



## Research Article

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# PERIODIC EXAMINATION OF ADOLESCENT STUDENTS IN PRIMARY CARE

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## Abstract

**Objectives:** Adolescence is an important transition period and The World Health Organization (WHO) defines adolescence as the age between 10-19. Today, there are approximately 1.3 billion adolescents, 16% of the world's population. It is important for individuals in adolescence, a group that is difficult to reach in a society consisting of healthy individuals, to have their diseases or deficiencies detected early and to be examined at least once a year.

**Materials and Methods:** The research was conducted cross-sectionally at Konya Karatay No: 09 Family Health Center. Sample selection was made in the study and it was conducted with 143 adolescents who applied to the family health unit.

**Results:** 143 adolescents were examined within the scope of the research, 53.1% were male, and 58.0% were early adolescents. 14.0% of the adolescents do not have a good home situation, 25.9% do not have a good education, and 36.4% do not do any activity. 21.7% of those examined stated that their eating situation was poor. 3.9% of adolescents are obese and all of them are boys. 67.1% had tooth decay and 3.5% had eye refraction problems. Of those examined, hemoglobin was found to be low in 35.7%, hematocrit in 28.7%, vitamin D in 14.0%, and vitamin B12 in 2.1%.

**Conclusion:** School health services and periodic monitoring of adolescents are important in helping individuals acquire positive health behaviors, thus improving the health of society. The role of parents, teachers, and school administrators is important, as well as health professionals multidisciplinary and multisectoral.

**Keywords:** Adolescence, periodic examination, student health.

## Introduction

Adolescence is an important transition period in terms of physical and psychological development, where childhood ends. In this period; new characteristics are acquired as we step into adulthood, we cannot separate the beginning and ending of adolescence. The World Health Organization (WHO) defines adolescence as the age between 10-19.<sup>1</sup> Today, there are approximately 1.3 billion adolescents, 16% of the world's population, and 85% of them are in developing countries.<sup>2</sup> According to the 2018 data from the Türkiye Demographic Health Survey (TNSA), adolescents in Türkiye constitute 16% of the entire population.<sup>3</sup> The adolescence is grouped is younger adolescence as younger adolescents (10-14 years old), and older adolescents (15-19 years old).<sup>4</sup>

To protect and improve the health of adolescents, who constitute a significant part of our country's population, the "School Health Services Cooperation Protocol" was signed between the Ministry of National Education (MEB) and the Ministry of Health (SB) on 17.05.2016. Following the preparatory work, the "Protection and Development of Health in Schools Program" was launched with the agreement reached between both Ministries. The Implementation Guide has been published within the scope of the Health Protection and Development Program at the School. In this regard, annual periodic follow-ups of all school-age children are carried out by family physicians following protocols.<sup>5</sup> Students who are in their adolescence period, accompanied by their families, apply to the Family Health Centers where they are registered once a year using a standard form. What will be done at each stage is explained. A complete systemic examination is performed. Arterial femoral pulses are palpated. Blood pressure, body weight, height, and hemoglobin/hematocrit (Hb/Htc) measurements are made. Respiration, heart, and hyperlipidemia risks are evaluated. In the genitourinary system examination, Tanner staging is used to determine the level of physical development of the adolescent. The Tanner staging card is given to the adolescent and he/she is asked at which stage he/she sees himself/herself. The adolescent is also examined by the family physician and evaluated in terms of early or late puberty. During the musculoskeletal examination, scoliosis is particularly checked. Their vaccinations are checked according to the national vaccination program, and if there is a missing vaccine, it is completed. The acronym HEEADSSS (Home, Education/Employment, Eating, Activities, Drugs, Sexuality, Suicide/Depression and Safety) is used to determine psychosocial status.<sup>6</sup>

The World Family Physicians Association (WONCA) has picked up the core competencies that family physicians should have under 6 headings in 2005, and the 6th of these items is to approach the person as a biopsychosocial whole. According to this model, health and disease are shaped by complex interactions of biological, psychological, and social variables, and none of them can be categorized separately from the other.<sup>7</sup>

Following the Family Medicine Practice Regulation and School Health Services Cooperation Protocol, periodic examinations/monitors of adolescents are carried out every year by family physicians in line with the Infant Child Adolescent Follow-up Protocols published by the Ministry, they are entered into the Family Medicine Information System, and the printout of the form is given to the family and forwarded to the school. The basic prediction is to prevent the conditions that predispose to the disease by detecting them in advance. This is both a healthier and more economical approach. Family physicians play a key role in the adoption and implementation of this approach.<sup>5-6</sup> Family physicians periodically provide many health services, from examination to health education and consultancy, to ensure the primary care management of common health problems for adolescents, thus protecting and improving adolescent health<sup>4-5-6-7</sup>. It is important for individuals in adolescence, a group that is difficult to reach in a society consisting of healthy individuals, to have their diseases or deficiencies detected early and to be examined at least once a year.<sup>6</sup>

This study aimed to evaluate the results of the health services received by adolescents registered to a family medicine unit in a city center within the scope of the 'School Health Protection and Promotion Programme'.

