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Original Article

Weight and Height Percentiles For 0-84-Month-Old Children in Kayseri - A Central Anatolian City in Turkey

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ABSTRACT

Objective: The aim of this study was to present weight and height percentiles for Turkish children aged 0-84 months residing in Kayseri, Turkey and to compare these findings with national references and international standards.

Methods: We used the data from the Anthropometry of Turkish Children aged 0-6 years (ATCA-06) study. This cross-sectional study conducted in Kayseri/Turkey between September 2009 and May 2010 included 2963 children (1491 girls, 1472 boys) aged 0-84 months. The centile curves were constructed using the LMS method.

Results: The 3rd, 5th, 10th, 15th, 25th, 50th, 75th, 85th, 90th, 95th, and 97th percentiles and the LMS values for boys and girls were constructed. The 50th percentiles for weight and height of the children were compared with world health organization (WHO) standards and national data. Height and weight values in Kayseri children were lower than WHO standards and Istanbul references in the first year of life. At ages 1 to 4, weight values in both genders and height in boys were slightly higher than the national and international standards. Starting at age 4 years, the weight percentiles of Kayseri children were strikingly higher compared to the national and international standards and the boys were also taller.

Conclusions: This study provides cross-sectional data for weight and height percentiles of Turkish children aged 0-84 months residing in Kayseri. These data reflect the growth status of healthy Kayseri children and also indicate that these children may be more prone to obesity than the Istanbul children. Since the above-mentioned data illustrate the current growth status of this population, we believe that they will serve as a basis for monitoring future trends.

Key words: Weight, height, infant, toddler, percentiles, Turkey

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Introduction

The physical growth of infants and children is an important indicator of health and well-being. Growth charts have been used to assess whether a child is receiving adequate nutrition and to screen for potentially inadequate growth that might be a sign of adverse health conditions (1,2,3,4,5,6). The world health organization (WHO) Multicentre Growth Reference Study (MGRS) data demonstrate that healthy children from around the world, who are raised in healthy environments and follow recommended feeding practices, have very similar patterns of growth in the first 5 years of life (5). However, there is still a considerable variation across populations in height and weight, which is the result of genetic diversity, exposition to vastly different environmental factors, and differences in socioeconomic status (7,8). Because of these differences, it may be better that each country has its own growth references (9,10,11). There may be some differences even within the same population or within similar geographic locations (12,13,14). While longitudinal studies are recommended to monitor child growth, cross-sectional studies have the advantage of reflecting the current status of the population. They also serve to demonstrate changes in growth references over time (secular changes).

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In this cross-sectional study, we constructed weight and height percentiles for Turkish children aged 0-84 months living in a large city of Central Anatolia in Turkey. We also compared these percentiles with previously reported national references and with international standards.

Materials and Methods

We used data from the Anthropometry of Turkish Children aged 0-6 years (ATCA-06) study that was conducted between September 2009 and May 2010. This cross-sectional study was conducted in Kayseri province which has more than 1 200 000 inhabitants and is a leading industrial trade center in Turkey.

Subjects and Sampling

The primary sampling units were Family Health Centers (FHC) located in the city center and suburbs of Kayseri. Firstly, children aged 0-84 months were selected from 21 FHC and stratified according to the socioeconomic status of their parents. The data provided by the local health authority were used to group families into low, medium, and high socioeconomic levels, based on their income. Accordingly, 17.5% of the families were in the low, 58.4% were in the medium and 24.1% were in the high socioeconomic level brackets. The sample size was calculated as 3200. The families were invited to ASM by district midwives and we were able to reach 3094 children to participate in the study. Premature and low birth weight infants, multiple births, and children who had any known chronic or serious illness or malnutrition were excluded (n=131). A total of 2963 children (1491 girls, 1472 boys) aged 0-84 months were included in the study, with 1468 measurements in boys and 1491 measurements in girls for weight as well as 1472 measurements in boys and 1491 measurements in girls for height. The study protocol was approved by the Ethics Committee at Erciyes University School of Medicine and individual consent was taken from parents.

