

An Analysis of Anthropometric Data on Iranian Primary School Children

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Abstract

Background: Anthropometric data can be used to identify the physical dimensions of equipment, furniture, etc. The use of furniture that fails to fulfill the anthropometric data of its users has a negative impact on human health. Specific anthropometric dimensions are necessary to design school furniture. Anthropometric data have been measured in many communities especially among schoolchildren. There are different ethnic groups with probably different anthropometric data in Iran, and anthropometric data can change by time, so gathering data about anthropometric dimensions is important. This study was designed to obtain anthropometric dimensions of Iranian children (Fars ethnicity) aged 7-11 years.

Methods: In a cross-sectional study in Yazd, Iran, descriptive statistics as well as key percentiles for 17 static anthropometric data of primary school students (1015 males and 1015 females), were measured and compared between boys and girls.

Results: The age of the students was between 6 and 11 years. Mean weight was between 21.56±5.33 kg and 36.63±9.45 kg in boys and between 20.79±3.48 kg and 35.88±9.40 kg in girls. Mean height was between 1187.02±53.98 mm and 1420.83±69.39 mm in boys and between 1173.90±51.01mm and 1421.27±70.82 mm in girls. There was also some difference in other anthropometric data between two genders.

Conclusion: Results of this study showed some differences in anthropometric data with other studies. We also observed significant gender differences in some dimensions as well.

Keywords: Anthropometry, School furniture, Ethnicity, Iran

Introduction

The health, well-being, and performance of people depend partly on equipment, furniture, and other devices each person uses. One of the important issues in this regard is designing equipment and furniture according to the anthropometric and characteristics of the users.

Anthropometric data can be used to identify the physical dimensions of equipment, furniture, clothing, and workstations (1, 2).

Schoolwork requires children to sit for "extended" periods on a chair. Students use school furniture during their developmental period, and the use of poorly designed furniture, e.g. school chairs and desks, that fails to fulfill the anthropometric data of its users has a negative impact on human health (3-5). Many studies have shown a high prevalence of low back pain among schoolchildren. (6-9). It is believed that strongest predictor

of having future back pain is often considered a previous history of such symptoms. (10). There is a high prevalence of mismatch between anthropometric data and school furniture which is a factor implicated in causing low back pain (10-12).

One of the most important factors that influences the students' sitting posture is anthropometric measures of the children and the measurements and design features of the school furniture they use (13-15).

Specific measurements such as popliteal height, knee height, buttock to popliteal length and elbow height are necessary in order to determine the dimensions of school furniture that will enable students to maintain the correct sitting posture (16, 17).

Anthropometric data have been measured in many communities especially among school children in different countries (18- 22), but because anthropometric measures vary among different nations

and ethnic groups, it is necessary to measure anthropometric data in each ethnic group separately, and to use these data to guide the design of school desks and chairs. There is only one study in our country about measuring anthropometric data in one ethnic group (23), although there are different ethnic groups with possible different anthropometric data in Iran.

The anthropometric data used in the design of the equipment in our country are based on anthropometric data from other countries and thus do not represent the average body measurements of the Iranian students. Therefore, there is a need to collect new data from our population to be used in designing school furniture. There are also some differences between two sexes in anthropometric data (2). Therefore, this study was designed to measure main anthropometric dimensions used for school furniture design among Iranian primary school children and to compare them between two genders.

Materials and Methods

In a cross-sectional study, to measure necessary data for school furniture design, we studied the students of primary schools in Yazd, a central province in Iran. Our sample included 2030 cases (1015 male and 1015 female students) in all primary school grades from 1 to 5 (203 cases in each grade for each gender). Students were selected from 10 primary schools in different parts of Yazd. Cases were selected from Fars ethnicity. Measurements were made in winter 2009 in a 3-month period.