## Materials and Methods

The study was conducted cross-sectionally at Karatay Family Health Center No. 09, after receiving approval from the KTO Karatay University Faculty of Medicine Non-Drug and Medical Device Research Ethics Committee with the decision number E-2020/038 dated 15.12.2020. The universe of the study consists of 164 adolescents registered in a family health unit 42.22.055 in Konya city center. Of the 164 adolescents attending the family health unit, the recommended sample size for this study was 162 adolescents with a 95% confidence level and 5% sampling error using G\*Power 3.1. 13 Adolescents enrolled in the family medicine unit were excluded from the study because they applied outside the study schedule, 6 adolescents could not be reached, and 2 adolescents' blood samples were reported as clotted. The study was conducted with 143 adolescents who applied to the family medicine unit with their parents, and the participation rate was 88.3%.

Before starting the research, adolescents and their parents were interviewed, information about the health screenings to be applied to the adolescents was given, consent forms were obtained and screenings were carried out. Height (centimeter (cm)), weight (kilogram (kg)), systolic and diastolic blood pressure (mm Hg), Hb (g/dL)/Htc (%), vitamin D (ng/mL), vitamin B12 (pg/mL) levels of each adolescent were measured. A cardiac examination was performed. Dental caries were also checked. The vision was examined separately for each eye with a Snellen chart. Hearing tests were performed with a tuning fork(diapason). Each heading in the HEEADSSS acronym was asked as an open-ended question. It was assessed whether they were vaccinated according to the national vaccination program. All data were recorded in the family medicine information system. For the study, socio-demographic characteristics, physical examination findings, and laboratory results

were recorded in the database created for retrospective research. Detection of abnormal findings in at least one of the physical examination findings and laboratory results was accepted as a health problem.

The research data was evaluated with the IBM Statistics 22.0 SPSS package program. As statistical analysis, variables were evaluated with normal distribution test (Kolmogorov Smirnov/Shapiro-Wilk Tests). In descriptive findings, categorical variables were presented with numbers and percentages, and continuous variables were presented with median (maximum, minimum value). The Chi-Square Test was used in the examination of nominal variables. In multivariate analysis, independent predictors of health problems were examined using logistic regression analysis. Age, gender, education, eating, and activity status were included in the model. The Hosmer Lemeshow Test was used for model compliance. A p-value of  $<0.05$  was accepted for statistical significance.

## Results

143 adolescents were examined within the scope of the research, 53.1% were male, and 58,0% were early adolescents. The median age was 14 (min; 10-max; 19). 14.0% of adolescents' home situation is not good, 25.9% of them have a bad educational status and 36.4% of them do not do any activity. Of those examined, 21.7% stated that their eating situation was bad. 23.9% of girls and 19.7% of boys stated that their eating situation was bad. No statistically significant difference was found between the distribution of adolescence, home situation, education status, activity, and eating situations according to the gender of those examined ( $p>0.05$ ). All of those examined stated that they were safe, did not use addictive substances, and did not have suicidal thoughts. (Table 1)

All those examined had normal blood pressure. Median systolic blood pressure is 97.0 (min; 86.0-max; 106.0) for girls, and the median for boys is 98.0 (min; 88.0-max; 106.0). Median diastolic blood pressure is 63.0 (min; 60.0-max; 74.0) for girls, and the median for boys is 67.0 (min; 60.0-max; 72.0). The median height for girls is 157.0 (min; 134.0-max; 168.0), median height for boys is 161.5 (min; 138.0-max; 178.0). The median weight for girls is 48.0 (min; 30.0-max; 62.0), and the median for boys is 57.0 (min; 35.0-max; 72.0). According to the BMI percentile, 2.1% of those examined are obese. All of the obese are male, 3.9% of the males are obese. 1.4% of those examined have a heart murmur, 67.1% have tooth decay, and 3.5% have refraction problems. 1.5% of the girls and 1.3% of the boys have a heart murmur, 67.2% of the girls and 67.1% of the boys have tooth decay, and 4.5% of the girls and 2.6% of the boys have refraction problems. All of the examined adolescents are fully vaccinated and none of them have hearing loss.