Anthropometric Techniques

All measurements were performed by two trained health technicians. Weight and height were measured twice and the average for each was recorded. Weight was measured with an electronic digital scale (Seca 354; accurate to 10 g) for children aged 0-24 months in a dry diaper without clothing. In children older than 2 years, weight was measured with a standard beam balance scale (Tefal Ultraslim, France; accurate to 100 g) with children wearing only underwear. Length for children younger than 2 years was measured by two examiners (one to position the child) with the child supine on a measuring board. Height for older children was determined to the nearest 1 mm with a portable stadiometer in the standing upright position without shoes, with hips and shoulders perpendicular to the central axis, heels against the footboard, knees together, arms hanging loosely at the sides and the horizontal board of the stadiometer touching the head. The portable scales and stadiometers were calibrated daily.

Statistical Analysis

Construction of the centiles for 0-84 months was performed with the LMS Chart Maker Pro version 2.3 software program (The Institute of Child Health, London), which fits smooth centiles to reference data using the LMS method (Cole and Green 1992). The percentile curves were constructed by Microsoft Office Excel version 2003. Inter-observer correlation coefficients were ≥0.98.

Results

A total of 131 (4%) children were excluded because of disorders that may interfere with growth and development, thus, the final number of subjects included in the study was 2963. All infants and children included in the sample, with the exception of 4, had been or were being breastfed. The proportion of breastfed infants was 88% at age 3 months and 60% at age 6 months. 92% of the mothers reported that they discontinued breastfeeding at age 18 months.

The 3rd, 5th, 10th, 15th, 25th, 50th, 75th, 85th, 90th, 95th, and 97th percentiles and the LMS values of weight and height for boys and girls are shown in Tables 1,4, respectively.

Figures 1 and 2 compare the 50th percentiles for weight in boys and girls of this study with WHO and Istanbul data. Weight percentiles of Kayseri children of both genders were lower in the first year when compared with the WHO standards and Istanbul references. In the 1 to 4 years age groups, weight values were slightly higher than the WHO standards and Istanbul percentiles in the girls and were higher than WHO standards, but lower than the Istanbul data in the boys (Figures 1,2). In children who were aged 4 years or older, weight percentiles of Kayseri children were higher than those of Istanbul children and WHO standards in both genders.

Figures 3 and 4 compare the 50th percentiles for height in the boys and girls in this study WHO standards and Istanbul references. Height percentiles of Kayseri boys were lower in the first year and very similar in the 1 to 4 years age period when compared with the WHO standards and Istanbul references. After age 4 years, height percentiles of Kayseri boys became strikingly higher than the WHO standard and Istanbul reference values, while height percentiles of Kayseri girls were very similar to WHO standards and Istanbul references.

We compared the height and weight of Kayseri boys and girls for 3rd, 50th, and 97th percentiles and found that boys were heavier and taller than girls. The differences at the 12-15-month age group in the 3rd, 50th, and 97th percentiles for weight were 413 g, 765 g, and 811 g, respectively (Tables 1,2). The differences in the 3rd, 50th, and 97th percentiles for height in this age group were 1.25 cm, 2.06 cm, and 1.85 cm, respectively (Tables 3,4).

Discussion

Growth references are one of the fundamental instruments which are used in child care and deviation from growth percentiles usually reflects adverse conditions that require correction. Since the growth pattern of a population may show changes with time, these references should be updated regularly. There may also be differences in growth pattern between countries and regions (5,6,12,13,14). A study on the growth of Turkish children aged between 0 and 5 years was published in 2008. This study was longitudinal in design and the study sample consisted of infants and young children attending the Well Child Clinic of a University Hospital in Istanbul between 1992 and 2006 (15). This study provides longitudinal data from which growth rates can also be calculated. On the other hand, the present study, being cross-

Table 1. The L, S and 3rd, 5th 10th, 25th, 50th, 75th, 85th, 90th, 95th, and 97th percentiles for weight in Turkish boys

