

# Anthropometric Measurements, Hematological Indices & Intelligence Quotient of Homeless Adolescents, Dar El Tarbia in Giza

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## ABSTRACT

The anthropometric measurements (height/age, weight, age & body mass index) (intelligence quotient (IQ) score) and some Hematological indices (I-Ib, TIBC & serum iron) were assessed for fifty male adolescents residents aged 12-16 years of Dar El-Tarbia in Giza. The study revealed that about two third (68%) of cases were stunted. Meanwhile, 34% of them were under weight. None of the adolescents were above the normal height /age or weight/age according to the used standard reference (WI-IO, 1995). The majority of the adolescents under study (84%) had normal BMI. Concerning hemoglobin concentration, the results obtained were relatively close to reference Hb value (mean Hb level=11.8 g/dl). The majority of the adolescents (90 & 94%) had normal levels of TIBC and serum iron, respectively. The mean of standard deviation and IQ scores estimated to be 95.28 ± 15.02 that considered close to the norm for IQ 1 test. There are significant correlations between time of residence in rehabilitation center and each of Hb concentration & serum iron ( $p < 0.05$ ).

## INTRODUCTION

Homeless children were defined as children less than 18 years old males or females, whose families and /or community have been unable to meet their basic needs due to social and economic problems, and who spend most or all of their time on the street with minimal or no contact with their families. Lack of supervision and protection or guidance, would make them vulnerable to a wide range of health and psychological hazards and exploitation violating their basic right [National Council of Childhood and Motherhood (NCCM), 2004].

The health records of street (homeless) children at different Non Governmental Organizations (NGOs) revealed a discrepancy between recorded health problems and the complaints mentioned by street children themselves. The most common health problems included in NGOs were skin diseases, anemia, intestinal parasitic infections, tonsillitis, hair lice and otitis media (UNICEF, 2001).

Generally, mild to moderate levels of anemia found to be prevalent among one third of young Egyptian children & adolescents according to WHO epidemiological criteria (WHO, 1995). Anemia and

malnutrition showed a significant adverse impact on both mental and physical development (WHO, 2001 and El-Zanaty & way, 2001). WHO (2008) reported that anemia is a public health problem that affects populations in both rich and poor countries.

There are no official or reliable statistics on the problem of street children in Egypt. The closest indicator is therefore the number of children arrested of the 42, 505 children arrested in 2001. with regard to the age of street children, random NGO sample suggest that 13 years was the average. A quarter of them was believed to be less than 12 years old, with two – third between 13 and 16 years old and only 10% over 17 (NCCM, 2004).

In recent years, the attention to the street children phenomenon has also increased, partly due to declarations from the national Council of Childhood and Motherhood (NCCM) under the auspice of the First Lady Susan Mubarak. A 'National Strategy to Protect, Integrate and Rehabilitate street Children' was also launched by the NCCM in March 2003. "Vulnerable to delinquency" this hinders are the work of NGOs by preventing them from reaching drop in centers for rehabilitation. The homeless children would need the protection and assistance rather than punishment (UNICEF, 2003).

Since there are very limited studies focused on physical and psychological development of such group.

Therefore, this study was conducted to assess anthropometric measurements, intelligence quotients (IQ) and some hematological indices as in one of the rehabilitation centers.

## MATERIALS AND METHODS

The present study included a sample of fifty male adolescents residents, of Dar El-Tarbia in Giza aged 12-16 years, who had spent time on the street before being institutionalized. Over a period of one year data were collected through personal interview with each subject to fill a specially designed questionnaire sheet including:

The anthropometric measurements including weigh, height, & body mass index (BMI) were assessed according to *Lee & Nieman* (2003).

According to WHO (1995<sub>b</sub>) the percentile ranking for height/age & weight/age was evaluated as follows:

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- Normal height/age or weight/age: height or weight within 5<sup>th</sup> - 95<sup>th</sup> percentile.
- Stunted or under weight: height or weight being less than 5<sup>th</sup> percentile.
- Over weight or over height: height or weight exceeding or equal 95<sup>th</sup> percentile.