Seventeen static anthropometric data was measured. Eight dimensions, i.e. stature, knee height (sitting), popliteal height (sitting), buttock-popliteal length, buttock-knee length, sitting height, eye height (sitting), and elbow height (sitting), were measured by an anthropometer designed by researchers and validated by a pilot study (accuracy: 5 millimeters); 8 dimensions, i.e. arm length, forearm length, buttock width, shoulder width, elbow-elbow distance, forearm-forearm distance, one thigh thickness, and two thigh thickness were measured by digital 75 cm calipers (LG, China, accuracy: 0.01 millimeters) which would have cali-

brated each week, and weight was measured by a digital weight scale (Laica, Italy, accuracy: 100 grams). All measurements that depend on the side of the body were taken on the right side. The subject posture and the definitions of each anthropometrical parameter were based on standard procedures (24).

Table 1 shows the definition of anthropometric data which were measured in this survey.

All measurements were conducted by trained, experienced technicians using similar techniques. There were 6 technicians in two 3-person groups (2 persons for measuring dimensions and one person for recording). In order to ensure quality control, 2 recorders and an observer participated in all measurements. At last, 7% of measurements were rechecked by two other observers. All children wore light (indoor) clothing without shoes. All anthropometric measures were taken with the subject in a relaxed and erect posture. For standing dimensions, we asked each case to stand upright on a horizontal surface, facing forward, and arms hanging beside the body. For sitting dimensions, each student seated erect on a flat horizontal surface, with knees bent 90°, and feet flat on the surface, facing forward, and arms hanging beside the body (19, 24).

We measured the average values of our 17 anthropometric dimensions and the key percentile values i.e. 5, 50 and 95%. The measurements were also compared between two genders in each school grade.

Results

Different anthropometric dimensions were measured in different age (grade) groups. A total of 2030 cases (203 boys and 203 girls in each grade) were selected and anthropometric data were measured and analyzed in these students. The age of the students was between 6 and 11 yr. Tables 2, 3, 4, 5, and 6 show anthropometric data measured in these students as well as key percentiles (5th, 50th, 95th) used for furniture design.

The average of different dimensions between boys and girls were compared. Some measures were higher in boys and some in girls.

Table 1: Definitions of anthropometric data measured in this study

Anthropometric dimensions	Definition
Weight (Kg)	Body weight
stature (mm)	Vertical distance from the floor to the vertex (i.e., the crown of the head)
Knee height (sitting) (mm)	Vertical distance from the floor to the upper surface of the knee in sitting position
Popliteal height (sitting) (mm)	Vertical distance from the floor to the popliteal angle at the underside of the knee where the tendon of the biceps femoris muscle is inserted into the lower leg
Buttock-popliteal length (mm)	Horizontal distance from the back of the uncompressed buttocks to the popliteal angle, at the back of the knee, where the back of the lower legs meets the underside of the thigh
Buttock-knee length (mm)	Horizontal distance from the back of the uncompressed buttock to the front of the kneecap
Sitting height (mm)	Vertical distance from the sitting surface to the vertex
Eye height (sitting) (mm)	Vertical distance from the sitting surface to the inner canthus of the eye
Elbow height (sitting) (mm)	Vertical distance from the seat surface to the underside of the elbow
Arm length (mm)	The difference between shoulder height and elbow height
Forearm length (mm)	The distance between acromion and tip of the middle finger
Buttock width (mm)	The maximum buttock width in sitting position
Shoulder width (mm)	The maximum shoulder width in standing position
Elbow-elbow distance (mm)	The distance between two acromions in standard sitting position
forearm-forearm distance (mm)	The maximum distance between two forearms
One thigh thickness (mm)	The maximum thickness of the thigh
Two thigh thickness (mm)	The maximum two thigh thickness when right thigh rests over left thigh