Age (years)	L	S	3rd p	5th p	10th p	25th p	50th p	75th p	85th p	90th p	95th p	97th p
0-28 days	0.894	0.144	2456	2567	2738	3026	3349	3676	3853	3973	4152	4268
28 days-3 months	0.715	0.145	4048	4221	4493	4957	5488	6034	6333	6537	6844	7046
3m- <6 m	0.559	0.143	5350	5564	5900	6482	7155	7859	8248	8516	8921	9188
6m- <9 m	0.431	0.137	6421	6657	7029	7678	8436	9235	9681	9990	10458	10768
9m- <12 m	0.353	0.131	7290	7538	7932	8619	9425	10279	10758	11090	11594	11929
12m- <15 m	0.330	0.125	7990	8249	8657	9369	10205	11089	11584	11928	12449	12796
15m- <18 m	0.341	0.121	8580	8848	9270	10004	10864	11772	12278	12630	13162	13516
18m- <21 m	0.363	0.117	9111	9387	9823	10581	11465	12394	12912	13271	13814	14174
21m- <24 m	0.373	0.115	9616	9901	10351	11131	12039	12993	13523	13890	14446	14814
24m- <27 m	0.358	0.113	10112	10405	10867	11667	12601	13580	14125	14502	15073	15451
27m- <30 m	0.317	0.111	10588	10887	11360	12180	13137	14145	14707	15097	15686	16078
30m- <33 m	0.248	0.110	11037	11342	11823	12661	13644	14683	15265	15669	16282	16689
33m- <36 m	0.152	0.109	11468	11778	12267	13125	14136	15212	15818	16240	16882	17311
36m- <39 m	0.035	0.110	11891	12205	12704	13583	14627	15749	16385	16830	17511	17967
39m- <42 m	-0.099	0.111	12302	12621	13131	14034	15119	16296	16969	17442	18170	18660
42m- 45 m	-0.243	0.112	12703	13028	13549	14480	15609	16849	17565	18072	18857	19389
45m- <48 m	-0.395	0.114	13101	13433	13966	14925	16102	17412	18178	18723	19573	20155
48m- <51 m	-0.550	0.116	13502	13839	14384	15372	16599	17985	18804	19392	20318	20956
51m- <54 m	-0.701	0.118	13901	14244	14801	15819	17097	18562	19438	20072	21080	21781
54m- <57m	-0.847	0.120	14297	14646	15214	16261	17590	19136	20072	20756	21852	22623
57m- <60 m	-0.985	0.122	14689	15043	15622	16696	18075	19701	20698	21433	22622	23467
60m- <63m	-1.113	0,124	15075	15434	16024	17124	18550	20253	21311	22097	23381	24304
63m- <66 m	-1.231	0.126	15455	15819	16418	17542	19013	20791	21909	22746	24127	25129
66m- <69 m	-1.338	0.127	15827	16196	16805	17953	19467	21317	22493	23381	24859	25943
69m- <72 m	-1.435	0.128	16195	16568	17186	18356	19911	21831	23063	24000	25574	26741
72m- <75 m	-1.525	0.129	16560	16938	17565	18756	20349	22335	23622	24608	26278	27528
75m- <78 m	-1.611	0.129	16923	17305	17940	19151	20782	22832	24173	25206	26974	28309
78m- <81 m	-1.694	0.130	17282	17668	18311	19542	21208	23322	24717	25800	27666	29092
81m- <84 m	-1.775	0.131	17635	18025	18676	19926	21628	23805	25255	26388	28359	29881

sectional in design, provides data on the actual status of growth in children of different ages and may be used as a basis to make future evaluations about changes in the growth status of this population (secular changes).

We found that 50th percentile values for both height and weight in Kayseri children were lower than both WHO standards and Istanbul references in the first year of life (Figures 1,4). One of the explanations for this can be the difference in methodology - our study being cross-sectional in design. Various factors which may interfere with growth may also have been responsible for the difference. These can be grouped as environmental, genetic, socioeconomic, nutritional and demographic factors (16). Altitude- and microclimate-related differences have also been reported to influence growth (14,17). However, nutrition and socioeconomic status are probably the dominant factors influencing growth in the first year of life (16).