According to Dennis (2001) BMI, was evaluated as follows:

- Normal BM: BMI value at 5<sup>th</sup> - < 85<sup>th</sup> percentile.
- Under weight: BMI value being less than 5<sup>th</sup> percentile.
- Over weight: weight exceeding or equal 95<sup>th</sup> percentile.

Hematological study: For each case, a venous blood sample was withdrawn for the analysis of blood hemoglobin concentration (Hb) according to the procedure described by *ICSh (1967)*, serum iron was determined calorimetrically as described by *Cerioti &*

*Cerioti (1980)*, total iron binding capacity (TIBC) was determined according to *picardi, et al. (1972)*.

Intelligent Quotient (IQ) : IQ for each case was assessed according to the individual test of intelligence described by Saleh (1978).

Statistical analysis: Data was statistically analyzed according to Rajagopalan (2006) by using SPSS software program Version 11.

## RESULTS AND DISCUSSION

Data in table (1) demonstrated the mean IQs scores of adolescents under study according to their ages. Form this table, it could be noticed that adolescents at different ages (13-16 years) had mean IQs scores within the average level, while those at age 12 years had means IQs close to the average. The mean and standard deviation of IQs scores for all subjects under study was 95.28± 15.02, close to the norm for this test and IQs ranged from 71 to 137. In this respect, El-Kherbawy (2004) reported that the mean and SD of IQs scores

**Table 1. Mean + SD, median and range of IQ, Hb, height and Wight of adolescents.**

Age	(Years)	IQ (Score)	HB (g/dl)	Height (cm)	Weight (kg)	BMI
12.00	Mean	89.00	11.65	139.5	36.00	18.47
	N	6	6	6	6	6
	Std.Devitation	7.746	.65320	3.14643	3.16228	0.98056
	Median	90.00	11.7000	139.0000	35.50000	18.6450
	Minimum	74	10.50	135.00	32.00	16.80
	Maximum	95	12.10	144.0	41.00	19.77
13.00	Mean	92.22	11.21	144.22	38.66	18.58
	N	9	9	9	9	9
	Std.Devitation	12.833	1.07987	4.08588	3.77492	1.58246
	Median	91.00	11.7000	145.0000	40.0000	18.6700
	Minimum	74	9.80	137.00	34.00	16.17
	Maximum	115	12.50	150	44.00	20.54
14.00	Mean	96.67	11.87	145.61	39.71	18.65
	N	21	21	21	21	21
	Std.Devitation	16.228	.84270	4.63116	5.44190	1.65122
	Median	90.00	12.1000	146.00	41.00	18.8100
	Minimum	71	9.00	136.00	30.00	15.73
	Maximum	123	13.20	157.00	52.00	21.29
15.00	Mean	101.83	12.15	151.00	42.16	18.54
	N	6	6	6	6	6
	Std.Devitation	21.619	.86891	7.37564	4.66548	2.19794
	Median	98.5	11.95	150.00	41.50	18.72
	Minimum	77	11.30	142.00	35.00	15.24
	Maximum	137	13.20	164.00	49.00	21.78
16.00	Mean	94.88	12.53	149.37	45.12	20.18
	N	8	8	8	8	8
	Std.Devitation	13.163	1.81575	4.27409	12.26420	5.26824
	Median	90.00	11.9500	149.5000	41.50000	17.7700
	Minimum	83	11.30	143.00	36.00	16.85
	Maximum	122	16.50	156.00	73.00	32.44
Total	Mean	95.28	11.85	145.88	40.24	18.8500
	N	50	50	50	50	50
	Std.Devitation	15.020	1.11578	5.60117	6.80204	2.53527
	Median	90.00	12.0500	146.0000	40.5000	18.6650
	Minimum	71	9.00	135.00	30.00	15.24
	Maximum	137	16.5	164.00	73.00	32.44

of urban Egyptian school students aging 4 to < 15 years old, were  $104.05 \pm 24$  and  $93.26 \pm 18.23$  for normal and anemic children, respectively.