Table 2: Anthropometric dimensions among children in grade 1 (n= 406: 203 boys, mean age = 6.9±0.3; and 203 girls, mean age = 6.97±0.18)

dimensions	sex	mean	SD	median	5th	50 th	95th	Sig.	95%CI	
									lower	upper
Weight	M	21.56	5.33	20.60	17.02	20.60	27.68	0.08	-1.64	0.11
	F	20.79	3.48	20.00	16.27	20.00	28.30			
Stature	M	1187.02	53.98	1180.00	1110.00	1180.00	1270.00	0.01	-23.33	-2.86
	F	1173.90	51.01	1170.00	1091.00	1170.00	1258.80			
Sitting dimensions: height	M	634.63	33.17	635.00	580.00	635.00	685.00	0.02	-13.25	-1.10
	F	627.45	29.06	630.00	580.00	630.00	670.00			
eye height	M	513.60	43.91	515.00	446.00	515.00	575.00	0.22	-2.98	12.70
	F	518.43	36.31	520.00	465.00	520.00	540.00			
elbow height	M	155.33	18.19	155.00	126.00	155.00	180.00	0.008	-9.85	-1.49
	F	149.66	24.26	150.00	110.00	150.00	190.00			
Popliteal height	M	276.20	20.21	277.00	239.20	277.00	306.60	0.25	-1.77	6.70
	F	277.66	23.15	280.50	239.25	280.50	310.50			
Knee height	M	345.28	22.10	347.00	305.00	347.00	380.00	0.66	-4.06	6.41
	F	346.46	30.96	347.00	310.00	347.00	384.00			
Buttock-popliteal length	M	271.37	22.49	271.00	235.00	271.00	305.60	0.000	22.85	31.47
	F	298.54	21.71	297.00	262.00	297.00	339.75			
Buttock-knee length	M	350.05	25.35	350.00	304.00	350.00	387.80	0.000	17.72	27.54
	F	372.69	25.02	373.00	336.25	373.00	411.75			
Arm length	M	230.26	24.56	230.00	196.00	230.00	265.00	0.000	5.13	13.31
	F	241.00	16.69	241.00	212.50	241.00	264.00			
Forearm length	M	299.91	21.86	300.00	263.40	300.00	335.00	0.37	-5.85	2.21
	F	298.09	19.45	297.00	267.25	297.00	328.75			
Elbow-elbow distance	M	282.75	28.35	280.00	245.80	280.00	319.60	0.000	-37.04	-26.58
	F	250.94	25.25	249.00	214.00	249.00	294.50			
forearm-forearm	M	314.81	29.21	316.00	268.20	316.00	352.00	0.008	1.88	12.40

Table 2: Countinued...

distance	F	321.96	24.57	319.00	282.25	319.00	370.25			
shoulder width	M	271.67	23.05	271.00	244.20	271.00	300.00	0.01	1.01	9.16
	F	276.76	18.52	275.00	250.25	275.00	310.75			
buttock width	M	205.24	23.02	205.00	171.40	205.00	233.60	0.000	11.88	19.72
	F	221.04	16.74	219.00	196.25	219.00	256.00			
one-thigh thickness	M	67.31	12.41	66.00	51.20	66.00	86.00	0.75	-1.83	2.52
	F	67.65	9.78	66.00	54.00	66.00	85.75			
two-thigh thickness	M	182.24	33.56	180.00	140.00	180.00	239.00	0.000	-31.33	-19.23
	F	156.96	28.28	152.00	121.00	152.00	217.50			