Table 2. The L, S and 3rd, 5th, 10th, 25th, 50th, 75th, 85th, 90th, 95th, and 97th percentiles for weight in Turkish girls

Age (years)	L	S	3rd p	5th p	10th p	25th p	50th p	75th p	85th p	90th p	95th p	97th p
0-28 days	0.818	0.133	2506	2605	2758	3019	3313	3612	3775	3886	4051	4159
28 days-3 months	0.287	0.131	4029	4164	4378	4754	5198	5671	5937	6122	6404	6592
3m- <6 m	-0.035	0.128	5178	5335	5588	6037	6580	7174	7516	7756	8128	8379
6m- <9 m	-0.219	0.126	6113	6288	6570	7076	7695	8382	8781	9064	9505	9805
9m- <12 m	-0.313	0.123	6896	7086	7393	7947	8627	9386	9830	10146	10640	10978
12m- <15 m	-0.360	0.122	7577	7781	8111	8706	9440	10259	10739	11082	11618	11985
15m- <18 m	-0.389	0.120	8190	8407	8758	9392	10173	11047	11559	11926	12498	12891
18m- <21 m	-0.416	0.119	8756	8985	9356	10025	10851	11777	12321	12709	13317	13735
21m- <24 m	-0.446	0.119	9288	9529	9918	10622	11491	12467	13041	13452	14096	14538
24m- <27 m	-0.482	0.118	9792	10044	10450	11187	12098	13125	13729	14163	14843	15311
27m- <30 m	-0.521	0.118	10270	10532	10956	11724	12677	13753	14389	14845	15563	16058
30m- <33 m	-0.563	0.118	10726	10997	11437	12235	13229	14355	15022	15502	16258	16781
33m- <36 m	-0.606	0.119	11159	11440	11894	12722	13756	14932	15631	16134	16930	17482
36m- <39 m	-0.651	0.119	11572	11861	12331	13187	14260	15485	16215	16743	17580	18160
39m- <42 m	-0.696	0.119	11966	12264	12747	13631	14742	16015	16778	17330	18207	18818
42m- 45 m	-0.742	0.120	12343	12648	13145	14055	15202	16524	17318	17894	18813	19454
45m- <48 m	-0.788	0.120	12703	13016	13525	14460	15643	17011	17837	18438	19398	20070
48m- <51 m	-0.833	0.121	13047	13367	13888	14847	16065	17479	18336	18961	19962	20666
51m- <54 m	-0.879	0.121	13377	13703	14236	15218	16468	17928	18815	19464	20507	21243
54m- <57 m	-0.923	0.122	13693	14025	14568	15572	16855	18357	19275	19948	21033	21800
57m- <60 m	-0.967	0.122	13995	14334	14887	15911	17225	18770	19717	20414	21540	22339
60m- <63 m	-1.009	0.123	14286	14629	15192	16236	17579	19166	20142	20862	22029	22861
63m- <66 m	-1.050	0.123	14564	14913	15485	16548	17919	19546	20551	21294	22502	23365
66m- <69 m	-1.090	0.124	14832	15185	15766	16846	18245	19912	20944	21710	22959	23854
69m- <72 m	-1.129	0.124	15089	15447	16036	17134	18559	20263	21323	22111	23400	24327
72m- <75 m	-1.166	0.124	15336	15699	16295	17410	18861	20601	21688	22498	23827	24785
75m- <78 m	-1.202	0.125	15574	15941	16545	17675	19151	20928	22041	22872	24240	25230
78m- <81 m	-1.237	0.125	15804	16175	16786	17932	19431	21242	22381	23234	24641	25662
81m- <84 m	-1.270	0.125	16026	16401	17018	18179	19701	21546	22710	23584	25029	26082

We found that height percentiles of boys were similar in toddlers (1-4 years) in the Kayseri, WHO and Istanbul groups, while in girls, the height percentiles of the WHO sample were slightly higher than the Istanbul and Kayseri toddlers. The 50th percentiles for weight in Kayseri toddlers were higher than WHO standards and Istanbul references in girls, while the Kayseri boys in this age group were heavier than the boys in the WHO sample, but lower in weight as compared to the Istanbul toddlers. After infancy, nutritional influences become less important and the effect of growth hormone (GH) increasingly dominates. However, the effect of environmental, genetic and socioeconomic factors continues to be important also in this period (16).

