewing time and obesity (for any definition) in our study, neither using the data from questionnaires nor from the diaries. As a matter of fact, the data from the diaries was well correlated with data from the questionnaires. The latest study supporting our findings came from the United States. Mc Murray et al.[19] analyzed data of 2,389 children and concluded that after adjusting for ethnicity and socioeconomic status, there were no significant effects of television viewing on BMI and TST.

Although we could not find any relation between obesity and television viewing for the whole study group, mean daily television viewing times of obese (by all definitions) girls were found to be longer than for their nonobese peers. Supporting our findings, Crawford et al.[20] reported BMI and television to be related for women but not for men; however, there are also researchers reporting the contrary[10,21]. To find different results about a television-obesity relation for girls and boys was not a surprise in our study because both television viewing time and obesity prevalence were different between the two groups. The two groups were also different in their 'activity' level. Boys were found to be more active than girls and perhaps

girls who are already not active enough are more readily affected by a sedentary life.

Television viewing is cited as affecting both ends of the energy balance in favor of obesity. One end is energy intake. Supporting the findings of Taras et al. and others[22-24], we found that most children demanded products advertised on television (especially food that is not nutritious but rich in fat and sugar), and that children who watch television longer make their parents purchase these products more frequently. Additionally, snacking while viewing television was found to be more frequent among children who watched television longer. Both snacking while viewing and demanding the advertised food products are shown to be more frequent among obese children. Thus, as the earlier reports suggested, television has a negative effect on our children's feeding behavior.

The other end of the balance is energy expenditure. We could not reveal any correlation between television viewing time and time dedicated to sports or the number of vigorous physical activities performed by the child. In fact the relation between physical activity and obesity is itself a subject of debate. There are reports relating obesity and physical activity both in a negative[25,26] and positive[27] way (as was the case in our study), while others do not mention any relation at all[28]. Measuring physical activity and examining the complicated relation between activity-obesity and television and other sedentary activities is not easy, but we must keep in mind that at least for the time the child watches television, he is in a state of very low metabolic rate (lower than basal metabolic rate[29]). A study performed among 8-12 year-old children revealed that decreasing sedentary behavior was more successful than increasing physical activity in decreasing the frequency of being overweight[30].

Obesity is an important health problem because it is a risk factor for many childhood and adult diseases. Hypertension and hyperlipidemia are two examples[31]. The relation between television and these two health problems was also examined. A study from Belgium reported a correlation between television viewing time and systolic blood pressure of boys in their study group[20]. In our study, we could not determine any correlation between viewing time with either systolic or diastolic blood pressure. Being hypertensive also did not differ among groups divided according to television viewing time. Wong et al.[9], studying 1,081 children, reported television viewing time to be the most important risk factor for hypercholesterolemia. We studied lipid profiles (LDL, VLDL, HDL, tg, chl) of 63 children and could not find a correlation between television viewing time with any of the blood lipids examined.

Although television viewing did not seem to be directly related to obesity among our children, the results for female children in this study group concerning the effect of television viewing on feeding behavior, and reports from other countries are serious enough to take measures regarding the appropriate amount of television viewing.

Another important point here is that obesity is not the only suspected negative effect of television on physical health. Watching television is believed to cause visual problems. The only study supporting this belief reported that juvenile myopia was correlated with television viewing distance[12]. We could not demonstrate any such correlation neither as a result of television viewing time nor viewing distance, based on information from patient-reported questionnaires. Although not directly related to visual acuity, we found that watching television longer was related to eye complaints. Perhaps the continuous accommodation and convergence while watching television causes eye fatigue.

Some physical complaints such as back pain and headache were found to be more often among children who watched television longer. Vincent et al.[32], revealed that watching television caused headache in 6.4% and worsened it in 27.7% of a group of patients who had chronic headache. In this study, we found that television viewing time of children who had headaches was significantly longer than that of their peers. Troussier et al.[11] reported television viewing time to be a risk factor for back pain. Although the study of Gunzburg et al.[33] did not support this finding, we found that back pain was more frequent in Group 3 than Groups 1 and 2, and also that television viewing time of children with back pain was longer than of those without.