M= male, F = female, Sig. = significance (2-tailed), CI = confidence interval

Table 3: Anthropometric dimensions among children in grade 2 (n= 406: 203 boys, mean age = 7.8±0.39; and 203 girls, mean age= 8.00±0.07)

dimensions	sex	mean	SD	median	5th	50th	95th	Sig.	95%CI	
									lower	upper
Weight	M	24.30	4.34	23.80	19.00	23.80	32.92	0.27	-1.35	0.38
	F	23.82	4.57	23.15	18.35	23.15	32.65			
Stature	M	1255.39	51.25	1255.00	1162.50	1255.00	1348.75	0.008	-24.60	-3.67
	F	1241.30	56.15	1240.00	1160.00	1240.00	1338.80			
Sitting dimensions: height	M	659.85	29.96	655.00	610.00	655.00	708.75	0.96	-5.98	5.68
	F	659.71	29.98	655.00	610.00	655.00	710.00			
eye height	M	541.21	33.64	540.00	485.00	540.00	595.00	0.000	5.97	18.71
	F	553.55	31.80	550.00	505.00	550.00	608.75			
elbow height	M	150.41	15.80	152.50	125.00	152.50	175.00	0.000	7.57	16.20
	F	162.30	27.07	160.00	121.25	160.00	200.00			
Popliteal height	M	290.55	20.08	290.00	259.25	290.00	321.00	0.54	-2.72	5.16
	F	291.77	20.47	290.00	261.25	290.00	327.75			
Knee height	M	365.75	25.71	369.50	326.00	369.50	400.00	0.042	0.18	9.71
	F	370.71	23.16	369.50	329.25	369.50	408.75			
Buttock-popliteal length	M	293.17	24.70	293.50	251.50	293.50	329.75	0.000	22.44	32.23
	F	320.50	25.58	320.00	281.50	320.00	358.00			
Buttock-knee length	M	381.66	22.73	384.00	343.00	384.00	418.00	0.000	12.71	22.35
	F	399.19	26.62	401.00	355.25	401.00	442.75			
Arm length	M	245.84	20.23	245.00	215.25	245.00	287.50	0.000	3.37	10.75
	F	252.91	17.62	254.00	223.75	254.00	279.00			
Forearm length	M	315.19	24.41	315.00	280.75	315.00	348.00	0.02	-9.38	-0.72
	F	310.13	23.08	310.50	262.75	310.50	347.75			
Elbow-elbow distance	M	297.90	25.46	295.00	260.00	295.00	343.25	0.000	-48.77	-38.33
	F	254.35	28.11	250.00	213.25	250.00	304.50			
forearm-forearm distance	M	326.45	29.49	329.00	280.00	329.00	367.00	0.058	-10.92	0.18
	F	321.08	27.57	319.00	275.25	319.00	369.75			
shoulder width	M	283.33	21.55	280.00	250.50	280.00	326.25	0.36	-2.40	6.48
	F	285.37	24.03	282.00	255.25	282.00	325.50			
buttock width	M	214.09	21.74	214.50	180.00	214.50	252.25	0.000	7.98	16.47
	F	226.32	21.90	224.50	195.25	224.50	267.75			
one-thigh thickness	M	71.87	11.10	70.50	56.00	70.50	92.00	0.005	-5.42	-1.00
	F	68.66	11.60	68.00	51.00	68.00	87.00			
two-thigh thickness	M	198.85	33.75	190.50	158.25	190.50	263.75	0.000	-47.19	-35.03
	F	157.73	28.47	151.50	120.50	151.50	212.75			

M = male, F = female, Sig. = significance (2-tailed), CI = confidence interval

Table 4: Anthropometric dimensions among children in grade 3 (n= 406: 203 boys, mean age = 8.7±0.45; and 203 girls, mean age = 9.00±0.00)