The median of hemoglobin values is 12.6 (min;11.3-max;14.5) for girls and 12.6 (min;11.3-max;15.2) for boys. The median of hematocrit values is 37.0 (min;32.4-max;39.4) for girls and 36.7 (min;32.4-max;40.1) for boys.

The median of vitamin D values is 16.0 (min;6.0-max;29.0) for girls and 17.0 (min;5.0-max;28.0) for boys. The median of vitamin B12 values is 220.0 (min;152.0-max;295.0) for girls and 222.0 (min;202.0-max;295.0) for boys. Of those examined, 35.7% had low hemoglobin, 28.7% had low hematocrit, 14.0% had low vitamin D, and 2.1% had low vitamin B12. When hemoglobin, hematocrit, vitamin D, and B12 levels were examined according to age and gender; hemoglobin was found to be low in 13.4% of girls and 55.3% of boys, hematocrit was found to be low in 13.4% of girls and 42.1% of boys, vitamin D was found to be low in 86.6% of girls and 85.5% of boys, and vitamin B12 was found to be low in 4.5% of girls. No statistically significant difference was found between the distribution of BMI percentile values, presence of heart murmur, presence of tooth decay, presence of refraction problems, and vitamin D levels according to the gender of those examined ( $p>0.05$ ). There was a statistically significant difference between hemoglobin and hematocrit levels ( $p<0.05$ ). The frequency of low hemoglobin and hematocrit levels is higher in boys. (Table 2)

**Table 1:** Distribution of Some Descriptive Characteristics of Those Examined According to Gender, Konya, 2021.

Feature	Total (n=143)		Girl (n=67)		Boy (n=76)	
	Number	%*	Number	%*	Number	%*
<b>Adolescence Periods</b>						
Early Adolescence	83	58,0	37	55,2	46	60,5
Older adolescence	60	42,0	30	44,8	30	39,5
			$\chi^2=0,411$ p=0,521			
<b>Situation at Home</b>						
Bad	20	14,0	6	9,0	14	18,4
Good	123	86,0	61	91,0	62	81,6
			$\chi^2=***$ p=0,165			
<b>Educational Status</b>						
Bad	37	25,9	16	23,9	21	27,6
Good	106	74,1	51	76,1	55	72,4
			$\chi^2=***$ p=0,749			
<b>Activity Status</b>						
Bad	52	36,4	19	28,4	33	43,4
Good	91	63,6	48	71,6	43	56,6
			$\chi^2=***$ p=0,090			
<b>Eating Status</b>						
Bad	31	21,7	16	23,9	15	19,7
Good	112	78,3	51	76,1	61	80,3
			$\chi^2=***$ p=0,692			

%\*: Column percentage \*\*: Fisher's Exact Test \*\*\*: Chi-square with Yates Correction

According to the results of the physical examination and laboratory tests, at least one health problem was found in 83.2% of those examined, 80.6% of the girls, 85.5% of the boys, 94.0% of those in early adolescence, 93.3% of those in late adolescence, 78.4% of those who said their educational status as not good, 84.9% of those said their educational status was good, 83.5% of those who said they did activities, 82.7% of those said they did not do activities, 93.5% of those who said their nutritional status was poor and 80.4% of those who said their nutritional status was good. No statistically significant difference was found between the status of having a health problem according to age ( $p: 0.213$ ), gender ( $p: 0.574$ ), adolescence ( $p: 1.000$ ), educational status ( $p: 0.510$ ), activity status ( $p: 1.000$ ), and eating status ( $p: 0.142$ ).

One unit increase in age creates a 1.1-fold risk of having a health problem, male gender 1.6 times, good education status 2.1 times, lack of activity 1.1 times, poor eating habits 1.2 times. However, these risk increases are not statistically significant ( $p>0.05$ ) (Table 3).