Data in the same table also illustrate means of hemoglobin concentration (Hb). Hemoglobin more than 12 g/dl was observed for the ages of 15 and 16 years old. However, adolescents at ages 12, 13 and 14 years old had Hb means slightly lower than 12 g/dl that ranged from 11.2-11.8 g/dl. The mean Hb level for the sample was  $11.85 \pm 1.11$  g/dl. Blood Hb ranged from 9-16.5 g/dl. It could be also noted that the minimum Hb level was 9.00 g/dl at the age of 14 years. The results obtained were relatively close to reference Hb value. As the Hb concentration ranged 9-16.5 g/dl, none of the adolescents suffered from severe anemia. These results are in the same line with those reported by WHO (1995<sub>a</sub>), which showed that most of the young Egyptian adolescents suffered from mild to moderate level of anemia according to WHO epidemiological criteria.

F test revealed no significant difference between each of IQs scores and Hb levels at different ages, as  $F = 0.669$  and  $1.817$ , respectively.

Regarding means of weights and heights for adolescents under study Table (1) showed that, weights & heights means were increased ascendingly according to their ages. The means of heights were (139.5, 144.2, 145.6, 151.0 & 149.4) and the means of weights were (36.0, 38.6, 39.7, 42.1 & 45.1) at ages 12-16 years, respectively.

F test showed a highly significant difference between mean heights of the adolescents at different ages. However, these differences were not significant between mean weights at different ages as  $F=3.556$  &  $2.298$ , in the same respective order.

In this respect, the National survey in Egypt on adolescents aging 10-19 years old over a period of one year 1997-1998, El-sahn, (2002) reported that the mean

height for boys aging 12, 13, 14, 15 and 16 years old were 143.2, 150.9, 156.4, 160.5 and 166.5 cm, respectively. While, the mean weights accounted to 36.8, 42.2, 47.6, 52.3 and 59.2 kg in the same order.

The obtained results of means of the homeless the adolescents under study showed lower value of heights & weights compared to those of the National survey on adolescents at the same ages. Meanwhile, these values as well as those obtained of the above mentioned National survey were lower than the standard according to the same used reference (WHO, 1995).

Concerning means of BMI for the adolescents under study, Table (1) showed relatively close BMI means for the adolescents at the different ages except at 16 years old. The adolescents at 13 years old had similar mean value of BMI reference (WHO, 1995). In addition the adolescents at age 16 years had mean of BMI (20.18) nearly close to the reference value. Adolescents at ages 14 & 15 years old had lower BMI means than the standards being (18.65 & 18.54), respectively. On the contrary, adolescents at the 12 years old had BMI mean that slightly above the reference value (18.47). The reference value for BMI means were 17.87, 19.22, 19.92 and 20.63 of the adolescents aging 12, 14, 15 and 16 years old, respectively.

F test showed no significant differences between means of BMI at different ages for the adolescents under study. In this concern, El-Sahn, (2002) reported that the means of weights heights and BMI for the adolescents increased ascendingly according to their ages.

Table (2) showed that about two third of the case (68%) were considered stunted. While about one third of them were within normal heights. Most of the stunted adolescents belonged to 14, 15 & 16 years old. On the other hand, these percentages decreased to be 2 and 4% in 12 and 13 years old in respective order. Thus, the majority of normal height cases were found in these ages. It could be also noted that none of the adolescents under study showed above normal height.

**Table 2. Male adolescent's distribution according to their height / age**

Age (Year)	Height / age							
	Stunted (<5 <sup>th</sup> )		Normal (5-95 <sup>th</sup> )		Above Normal Height (>95 <sup>th</sup> )		Total	
	No	%	No	%	No	%	No	%
12	1	2	5	10	---	---	6	12
13	2	4	7	14	---	---	9	18
14	18	36	3	6	---	---	21	42
15	5	10	1	2	---	---	6	12
16	8	16	---	---	---	---	8	16
Total	34	68	16	32	---	---	50	100

In this concern, the nutrition status assessment of preparatory school children in Ismailia Governorate by Abd El-Ghany (1998) revealed that 25% of the boys were stunted. While Baba et al (1991) found that 38% of public school children were stunted, while only 10.55% of private school children were so stigmatized, Stunting is the result of chronic under nutrition over a long period of time [Egypt Demographic & Health Survey (EDHS), 1992]. The height for age indicator reveals long standing under nutrition that needs a long time to be corrected

From table (3), it is obvious that all adolescents at ages 12 and 13 years old were within normal weight /age. Most of these cases with normal weight /age were at 14 years old. However, all the cases having under weight/ age were seen at the ages of 14, 15 and 16 years.