dimensions	sex	mean	SD	median	5th	50th	95th	Sig.	95%CI	
									lower	upper
Weight	M	25.51	6.12	27.20	21.82	27.20	39.92	0.096	-2.19	0.18
	F	27.51	6.07	25.90	20.82	25.90	38.82			
Stature	M	1311.24	52.30	1305.00	1231.25	1305.00	1410.00	0.02	-25.05	-2.12
	F	1297.60	64.85	1290.00	1200.00	1290.00	1417.50			
Sitting dimensions: height	M	679.90	34.94	680.00	625.00	680.00	735.00	0.000	10.70	25.66
	F	698.08	41.63	690.00	635.00	690.00	773.75			
eye height	M	558.38	44.74	560.00	492.50	560.00	620.00	0.000	24.70	41.72
	F	591.59	42.66	587.50	526.25	587.50	668.75			
elbow height	M	147.50	15.46	142.50	130.00	142.50	178.75	0.000	26.46	35.35
	F	178.40	28.35	180.00	126.25	180.00	220.00			
Popliteal height	M	305.23	20.98	306.00	271.25	306.00	334.75	0.65	-3.45	5.48
	F	306.24	24.80	307.00	259.25	307.00	345.75			
Knee height	M	386.05	23.03	387.00	346.50	387.00	428.00	0.31	-2.83	8.90
	F	389.09	35.92	389.00	347.00	389.00	437.75			
Buttock-popliteal length	M	309.21	24.55	307.50	266.75	307.50	345.50	0.000	20.11	30.93
	F	334.74	30.70	332.00	283.50	332.00	387.50			
Buttock-knee length	M	405.12	25.21	403.00	367.50	403.00	440.75	0.000	6.76	17.76
	F	417.39	30.98	417.00	376.00	417.00	473.00			
Arm length	M	260.20	20.42	260.00	228.00	260.00	295.00	0.000	3.54	11.96
	F	267.95	22.73	267.00	234.00	267.00	307.00			
Forearm length	M	331.23	22.57	331.00	292.50	331.00	365.00	0.23	-7.41	1.84
	F	328.45	24.94	330.00	228.25	330.00	368.25			
Elbow-elbow distance	M	315.19	26.32	313.50	276.25	313.50	366.25	0.000	-50.49	-38.86
	F	270.51	33.04	269.00	219.50	269.00	333.75			
forearm-forearm distance	M	345.07	30.38	342.50	299.25	342.50	399.00	0.02	-13.64	-1.09
	F	337.71	34.01	333.00	283.00	338.00	392.00			
shoulder width	M	299.60	24.38	298.00	268.00	298.00	345.25	0.61	-3.78	6.39
	F	300.91	27.79	297.50	263.00	297.50	353.50			
buttock width	M	299.88	24.92	226.00	200.00	226.00	283.00	0.002	3.26	14.15
	F	238.59	30.72	233.00	200.00	233.00	286.75			
one-thigh thickness	M	79.47	12.98	78.00	63.00	78.00	102.25	0.007	-9.00	-1.45
	F	74.24	24.19	72.00	47.00	72.00	102.00			
two-thigh thickness	M	224.68	48.03	213.50	170.00	213.50	327.25	0.000	-60.00	-43.61
thickness	F	172.86	35.16	163.00	131.25	163.00	247.00			

M = male, F = female, Sig. = significance (2-tailed), CI = confidence interval

Table 5: Anthropometric dimensions among children in grade 4 (n= 406: 203 boys, mean age = 9.8±0.51; and 203 girls, mean age = 10.05±0.22)