Sleep problems may also be related to television viewing behavior. Gupta et al.[34] observed 250

children for nine months after their initial introduction to television, and showed that 24% of the children had sleep problems although they had had none previously. Owens et al.[13] reported that television viewing time, watching television right before bedtime and presence of a television inside the child's bedroom were all risk factors for sleep problems. In this study, we also found that children who watch television longer, who continue to watch after 21:00 and who have a television set in their bedroom have sleep problems more often than their peers.

The American Academy of Pediatrics advises limiting children's viewing time to one to two hours per day[35]. The mean television viewing time in this study was over this range, and 53% of our children watched television more than two hours per day. As pediatricians, we must be familiar with the possible physical effects of television viewing in addition to psychological effects. Acquiring information about the viewing behavior of the child must be a part of the medical history, especially when the concern is one of these suggested effects (obesity, headache, back pain, sleep problems, etc). We must inform parents that they should limit their children's viewing time and not place a television set in the child's bedroom. Less sedentary and more creative activities shared with parents and friends should take the place of television viewing for the physical and psychosocial health of our children.

REFERENCES

1. Leung AK, Fagan JE, Cho H, Lim SH, Robson LM. Children and television. Am Fam Physician 1994; 50: 905-917.
2. Dietz WH, Gortmaker SL. Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. Pediatrics 1985; 75: 807-812.
3. Gortmaker SL, Must A, Sobol AM, Peterson K, Colditz GA, Dietz WH. Television viewing as a cause of increasing obesity among children in the United States, 1986-1990. Arch Pediatr Adolesc Med 1996; 150: 356-362.
4. Obarzenek E, Schreiber GB, Crawford PB, et al. Energy intake and physical activity in relation to indexes of body fat: The National Heart, Lung and Blood Institute Growth and Health Study. Am J Clin Nutr 1994; 60: 15-22.
5. Anastassea-Vlachou K, Fryssira-Kanioura H, Papathanasiou-Klontza D, Xipolita-Zachariadi A, Matsaniotis N. The effects of television viewing in Greece, and the role of the pediatrician: a familiar triangle revisited. Eur J Pediatr 1996; 155: 1057-1060.
6. Rissel CE. Overweight and television watching. Aust J Public Health 1991; 15: 147-150.
7. Locard E, Mamella N, Bitella A, Miginiac M, Monoz F, Rey S. Risk factors of obesity in a five-year-old population. Int J Obes Metab Disord 1992; 16: 721-729.
8. Andersen ER, Crespo JC, Bartlett SJ, Cheskin LJ, Pratt M. Relationship of physical activity and television watching with body weight and level of fatness among children. Results from the Third National Health and Nutrition Examination Survey. JAMA 1998; 279: 938-942.
9. Wong ND, Hei KT, Qaqundah PY, Davidson DM, Bassin SL, Gold KV. Television viewing and hypercholesterolemia. Pediatrics 1992; 90: 75-79.
10. Guillaume M, Lapidus L, Bjorntorp P, Lambert A. Physical activity, obesity and cardiovascular risk factors in children. The Belgian Luxembourg Child Study II. Obes Res 1997; 5: 549-556.
11. Troussier B, Davoine P, De Gaudermaris R, Fauconnier J, Phelip X. Back pain in school children. A study among 1178 pupils. Scand J Rehabil Med 1994; 26: 143-146.
12. Qiang M, Zhao R. A Logistic regression analysis of relations between juvenile myopia and TV watching, trace elements and psychological characteristics. Chung Hua Yu Fang I Hsueh Tsa Chih 1991; 25: 222-224.
13. Owens J, Maxim R, Mc Guinn M, Nobile C, Msall M, Alario A. Television viewing habits and sleep disturbance in school children. Pediatrics 1999; 104: e27.
14. Tanner JM, Whitehouse RH. Revised standards for triceps and subscapular skinfolds in British children. Arch Dis Child 1975; 50: 142-145.
15. Must A, Dallal GE, Dietz WH. Reference data for obesity: 85th and 95th percentiles of body mass index (wt/ht^2) and triceps skinfold thickness. Am J Clin Nutr 1991; 53: 839-846.
16. Robinson TN, Hammer LD, Killen JD, et al. Does television viewing increase obesity and reduce physical activity? Cross-sectional and longitudinal analyses among adolescent girls. Pediatrics 1993; 91: 273-280.
17. DuRant RH, Baranowski T, Johnson M, Thompson WO. The relationship among television watching, physical activity and body composition of young children. Pediatrics 1994; 94: 449-455.
18. Anderson DR, Field DE, Collins PA, Lorch EP, Nathan JG, Estimates of young children's time with television: a methodological comparison of parent reports with time lapse video home observation. Child Dev 1985; 56: 1345-1357.
19. Mc Murray RG, Harrell JS, Deng S, Bradley CB, Cox LM, Bangdiwala SI. The influence of physical activity, socioeconomic status and ethnicity on the weight status of adolescents. Obes Res 2000; 8: 130-139.
20. Crawford DA, Jeffery RW, French SA. Television viewing, physicial inactivity and obesity. Int J Obes 1999; 23: 437-440.
21. Fitzgerald SJ, Kriska AM, Pereira MA, de Courten MP. Associations among physical activity, television watching and obesity in adult Pima Indians. Med Sci Sports Exerc 1997; 29: 910-915.