The weight for age indicator is much more sensitive to the current status of nutrition. It seems that adolescents had been subjected to a long standing malnutrition that might have been partially corrected by the ongoing rehabilitation center feeding program.

In this respect, Aly (1996) examining school children in Giza Governorate found that none of her cases suffered from under nutrition. However, Soliman (1994) reported that 3.2% of the sample demonstrated the prevalence of under nutrition. While, this percent

was 11%for boys in preparatory school in Ismailia Governorate (Abd El-Ghany, 1998).

From table (4) and Fig (1) it could be noticed that the majority of adolescents under study (84%) had normal BMI. While, 14% of them were blow the normal BMI and only one case considered obese, representing 2%. In addition, data demonstrated that all the young adolescents aged 12 and 13 years old had normal BMI. The very small minority of adolescents (14-16 years old) showed lower BMI compared to their counterparts with normal BMI. None of them could be considered at risk of obesity (over weight). Such findings might be ascribed to affect of devoted nutrition and physical care to the adolescents in the rehabilitation center.

From table (5) and Fig (2) it could be noticed that fifth of adolescents sample (20%) had above average and superior levels of IQs score. While, 46% of the adolescents had IQs scores within the average level. However, 34% of them showed IQ score below the average. UNICEF (2001) reported that children resident of governmental institutions have a higher degree of psychosocial adjustment than those children who reside on the street. Such findings draw attention to the importance of children's rehabilitation in Governmental care centers and its role in adjusting the psychosocial status of homeless children.

**Table 3. Male adolescent's distribution according to their Weight/age**

Age (Year)	Weight / age							
	Under weight (<5 <sup>th</sup> )		Normal (5-95 <sup>th</sup> )		Over weight (>95 <sup>th</sup> )		Total	
	No	%	No	%	No	%	No	%
12	---	---	6	12	---	---	6	12
13	---	---	9	18	---	---	9	18
14	8	16	13	26	---	---	21	42
15	4	8	2	4	---	---	6	12
16	5	10	3	6	---	---	8	16
Total	17	34	33	66	---	---	50	100

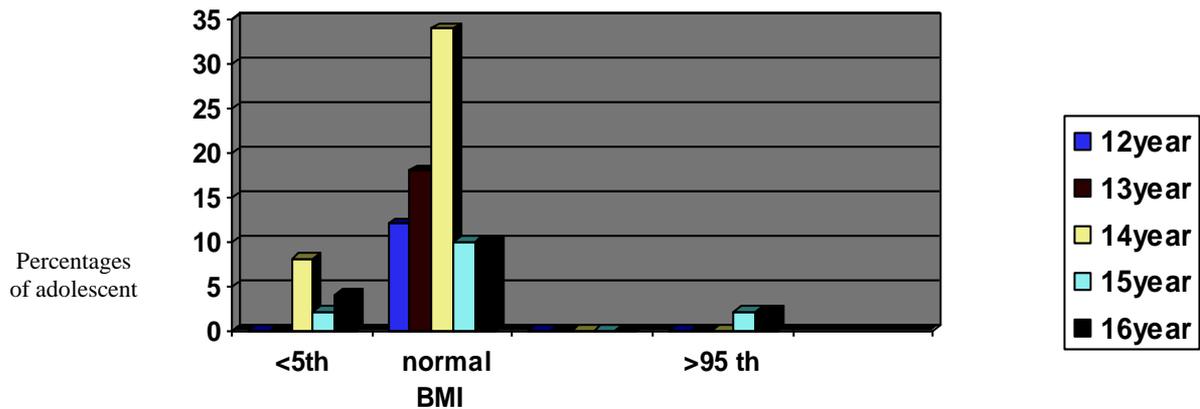
Data also demonstrated that none of the adolescents under study at the different ages exceeded the normal weight / age.