In the Kayseri sample, both boys and girls of ages 4 years or older appeared to be strikingly heavier as compared to national references and international standards. The boys were

Table 3. The L, S and 3rd, 5th, 10th, 25th, 50th, 75th, 85th, 90th, 95th, and 97th percentiles for height in Turkish boys

Age (years)	L	S	3rd p	5th p	10th p	25th p	50th p	75th p	85th p	90th p	95th p	97th p
0-28 days	2.413	0.048	45.44	46.09	47.05	48.61	50.26	51.83	52.65	53.20	53.99	54.50
28 days-3 months	1.425	0.048	53.38	54.08	55.15	56.91	58.84	60.74	61.76	62.44	63.44	64.09
3m- <6 m	0.834	0.048	59.09	59.81	60.92	62.79	64.87	66.96	68.09	68.86	70.00	70.74
6m- <9 m	0.510	0.047	63.71	64.44	65.59	67.52	69.70	71.91	73.11	73.93	75.15	75.95
9m- <12 m	0.394	0.046	67.58	68.34	69.51	71.50	73.75	76.04	77.28	78.13	79.40	80.24
12m- <15 m	0.401	0.045	70.92	71.70	72.90	74.94	77.25	79.60	80.87	81.75	83.05	83.90
15m- <18 m	0.457	0.044	73.87	74.67	75.91	78.00	80.36	82.76	84.06	84.95	86.28	87.15
18m- <21 m	0.521	0.043	76.54	77.36	78.63	80.77	83.19	85.63	86.96	87.87	89.22	90.10
21m- <24 m	0.573	0.043	78.99	79.83	81.13	83.32	85.79	88.29	89.64	90.56	91.94	92.83
24m- <27 m	0.604	0.043	81.26	82.12	83.45	85.70	88.22	90.77	92.15	93.08	94.48	95.40
27m- <30 m	0.614	0.042	83.40	84.27	85.63	87.92	90.50	93.09	94.50	95.46	96.89	97.82
30m- <33 m	0.603	0.042	85.41	86.30	87.69	90.02	92.65	95.30	96.73	97.71	99.16	100.11
33m- <36 m	0.573	0.042	87.32	88.23	89.64	92.02	94.69	97.39	98.85	99.85	101.34	102.31
36m- <39 m	0.526	0.042	89.14	90.06	91.49	93.91	96.63	99.38	100.88	101.90	103.41	104.40
39m- <42m	0.467	0.042	90.87	91.81	93.26	95.71	98.48	101.29	102.81	103.85	105.40	106.41
42m- 45 m	0.400	0.042	92.53	93.48	94.95	97.44	100.25	103.11	104.66	105.72	107.31	108.34
45m- <48 m	0.327	0.042	94.11	95.07	96.56	99.08	101.94	104.85	106.43	107.51	109.13	110.19
48m- <51 m	0.252	0.042	95.62	96.59	98.10	100.65	103.55	106.51	108.12	109.23	110.88	111.96
51m- <54 m	0.174	0.042	97.07	98.05	99.57	102.16	105.10	108.10	109.75	110.87	112.55	113.66
54m- <57 m	0.097	0.042	98.46	99.44	100.98	103.60	106.57	109.63	111.30	112.44	114.16	115.29
57m- <60 m	0.021	0.042	99.78	100.78	102.33	104.97	107.99	111.09	112.79	113.95	115.70	116.85
60m- <63 m	-0.054	0.042	101.05	102.06	103.62	106.29	109.34	112.49	114.21	115.40	117.18	118.35
63m- <66 m	-0.126	0.042	102.27	103.28	104.86	107.56	110.64	113.83	115.58	116.79	118.60	119.79
66m- <69 m	-0.196	0.042	103.44	104.46	106.05	108.77	111.89	115.12	116.90	118.12	119.96	121.18
69m- <72 m	-0.264	0,042	104.57	105.59	107.19	109.93	113.09	116.36	118.16	119.40	121.27	122.51
72m- <75 m	-0.329	0.042	105.65	106.68	108.29	111.06	114.24	117.55	119.38	120.63	122.53	123.79
75m- <78 m	-0.391	0.042	106.69	107.72	109.35	112.14	115.35	118.69	120.55	121.82	123.75	125.02
78m- <81 m	-0.451	0.042	107.69	108.73	110.37	113.18	116.42	119.80	121.67	122.97	124.92	126.21
81m- <84 m	-0.510	0.042	108.66	109.71	111.35	114.18	117.45	120.87	122.76	124.07	126.05	127.36