22. Taras HL, Sallis JF, Patterson TL, Nader PR, Nelson JA. Television's influence on children's diet and physical activity. J Dev Behav Pediatr 1989; 10: 176-180.

23. Olivares S, Albala C, Garcia F, Jofre I. Television publicity and food preferences of school age children of the metropolitan region. Rev Med Chil 1999; 127: 791-799.

24. Kulen E. Televizyondaki şekerli yiyecek maddesi reklamlarının ilkokul üç ve beşinci sınıf öğrencileri üzerindeki etkisinin incelenmesi. Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, Çocuk Sağlığı ve Eğitimi Programı Bilim Uzmanlığı Tezi, Ankara, 1990.

25. Trost GS, Pate RR, Ward SD, Saunders R, Riner W. Determinants of physical activity in active and low active sixth grade African-American youth. J Sch Health 1999; 69: 29-34.

26. Moore LL, Nguyen US, Rothman KJ, Cupples LA, Ellison RL. Preschool physical activity level and change in body fatness in young children. The Framingham Children's Study. Am J Epidemiol 1995; 142: 982-988.

27. Andersen ER, Crespo JC, Bartlett SJ, Cheskin LJ, Pratt M. Relationship of physical activity and television watching with body weight and level of fatness among children. Results from the Third National Health and Nutrition Examination Survey. JAMA 1998; 279: 938-942.

28. Klesges RC, Haddock CK, Eck LH. A multimethod approach to the measurement of childhood physical activity and its relation to blood pressure and body weight. J Pediatr 1990; 116: 888-893.

29. Klesges RC, Shelton ML, Klesges LM. Effects of television on metabolic rate: potential implications for childhood obesity. Pediatrics 1993; 91: 281-286.

30. Epstein LH, Valoski AM, Vara LS, et al. Effects of decreasing sedentary behavior and increasing activity on weight change in obese children. Health Psychol 1995; 14: 109-115.

31. Schonfeld-Warden N, Warden CH. Pediatric obesity: an overview of etiology and treatment. Pediatr Clin North Am 1997; 44: 339-361.

32. Vincent AJ, Spierings EL, Messinger HB. A controlled study of visual symptoms and eye strain factors in chronic headache. Headache 1989; 29: 523-527.

33. Gunzburg R, Balague F, Nordin M, et al. Low back pain in a population of school children. Eur Spine J 1999; 8: 439-443.

34. Gupta RK, Saini DP, Acharya U, Miglani N. Impact of television on children. Indian J Pediatr 1994; 61: 153-159.

35. American Academy of Pediatrics, Committee on Communications. Children, adolescents and television. Pediatrics 1990; 85: 1119-1120.