**Table 4. Male adolescent's distribution according to their age and body mass inbox (BMI)**

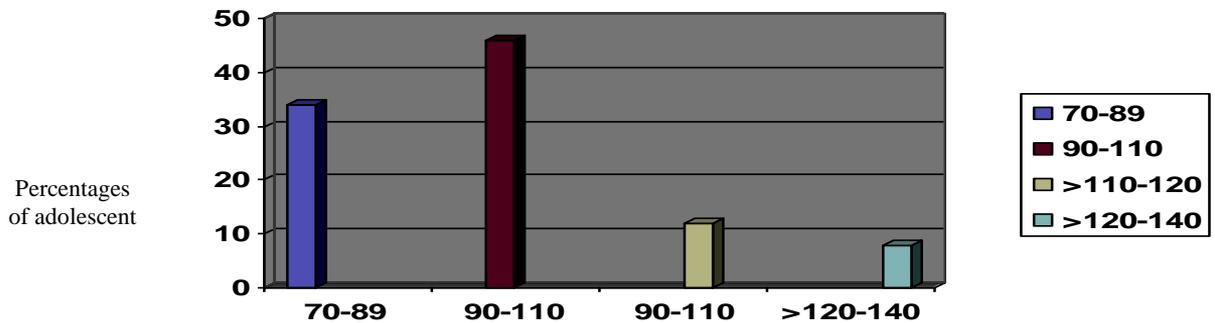
Age	Body mass inbox(BMI)									
	Blow Normal (<5 <sup>th</sup> )		Blow Normal (5 <sup>th</sup> < 85 <sup>th</sup> )		At risk of obesity (85-< 95 <sup>th</sup> )		Obese (≥ 95 <sup>th</sup> )		Total	
	No	%	No	%	No	%	No	%	No	%
12	---	---	6	12	---	---	.....	.....	6	12
13	---	---	9	18	---	---	.....	.....	9	18
14	4	8	17	34	---	---	.....	.....	21	42
15	1	2	5	10	---	---	.....	.....	6	12
16	2	4	5	10	---	---	1	2	8	16
Total	7	14	42	84	---	---	1	2	50	100

**Table 5. Male adolescent's distribution according to their intelligence quotients**

Grades of I.Q test	No	%
Below average (70-89)	17	34
Average (90-110)	23	46
Above Average (111-120)	6	12
Superior	4	8
Total	50	100



**Figure 1. Adolescents distribution according to their BMI**



**Figure 2. Adolescents distribution according to their IQs**

Data in table (6) and Fig (3) revealed that nearly half of the cases had hemoglobin (Hb) levels less than 12g /dl. While, the level of Hb for the remaining cases were  $\geq 12$ g/dl. The mean Hb level was  $11.85 \pm 1.11$  g/dl. Blood hemoglobin concentration ranged from 9 to 16.5 g/dl.

The mean Hb level was relatively close to the mean hemoglobin Concentration for Costarican adolescents aged (10-16) years old which  $12 \pm 1.0$  g/dl was. The result in this study also revealed high prevalence of anemia (57%) in the adolescent (Monge –Rojas et al,2005)

Data in table (6) also illustrate mean and standard deviation of total iron binding capacity (TIBC) and Serum iron .the mean value of TIBC for adolescents and the mean value of serum iron were within- normal range .IT could be also noticed from table (6) that the majority

of adolescents (90 and 94%) had normal levels of TIBC and serum iron , respectively .While a small percent of them (8 and 2%) had below normal levels of TICB and serum iron in respective order .Meanwhile, a very limited number of them (one case) representing 2% had TIBC above 4.2 mg/L and 2 cases of them (4%) showed serum iron level exceeding 1.6mg/L. The ranges were 0.4-4.8 mg/L for TIBC and 0.4-2.6mg/L for serum iron.

Concerning correlation coefficients among some variable (Hb, age time o residence in care center and serum iron) were illustrated in table (7). There are significant correlation between Hb and each of age and time of residence ( $P < 0.05$ ). However, serum iron was highly significantly correlated with Hb ( $P < 0.01$ ) and significantly correlated with the time of residence in care center ( $P < 0.05$ ).