Table 4. The L, S and 3rd, 5th, 10th, 25th, 50th, 75th, 85th, 90th, 95th, and 97th percentiles for height in Turkish girls

Age (years)	L	S	3rd p	5th p	10th p	25th p	50th p	75th p	85th p	90th p	95th p	97th p
0-20-28 days	1.596	0.048	45.39	45.99	46.90	48.41	50.05	51.66	52.51	53.08	53.92	54.46
28 days-3 months	0.281	0.047	52.46	53.06	53.99	55.57	57.36	59.19	60.19	60.88	61.90	62.58
3m- <6 m	-0.632	0.046	57.91	58.51	59.45	61.08	62.98	64.97	66.09	66.86	68.03	68.81
6m- <9 m	-1.234	0.045	62.43	63.04	64.00	65.67	67.65	69.77	70.97	71.81	73.09	73.96
9m- <12 m	-1.559	0.044	66.31	66.92	67.90	69.62	71.67	73.88	75.14	76.03	77.39	78.31
12m- <15 m	-1.668	0.043	69.67	70.30	71.31	73.08	75.19	77.47	78.77	79.68	81.09	82.05
15m- <18 m	-1.622	0.043	72.63	73.29	74.32	76.14	78.31	80.65	81.98	82.91	84.35	85.32
18m- <21 m	-1.477	0.042	75.29	75.97	77.04	78.91	81.14	83.52	84.88	85.83	87.28	88.26
21m- <24 m	-1.274	0.042	77.71	78.41	79.52	81.46	83.74	86.18	87.55	88.51	89.97	90.95
24m- <27 m	-1.039	0.041	79.96	80.69	81.84	83.84	86.18	88.66	90.05	91.02	92.49	93.47
27m- <30 m	-0.786	0.041	82.06	82.82	84.01	86.07	88.48	91.00	92.41	93.39	94.87	95.85
30m- <33 m	-0.528	0.041	84.04	84.83	86.07	88.20	90.67	93.24	94.67	95.65	97.14	98.13
33m- <36 m	-0.271	0.041	85.93	86.75	88.04	90.24	92.77	95.39	96.83	97.83	99.32	100.31
36m- <39 m	-0.020	0.041	87.74	88.60	89.93	92.20	94.79	97.46	98.92	99.92	101.43	102.42
39m- <42 m	0.227	0.041	89.48	90.36	91.74	94.09	96.74	99.46	100.94	101.95	103.46	104.45
42m- 45 m	0.468	0.041	91.14	92.06	93.49	95.91	98.63	101.39	102.88	103.90	105.43	106.42
45m- <48 m	0.701	0.041	92.75	93.70	95.18	97.67	100.45	103.25	104.77	105.80	107.33	108.33
48m- <51 m	0.926	0.041	94.29	95.29	96.81	99.37	102.21	105.06	106.60	107.63	109.18	110.18
51m- <54 m	1.145	0.041	95.78	96.81	98.39	101.01	103.92	106.82	108.37	109.41	110.96	111.97
54m- <57 m	1.359	0.041	97.22	98.28	99.91	102.61	105.58	108.52	110.09	111.14	112.70	113.71
57m- <60 m	1.569	0.042	98.60	99.70	101.39	104.16	107.19	110.18	111.76	112.82	114.39	115.40
60m- <63 m	1.775	0.042	99.94	101.08	102.82	105.66	108.76	111.79	113.39	114.46	116.04	117.05
63m- <66 m	1.977	0.042	101.24	102.42	104.21	107.13	110.29	113.36	114.98	116.06	117.65	118.67
66m- <69 m	2.176	0.042	102.50	103.72	105.57	108.57	111.79	114.90	116.54	117.63	119.22	120.24
69m- <72 m	2.369	0.042	103.73	104.99	106.89	109.97	113.25	116.41	118.06	119.16	120.76	121.78
72m- <75 m	2.558	0.042	104.93	106.23	108.19	111.34	114.69	117.89	119.55	120.66	122.27	123.30
75m- <78 m	2.742	0.042	106.09	107.44	109.45	112.68	116.09	119.33	121.01	122.13	123.75	124.78
78m- <81 m	2.922	0.043	107.23	108.62	110.69	114.00	117.47	120.76	122.45	123.57	125.20	126.23
81m- <84 m	3.099	0.043	108.34	109.78	111.91	115.30	118.83	122.15	123.86	124.99	126.62	127.66

