A Research on Updating of Anthropometric Measurements

M. Dursun KAYA
Atatürk University,
Vocational College of Erzurum,
Erzurum, Turkey
dursun@atauni.edu.tr

İsmail MALKOÇ
Atatürk University,
Department of Anatomy, Faculty of Medicine,
Erzurum, Turkey
imalkoc@atauni.edu.tr

Osman ERDOĞAN
Management of National Education,
Erzurum, Turkey
osman124512@hotmail.com

Aslı KARA
Center of Public Health of Yakutiye,
Erzurum, Turkey
dr.aslikara@hotmail.com

Hakkı YELŞİYURT
Ministry of Health, Ankara
hyesil62@hotmail.com

Abstract: By considering the dimensional measurements of the students who spend most of their time at school, the fact that their body and structural equipment haven't been designed will affect their body and psychological improvements negatively. Anthropometric measurements are necessary for education equipment and designs of education-structural equipment of the children at the age of school. It is emphasized that anthropometric measurements of the people living in different climate and altitude conditions in literature will be different. It is mentioned that anthropometric data available for a certain region will be able to change in terms of changing socio-economical conditions and therefore, updating of anthropometric data is necessary in certain in period of times.

For the reason, in 1999 anthropometric data obtained from the children, between the age of seven and fifteen, who were in sitting and standing position, were measured to plan a longitudinal study in 2007. In the result of comparison which was made, as reported in literature, it is clear that anthropometric data will be able to be updated in certain period of times.

Keywords: anthropometric measurement, primary school students, longitudinal

Introduction

Anthropometric measurements are essential in the correct designs of ergonomic business areas. Obtaining of anthropometric data is very significant in terms of growing and shaping of body posture regularly of the children who spend most of their time sitting in the desks and on the chairs (Jeong and Park, 1990, Floyd, and Roberts, 1958, Oxford, 1969). The fact that the chairs and desks were designed appropriately and in a functional way according to the physical structure of the user made the design of equipment for school significant. Therefore, it is necessary that different changes and relations among body dimensions should be known (Kayış & Özok, 1986, Mandal, 1982,).

First of all, Ergonomist's duty is to determine the features of the product to be used in the design of the equipment produced with mass production and then is to provide the usage of the objects including fixed things which will be benefited in the design by anthropometry (Hira, 1980, Floyd & Word, 1969). Firstly, it is necessary to obtain anthropometric measurements for the design of certain products. It is emphasized that anthropometric data of the people living in different altitude and climate conditions will be separate (Yip et

al., 1988). Also, it is mentioned that anthropometric data obtained for a certain region will change within the time in terms of changing socio-economical conditions and therefore, updating of anthropometric measurements made in the studies before at every five years is necessary. In this study, anthropometric measurements obtained by using Phesant measurements method (Tab. 1) in 1999 were obtained again by using the same method in 2007 and these data compared by updating as Yip and their colleagues suggested (Phesant, 1988).

Variable	Corresponding measurement in Pheasant (1988)	Method of Measurement
Eye Height	2	Vertical distance from the floor to the inner canthus (corner) of the eye.
Elbow height	4	Vertical distance from the floor to the radiale
Shoulder breadth	18	Horizontal distance across the shoulders measured between the acromia (bony points)
Buttock-knee length	13	Horizontal distance from the back of the uncompressed buttock to the front of the kneecap

Table 1: List of anthropometric variables and methods of measurement.

Material and Method

In this study, in 1999 in Erzurum province, the altitude of which is 2000 meters (medium altitude), 1408 students, 694 of whom are male, and in 2007 1477 students, 732 of whom are male, were included in the research by stratified sampling method (Kaya et al., 2000a, Kaya et al., 2000b, Kaya et al., 2003). These children were evaluated with regard to four different anthropometric measurements in both studying periods. These anthropometric measurements included the height of eye and elbow at standing position, the width of shoulder and leg and knee distance. All the students included in the study were examined regarding general health control by pediatrician. Any chronic and systemic cases which will be able to affect anthropometric measurements weren't included in the study. The students whose families have monthly incomes above minimum living conditions according to State Statistics Institute's economical indications were included in the study in every both periods (1999 and 2007 years).

Harpenden Anthropometer device was used for all the measurements. The anthropometer was calibrated with the accuracy of 0.05 cm. During the measurements, the children were barefooted and lightly clothed. All the measurements were taken between 8 and 12 o'clock every in the morning to prevent within day variability in the measurements (Kayis, 1987, Kaya et al., 2003).

The students included in the study were divided into groups in terms of age and sex in every both periods. The data obtained were evaluated statistically in both among themselves and among the groups. SPSS statistical packet programme was used for statistical analysis.