dimensions	sex	mean	SD	median	5th	50th	95th	Sig.	95%CI	
									lower	upper
Weight	M	31.34	8.11	29.15	22.82	29.15	48.45	0.25	-2.34	0.61
	F	30.48	7.03	28.60	21.62	28.60	45.17			
Stature	M	1361.15	59.20	1360.00	1266.25	1360.00	1463.75	0.06	-24.03	0.71
	F	1349.50	67.65	1347.50	1226.30	1347.50	1450.00			
Sitting dimensions: height	M	702.57	35.47	700.00	645.00	700.00	755.00	0.000	13.92	28.67
	F	723.87	40.17	720.00	656.25	720.00	793.75			
eye height	M	587.21	47.00	590.00	530.00	590.00	657.00	0.000	19.46	37.13
	F	615.51	43.70	615.00	551.25	615.00	683.75			
elbow height	M	147.45	15.16	150.00	130.00	150.00	178.75	0.000	40.60	48.90
	F	192.21	26.02	190.00	150.00	190.00	243.75			
Popliteal height	M	320.85	18.58	321.00	290.00	321.00	350.00	0.45	-2.59	5.76
	F	322.44	24.01	323.00	278.00	323.00	359.75			
Knee height	M	403.74	24.49	402.00	363.50	402.00	444.75	0.002	2.92	13.20
	F	411.80	28.16	413.00	363.25	413.00	451.75			
Buttock-popliteal length	M	329.30	29.46	330.00	281.00	330.00	375.80	0.000	17.53	28.61
	F	352.38	27.42	351.50	308.00	351.50	397.00			
Buttock-knee length	M	426.15	30.70	424.00	385.00	424.00	490.00	0.000	9.82	21.71
	F	441.90	30.37	442.00	390.50	442.00	491.00			
Arm length	M	268.45	20.03	269.00	235.25	269.00	303.00	0.000	6.97	15.21
	F	279.54	22.23	280.00	241.50	280.00	311.50			
Forearm length	M	341.48	29.24	345.00	299.25	345.00	380.00	0.71	-4.27	6.19
	F	342.44	24.24	341.50	301.50	341.50	380.75			
Elbow-elbow distance	M	322.57	30.33	320.00	280.00	320.00	373.75	0.000	-49.82	-37.16
	F	272.08	34.57	275.00	231.00	275.00	338.00			
forearm-forearm distance	M	353.39	34.98	349.50	307.25	349.50	412.00	0.009	-15.65	-2.22
	F	344.45	34.04	345.50	293.00	345.50	339.50			
shoulder width	M	310.72	28.81	307.00	270.00	307.00	366.00	0.05	-0.02	11.37
	F	316.39	29.76	310.50	278.25	310.50	366.75			
buttock width	M	239.00	26.44	235.00	204.00	235.00	281.00	0.001	3.92	14.86
	F	248.40	29.65	245.00	212.00	245.00	301.50			
one-thigh thickness	M	86.86	16.05	86.00	63.00	86.00	120.00	0.000	-10.62	-4.81
	F	79.14	13.68	77.50	59.25	77.50	101.75			
two-thigh thickness	M	223.37	47.75	212.50	163.25	212.50	300.00	0.000	-53.41	-36.92
	F	178.21	37.44	170.00	131.00	170.00	252.00			

M = male, F = female, Sig. = significance (2-tailed), CI = confidence interval

Table 6: Anthropometric dimensions among children in grade 5 (n= 406: 203 boys, mean age = 11.04±0.36; and 203 girls, mean age = 11.01±0.24)