also taller, but the girls appeared to have height values comparable to those of the Istanbul children and WHO standards. Although we compared our data graphically with Istanbul references and WHO standards, we were not able make statistical comparisons since we did not have access to the original data of these studies. Our data appear to indicate that Kayseri children may be more prone to obesity than the Istanbul children, a finding which may be related to dietary habits and/or opportunities for physical exercise. However, we do not have enough data on the dietary regimens/feeding habits or lifestyle of the subjects in our sample and thus are unable to comment on the effect of these parameters on the anthropometric results. This may be a limitation of our study.

In this study, we also found that boys were heavier and taller than girls. Similar gender differences in favor of boys were also observed in the national reference and international standard (5,15).

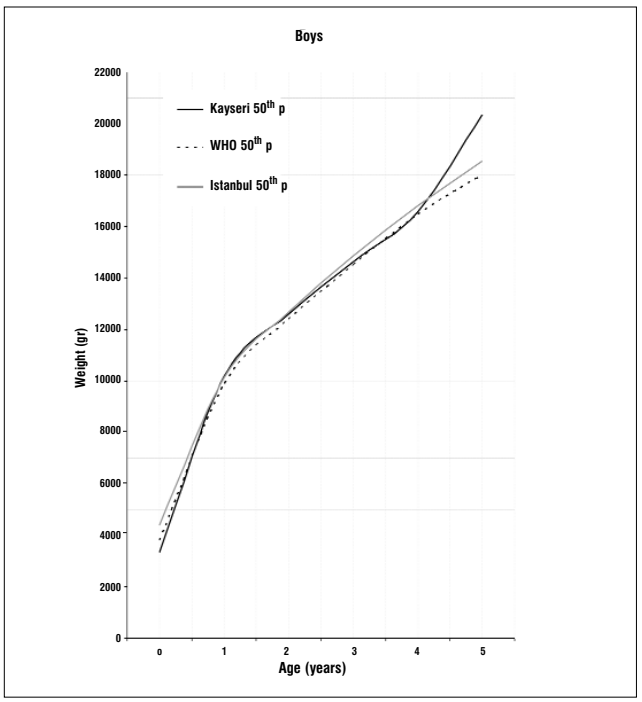

Figure 1. Comparison of 50th weight percentiles of Kayseri, WHO and Istanbul for boys

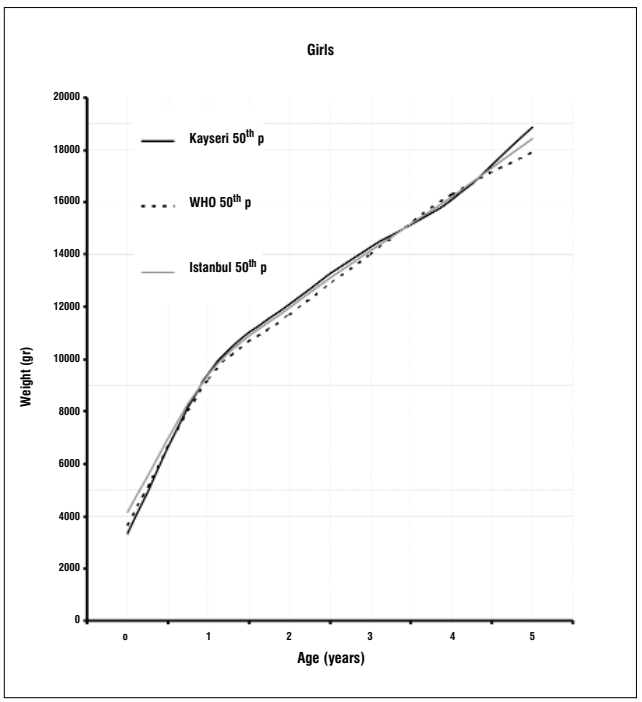

Figure 2. Comparison of 50th weight percentiles of Kayseri, WHO and Istanbul for girls