Findings

According to age and sex, description and statistical analyses of anhropometric measurements belonging to female and male students in 1999's and 2007's were shown in (Tab. 2 and 3). According to this it was determined that anthropometric measurements according to age and sex of cases evaluated in 1999's and 2007 are increased. Anthropometric measurements obtained in every both periods were compared according to age and sex. When (Tab. 2) was examined, for example, it was found that there was a significant difference among the heights of elbow values at standing position of male students, 8 years old, in 1999's and 2007's (t=-4.29, p<0.001). While anthropometric measurements of the heights of elbow at standing position of the female students, 8 years old, was 72.38 ± 4.26 in (Tab. 3) in 1999, it was found to be 74.67 ± 3.02 in 2007 and the comparison of these two values was quite significant (t=-3.97, p<0.001). In every both periods, the comparison of anthropometric measurements obtained among their kinds of the students at same age of group was shown in (Tab. 2 and 3).

Anthropometric measurements	Age	1999 Year		2007 Year		t
		n	Mean ± SD	n	Mean ± SD	
Eye Height	7	71	108.43 ± 4.57	74	109.35 ± 4.43	-1.23
	8	73	112.52 ± 6.16	80	114.82 ± 4.11	-2.75 **
	9	81	118.02 ± 5.55	83	120.63 ± 5.85	-2.93 **
	10	76	122.80 ± 5.45	82	123.58 ± 5.29	-0.91
	11	78	129.87 ± 5.07	82	129.76 ± 5.55	0.12
	12	80	134.84 ± 3.63	85	135.75 ± 5.13	-1.23
	13	81	139.58 ± 4.03	82	140.20 ± 5.10	-0.82
	14	76	141.98 ± 4.65	81	144.87 ± 6.31	-3.24 **
	15	78	145.01 ± 5.07	83	145.42 ± 5.20	-0.49
Elbow height	7	71	69.08 ± 3.67	74	71.66 ± 3.73	-4.24 ***
	8	73	72.38 ± 4.55	80	74.99 ± 2.89	-4.29 ***
	9	81	76.24 ± 3.97	83	79.33 ± 4.22	-4.82 ***
	10	76	80.13 ± 3.97	82	81.54 ± 3.93	-2.25 *
	11	78	84.65 ± 3.85	82	85.72 ± 3.88	-1.74
	12	80	88.73 ± 4.36	85	89.31 ± 3.42	0.94
	13	81	90.18 ± 3.42	82	92.98 ± 4.24	-3.92 ***
	14	76	92.39 ± 3.75	81	96.56 ± 4.33	-6.44 ***
	15	78	94.29 ± 3.73	83	94.57 ± 3.86	-0.45
Shoulder breadth	7	71	26.88 ± 1.12	74	28.38 ± 2.95	-4.02 ***
	8	73	27.62 ± 1.40	80	29.18 ± 1.40	-6.71 ***
	9	81	28.91 ± 1.51	83	30.43 ± 2.24	-5.08 ***
	10	76	29.82 ± 1.69	82	30.98 ± 1.80	-4.12 ***
	11	78	31.26 ± 1.51	82	32.47 ± 1.77	-4.62 ***
	12	80	32.73 ± 1.67	85	33.51 ± 1.53	-3.12 **
	13	81	33.23 ± 1.24	82	34.51 ± 1.72	-5.27 ***
	14	76	34.52 ± 1.43	81	35.80 ± 2.67	-3.70 ***
	15	78	35.39 ± 1.54	83	35.50 ± 1.67	-0.42
Buttock-knee length	7	71	38.97 ± 2.16	74	39.26 ± 1.90	-0.85
	8	73	40.74 ± 2.49	80	41.31 ± 2.08	-1.55
	9	81	42.93 ± 2.73	83	43.80 ± 2.73	-2.04 *
	10	76	44.76 ± 2.88	82	44.87 ± 2.61	-0.26
	11	78	47.71 ± 2.60	82	47.31 ± 2.74	0.95
	12	80	50.32 ± 2.53	85	49.37 ± 2.12	2.62 **
	13	81	51.33 ± 2.17	82	51.29 ± 2.24	0.13
	14	76	52.64 ± 2.79	81	51.29 ± 2.79	0.83
	15	78	53.57 ± 2.85	83	53.70 ± 2.98	-0.27

*: significant at p<0.05, **: significant at p<0.0.1, ***: significant at p<0.001