dimensions	sex	mean	SD	median	5th	50th	95th	Sig.	95%CI	
									lower	upper
Weight	M	36.63	9.45	34.50	25.32	34.50	55.57	0.42	-2.58	1.09
	F	35.88	9.40	33.55	25.00	33.55	54.12			
Stature	M	1420.83	69.39	1417.50	1302.50	1417.50	1543.75	0.94	-13.20	14.08
	F	1421.27	70.82	1420.00	1300.00	1420.00	1543.75			
Sitting dimensions: height	M	734.02	35.25	730.00	681.25	730.00	739.75	0.000	17.30	32.10
	F	758.70	40.59	760.00	695.00	760.00	820.00			
eye height	M	619.68	35.16	620.00	570.00	620.00	680.00	0.000	25.35	39.83
	F	652.28	39.11	650.00	595.00	650.00	720.00			
elbow height	M	152.20	15.52	150.00	130.00	150.00	180.00	0.000	45.39	58.37
	F	204.09	44.54	200.00	155.00	200.00	243.75			
Popliteal height	M	337.96	20.26	337.00	310.00	337.00	375.00	0.53	-5.53	2.88
	F	336.63	22.91	337.50	302.25	337.50	369.75			
Knee height	M	427.89	26.23	426.00	390.00	426.00	467.25	0.009	1.79	12.68
	F	435.14	29.64	434.00	393.50	434.00	478.75			
Buttock-popliteal length	M	351.33	30.85	352.00	303.25	352.00	401.50	0.000	18.08	29.96
	F	375.36	30.17	374.00	327.25	374.00	422.25			
Buttock-knee length	M	455.37	33.29	450.00	405.00	450.00	510.00	0.02	1.47	17.10
	F	464.66	45.99	467.50	409.75	467.50	527.00			
Arm length	M	285.40	21.15	286.00	250.00	286.00	314.75	0.000	5.77	15.79
	F	296.20	29.63	295.00	261.00	295.00	328.00			
Forearm length	M	363.20	26.51	362.50	322.25	362.50	406.75	0.74	-6.01	4.32
	F	362.35	26.59	362.00	318.25	362.00	402.75			
Elbow-elbow distance	M	340.61	33.30	339.00	291.00	339.00	400.00	0.000	-55.48	-41.32
	F	292.21	39.22	288.00	232.75	288.00	367.00			
forearm-forearm distance	M	366.77	37.07	361.50	315.00	361.50	437.25	0.17	-11.84	2.13
	F	361.92	34.68	361.50	310.25	361.50	431.00			
shoulder width	M	327.94	28.97	322.00	290.00	322.00	383.75	0.10	-1.04	11.51
	F	333.18	35.23	328.00	289.25	328.00	398.00			
buttock width	M	252.49	27.44	250.00	210.00	250.00	307.00	0.000	5.79	17.78
	F	264.28	33.81	260.00	224.50	260.00	324.50			
one-thigh thickness	M	92.45	18.06	90.00	69.25	90.00	126.25	0.000	-9.88	-2.82
	F	86.09	18.23	83.00	54.28	83.00	122.75			
two-thigh thickness	M	229.17	51.85	214.00	169.00	214.00	340.00	0.000	-49.70	-31.22
	F	188.71	42.59	178.00	135.00	178.00	270.25			

M = male, F = female, Sig. = significance (2-tailed), CI = confidence interval

Discussion

It is known that there is a mismatch between school furniture and anthropometric dimensions of the students all over the world and many musculoskeletal disorders can be attributed to this mismatch.

In our country, as well, the mismatch is observed obviously. Therefore, it was necessary to provide an anthropometric data bank for use in the designing of school furniture. This study was

designed to investigate the anthropometric dimensions of the primary school students in Fars ethnicity, which is not representative of children in other Iranian ethnic groups.

In this study, we obtained anthropometric measures that could be used in the design of the desks and chairs from a population of students in different grades of primary schools (from grades 1 to 5) in two genders.

This is the first phase of a large study in all school grades and different ethnic groups in our country. Although another study in 6-11 yr old children has been done in another part of our country before, because of changes in measures of the human body, this kind of study should be repeated periodically.

We measured 17 anthropometric dimensions necessary for school furniture design. Our anthropometric data was different from data from other countries. Anthropometric dimensions of American and Greek children were more than of our children (14, 18), and these dimensions in Vietnamese students were less than of our students (5). The most similar data to our data was data obtained from Mexican students (21).

Some dimensions were significantly higher in girls especially in grades 3 to 5, i.e. sitting height, sitting eye height, sitting elbow height, knee height, buttock-popliteal length, buttock-knee length, arm length, and buttock width; and some were significantly higher in boys, i.e. stature, elbow-elbow distance, forearm-forearm distance, one thigh thickness and two thigh thickness. Some of these results were consistent with studies in other parts of the world (14, 21).

In conclusion, this study showed significant differences in anthropometric dimensions between Iranian children and children of other parts of the world, and there was a significant difference between two genders of our children, as well. Therefore, for designing and manufacturing of school furniture paying attention to these differences is very important.

Ethical Considerations

All ethical issues including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc have been completely observed by the author.

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