**Table 2:** Distribution of Some Health-Related Characteristics of Those Examined According to Gender, Konya, 2021.

Feature	Total (n=143)		Girl (n=67)		Boy (n=76)	
	Number	%*	Number	%*	Number	%*
<b>According to BMI</b>						
Obese	3	2,1	0	0,0	3	3,9
Normal	140	97,9	67	100,0	73	96,1
<b>Presence of Heart Murmur</b>						
There is	2	1,4	1	1,5	1	1,3
None	141	98,6	66	98,5	75	98,7
			$\chi^2 = **$ p=1,000			
<b>Presence of Tooth Decay</b>						
There is	96	67,1	45	67,2	51	67,1
None	47	32,9	22	32,8	25	32,9
			$\chi^2 = **$ p=1,000			
<b>Presence of Refraction Problems of Eye</b>						
There is	5	3,5	3	4,5	2	2,6
None	138	96,5	64	95,5	74	97,4
			$\chi^2 = **$ p=0,665			
<b>Haemoglobin Level</b>						
Low	51	35,7	6	9,0	31	40,8
Normal	92	64,3	61	91,0	45	59,2
			$\chi^2 = ***$ p<0,001			
<b>Haematocrit Level</b>						
Low	41	28,7	10	14,9	31	40,8
Normal	102	71,3	57	85,1	45	59,2
			$\chi^2 = ***$ p=0,001			
<b>Vitamin D Level</b>						
Low	16	11,2	9	13,4	7	9,2
Normal	127	88,8	58	86,6	65	90,8
			$\chi^2 = ***$ p=0,594			
<b>VitaminB12 Level</b>						
Low	3	2,1	3	4,5	0	0,0
Normal	140	97,9	64	95,5	76	100,0

%\*: Column percentage \*\*; Fisher's Exact Test \*\*\*: Chi-square with Yates Correction

**Table 3:** Logistic Regression Analysis Results of Factors Affecting the Health Problem Status of Those Examined, Konya, 2021.

Risk Factor	RR (%95 GA)*	p
Age	1,1 (0,934-1,380)	0,204
Gender (Boy)	1,6 (0,627-3,861)	0,340
Educational Status (Good)	2,1 (0,747-6,117)	0,157
Activities Status (Bad)	1,1 (0,398-2,796)	0,914
Eating Status (Bad)	1,2 (0,805-17,719)	0,092



## Discussion

Adolescence is a transformative period of growth and development that has profound consequences for both the individual's health in later life and the health of potential children. Common problems during this period include iron deficiency anemia, eating disorders, obesity, and growth and developmental delays.<sup>8,9</sup> In this study, which was conducted within the scope of a school-based adolescent health screening program, it was determined that those examined had health risks such as poor eating habits, tooth decay, and low hemoglobin and hematocrit levels, as stated in a publication by Norris et al.<sup>8</sup> Nutrition has a formative role in the timing and patterning of puberty. Nutritional effects on adolescent development extend to adult height, muscle, and fat mass gain, as well as cardiorespiratory fitness, neurodevelopment, and immunity. It also has implications for the risk of noncommunicable diseases in later life. In the study of Norris et al., which showed the effects of changing nutrition and lifestyle on 54 million children and adolescents (5-19 years of age), it was reported that linear growth in children and adolescents in many countries was below the WHO reference, malnutrition and overweight continued, and there was very little growth in height. It was also reported that height increased in all populations for decades, that this situation was moderate in high-income countries and varied in low- and middle-income countries.<sup>8</sup> According to the WHO European Region Obesity Report 2022, published recently by WHO, it was stated that approximately one in three children in the European region (29% in boys, 27% in girls) is overweight or obese.<sup>10</sup> According to the results of the Türkiye Statistical Institute (TÜİK) Health Survey, the prevalence of obesity in the 15-year-old and older age group is 21.1%. According to the Türkiye Nutrition and Health Survey 1.2% of those aged 15 and under are underweight, 39.9% are overweight, 23.3% are obese, and 1.3% are morbidly obese. In the 15-19 age group, 1.1% are underweight, 43.4% are overweight, 24.9% are obese, and 1.4% are morbidly obese.<sup>3,11</sup> In a study conducted by Digrak E. et al., it was determined that 3.0% of those examined were underweight, 13.7% were overweight and 15.4% were obese.<sup>12</sup> In this study, obesity was found as 2.1%. The prevalence of obesity is very low.