Table 2: The Comparison of anthropometric measurements of boys in 1999 and 2007

Anthropometric measurements	Age	1999 Year		2007 Year		t	
		n	Mean ± SD	n	Mean ± SD		
Eye Height	7	80	108.66 ± 4.42	78	108.37 ± 4.56	0.39	
	8	78	112.59 ± 5.91	85	113.75 ± 4.07	-1.47	
	9	82	118.31 ± 5.75	86	119.10 ± 6.60	0.82	
	10	85	122.45 ± 5.82	76	124.23 ± 6.05	-1.91	
	11	77	128.48 ± 5.22	85	129.63 ± 4.99	-1.43	
	12	85	132.11 ± 5.18	87	133.58 ± 5.23	-1.69	
	13	81	139.84 ± 6.71	83	141.85 ± 5.37	-1.19	
	14	78	144.74 ± 6.84	86	144.54 ± 4.64	0.20	
	15	68	150.21 ± 7.75	79	151.58 ± 8.09	-0.94	
Elbow height	7	80	69.17 ± 3.25	78	71.35 ± 3.26	-4.20	***
	8	78	72.38 ± 4.26	85	74.67 ± 3.02	-3.97	***
	9	82	76.45 ± 4.02	86	78.76 ± 5.62	-3.05	**
	10	85	79.57 ± 4.34	76	82.29 ± 4.41	-3.98	***
	11	77	84.15 ± 3.93	85	85.59 ± 4.14	-5.22	***
	12	85	86.40 ± 4.28	87	88.40 ± 3.81	-2.95	**
	13	81	91.53 ± 5.25	83	93.99 ± 3.88	-2.35	*
	14	78	94.32 ± 5.04	86	96.39 ± 3.70	-2.73	**
	15	68	98.17 ± 5.32	79	98.54 ± 5.64	-0.60	
Shoulder breadth	7	80	27.30 ± 1.35	78	27.97 ± 1.36	-3.11	**
	8	78	28.19 ± 1.39	85	28.78 ± 1.29	-2.79	**
	9	82	29.24 ± 1.57	86	29.88 ± 1.93	-2.33	*
	10	85	30.17 ± 1.66	76	30.92 ± 1.85	-2.75	**
	11	77	31.11 ± 1.49	85	32.33 ± 1.70	-4.79	***
	12	85	32.00 ± 1.61	87	32.96 ± 1.47	-3.73	***
	13	81	33.92 ± 1.96	83	34.91 ± 1.97	-3.22	**
	14	78	34.96 ± 2.14	86	35.63 ± 1.53	-2.11	*
	15	68	36.61 ± 2.41	79	36.72 ± 2.31	-0.17	
Buttock-knee length	7	80	38.77 ± 1.96	78	39.51 ± 2.34	2.16	*
	8	78	40.05 ± 2.61	85	41.48 ± 1.90	-4.02	***
	9	82	42.29 ± 2.75	86	43.69 ± 2.71	-3.31	**
	10	85	44.32 ± 2.61	76	45.44 ± 2.70	-2.72	**
	11	77	46.44 ± 2.43	85	47.60 ± 2.63	-2.92	**
	12	85	48.24 ± 2.29	87	49.06 ± 2.32	-1.99	*
	13	81	51.19 ± 2.95	83	51.74 ± 3.23	-1.12	
	14	78	52.80 ± 2.26	86	53.14 ± 2.41	-0.84	
	15	68	54.83 ± 2.78	79	54.59 ± 2.69	-0.49	

*: significant at p<0.05, **: significant at p<0.0.1, ***: significant at p<0.001

Table 3: The Comparison of anthropometric measurements of girls in 1999 and 2007

Discussion

It is always obvious that updating of the data bank is necessary in terms of checking and following the students' growing and developing in a healthy way by determining the dimensions of desks and tables used by the students who spend most of their daily life at school during teaching and educating period. Although discussions are available about for how long anthropometric measurements should be updated, the results of our study reflect the difference of 8 year anthropometric measurements. Yip and their colleagues emphasize that anthropometric measurements should be updated at every 5 years (Yip et al., 1988). According to the result of our study, it was determined that there was q significant difference in the comparison of anthropometric measurements of the same age and kind of group. Although it was considered that changing of climate conditions, developing of socio and economical conditions and health services, increasing the percent of individual education level and changing of their feeding habit caused anthropometric measurements increase, the result of our study showed that this period was necessary for updating anthropometric measurements.

However, in spite of the fact that statistical difference wasn't found among anthropometric measurements dealing with the height of the eye and the distance between the leg and knee at standing position from the point of all age groups, on the other hand, it was determined that statistical difference was found in terms of the age and the kind in every both periods with the regard to the height of the elbow and width of shoulder parameters at standing position.

As a result, although the results of our study suggest that anthropometric measurement values during the childhood should be updated always needed at every ten years, new studies are the children living in different socio and economic and altitude conditions.

Acknowledgments

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