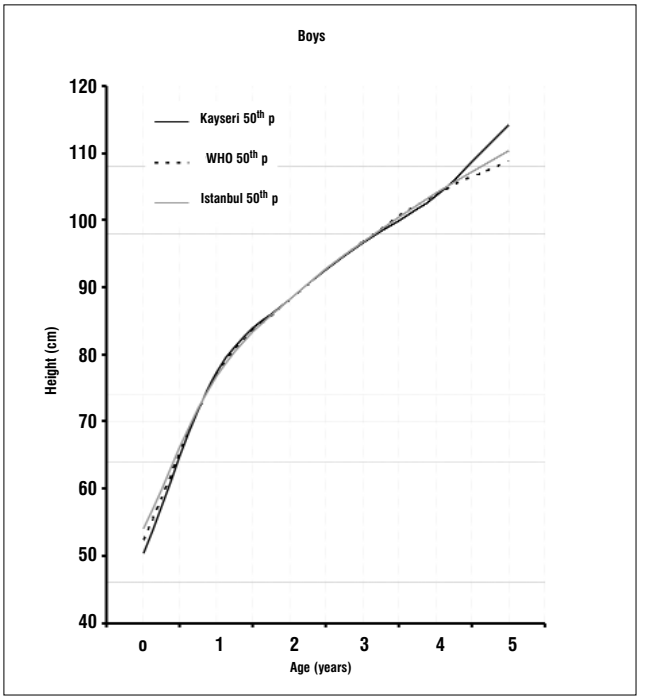

Figure 3. Comparison of 50th height percentiles of Kayseri, WHO and Istanbul for boys

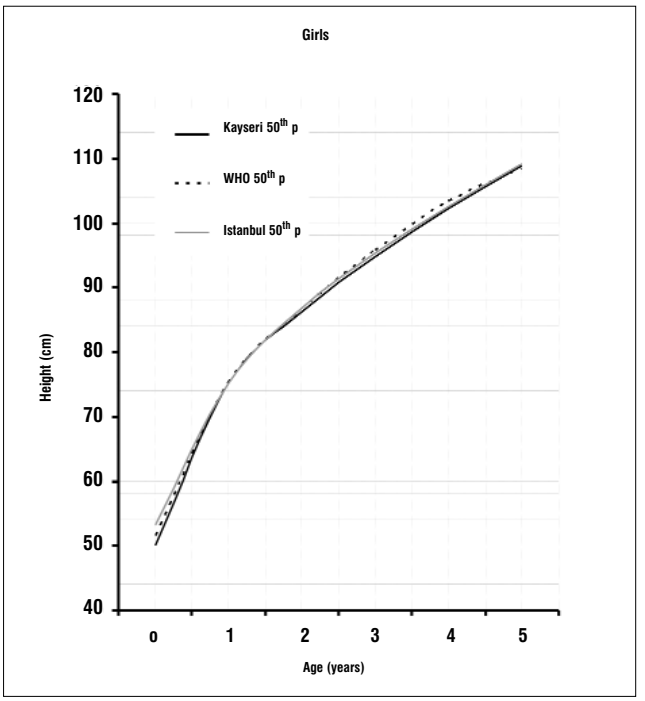

Figure 4. Comparison of 50th height percentiles of Kayseri, WHO and Istanbul for girls

In conclusion, this study shows that there are differences between our findings and national and international growth data which may be due to the effect of various factors, including dietary habits. While longitudinal growth studies provide data for the monitoring of growth, national and even local cross-sectional data will provide valuable information to evaluate the actual status of the pediatric population and serve as a basis for monitoring secular changes.

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