One of the WHO's global nutrition targets is to reduce the prevalence of anemia, which is a widespread health problem worldwide. According to WHO, if the prevalence of anemia is below 5% in a country, there is no problem. If the prevalence is between 5-19%, it is considered mild, if between 20-39%, it is considered moderate, and if it is  $\geq 40\%$ , it is considered a serious health problem. The global prevalence of anemia at all ages is 24.3%. While the prevalence of anemia is 17.5% in men, it is 31.2% in women. Differences by gender are especially high among adolescents and adults.<sup>13</sup> Although iron deficiency anemia has been reported to be between 15.2% and 62.5% in studies conducted in different age groups and regions between the ages of 10-19 in our country, there is no study representing the entire country.<sup>14</sup>

When we research the literature, it is understood that there is no current study reflecting the B12 and vitamin D levels in adolescents as in anemia in the country, and there are studies conducted in different regions in

different age groups. In a study conducted with adolescents living in the central region of Diyarbakır province; B12 vitamin levels were found to be insufficient in 2.2%.<sup>15</sup> Wetherilt et al. determined the frequency of B12 vitamin deficiency as 5.9% in a study they conducted in the 7-17 age group in Turkey.<sup>16</sup> In a study conducted by Uçar et al. in Ankara, vitamin D insufficiency was found as 20.7%, and in a study conducted by Türe et al. in Samsun, vitamin D insufficiency was found as 65%.<sup>17,18</sup> Of those examined, 11.2% had low Vitamin D levels, 2.1% had low Vitamin B12 levels, 35.7% had low hemoglobin levels, and 28.7% had low hematocrit levels. According to WHO, anemia is a mild-to-serious problem in our country, but when the hemoglobin and hematocrit levels detected in this study are considered, it is a mild health problem. Vitamin D and B12 levels detected in this study are also less frequent compared to the studies mentioned. 21.7% of those examined stated that they were malnourished. Although one in every five people examined in the study stated that they were malnourished, examination findings and laboratory results show that malnutrition is less frequent than in previous studies.

It is reported that disorders in oral and dental health can cause toothache, early tooth loss, systematic diseases, speech development disorders, school absences, learning problems, and loss of attention and self-confidence.<sup>19</sup> Tooth decay affects 60-90% of school children even in developed countries.<sup>20</sup> The prevalence of decay is 46.6% for the 12-year-old age group in Europe. It decreased from 61.2% to 58.3% in 15-year-olds between 2004 and 2018.<sup>21</sup> According to the 2019 Turkey Health Survey data; oral and dental health problems are in third place with a frequency of 14.2% in the distribution of health problems/diseases seen in the 7-14 age group.<sup>11</sup> Different prevalences are known in studies conducted in different regions of our country, with different socioeconomic levels, different oral and dental health habits, and different numbers of children. The prevalence of tooth decay was reported as 81.1% in the 8-12 age group in a study conducted by Egemen and Tüloğlu, 56.7% in the 12 age group in a study conducted by Karatepe and Güner, 82% in a study conducted by Eğri et al., and 85.2% in the 15 age group in a study conducted by Öztürk and Sönmez.<sup>19,22</sup> The 67.1% tooth decay prevalence found in this study is consistent with the literature. The results of this study and literature reports show that the frequency of tooth decay is quite high in our country, and despite the developments in preventive and therapeutic practices, the targeted rates have not yet been achieved.

In conclusion, although this study conducted with adolescents is evaluated within the scope of public health and school health services in terms of its follow-up results, it is specific to the family medicine unit. Considering the density of the adolescent population, the importance of preventive and therapeutic services for school age and the role of the family medicine unit in the provision of these services are emphasized.

Although school health services are standardized throughout our country, the priority of targets and preventive methods may differ among societies due to socioeconomic, demographic, cultural, etc. characteristics. Public health needs to conduct and publish studies that comparatively evaluate the results in different regions and at

the national level, considering different periods, different age groups, and sociodemographic and socioeconomic variables regarding school health services.

School health services and periodic monitoring of adolescents are important in helping individuals acquire positive health behaviors, thus improving the health of society. The role of parents, teachers, school administrators, as well as health workers, and the need for a multidisciplinary and multisectoral approach in increasing the quantity and quality of these important services is an undeniable fact.

#### *Limitations*

The findings in the study are limited to adolescents registered in a family health unit, and the study findings cannot be generalized to the adolescent group in Turkey. The presence of family members when asking questions to adolescents may have influenced their answers. In addition, it provides an idea about the important health problems of adolescents and reveals the importance of health screening.

**Ethical Considerations:** The study was approved by KTO Karatay University Faculty of Medicine Non-Drug and Medical Device Research Ethics Committee with the decision number E-2020/038 dated 15.12.2020.

**Conflict of Interest:** The authors declare no conflict of interest.

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