**Table 6. Male adolescent's distribution according to hematological indices**

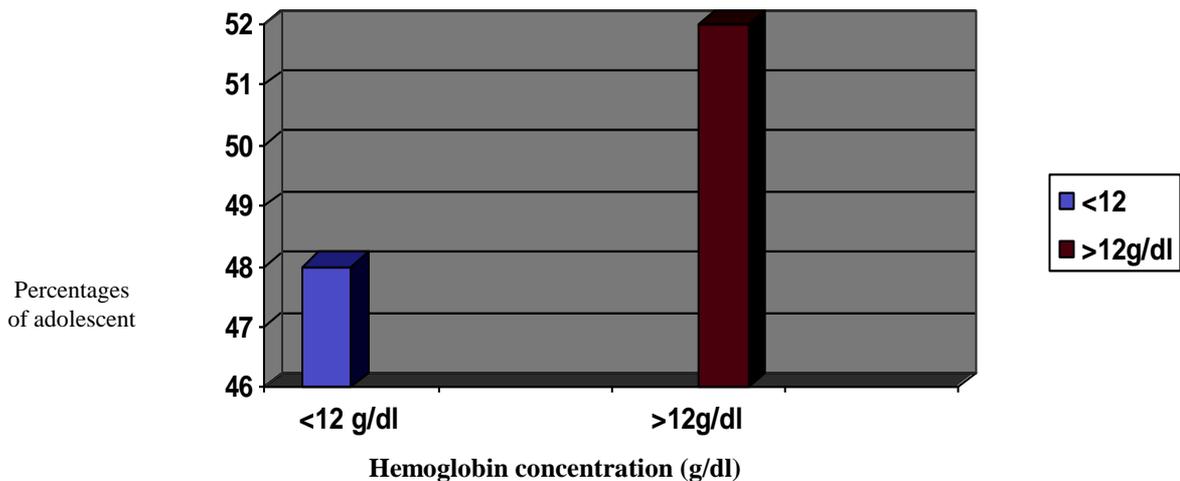
Item	No	%
<b>1) Hemoglobin (g/dl)</b>		
<12	24	48
>12	26	52
<b>Total</b>	<b>50</b>	<b>100</b>
<b>Mean <math>\pm</math> SD</b>		11.85 $\pm$
<b>Range</b>		9-16.50
<b>2) Total iron binding Capacity (mg/L)</b>		
< 2.5	4	8
Normal (2.5- 4.2)	45	90
> 4.2	1	2
<b>Total</b>	<b>50</b>	<b>100</b>
<b>Mean <math>\pm</math> SD</b>		3.02 $\pm$ 0.60
<b>Range</b>		0.4 - 4.8
<b>3) Serum iron (mg/ L)</b>		
<0.6	1	2
Normal (.06-1.6)	47	94
>1.6	2	4
<b>Total</b>	<b>50</b>	<b>100</b>
<b>Mean <math>\pm</math> SD</b>		1.18 $\pm$ 0.35
<b>Range</b>		0.4- 2.6

**Table 7. Correlation coefficient among some variables**

	HB	IQ	AGE	Time of residence in care center	Serum iron
<b>HB</b>					
<b>IQ</b>	-.020				
<b>AGE</b>	.333*	.153			
<b>Time of residence in care center</b>	.311*	.104	.191		
<b>Serum iron</b>	.368**	.186	.055	.312*	
<b>TIBC</b>	-.131	-.156	.210	-.088	-.202

\* Correlation is significant at the 0.05 level

\*\* Correlation is Significant at the 0.01 level

**Figure 3. Adolescents distribution according to hemoglobin concentration (g/dl)**

Concerning the relationship between Hb concentration and age, Al -Sharbitti et al. (2003) showed that age was significantly correlated with Hb concentration of male adolescents two distinct socio – economic areas.

The correlation between the time of residence and each of Hb and serum iron revealed the importance of residence in rehabilitation care center as both health and nutrition would be provided to the adolescents the longer time of residence the better serum iron and Hb level were observed .

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## الملخص العربي

### المقاييس الأنتروبومترية ومؤشرات الدم وحاصل الذكاء لدى المراهقين بدار التربية- محافظة الجيزة

غادة مجدى إبراهيم الخرباوى

كما أن أغلبية المراهقين موضوع الدراسة (84%) كانوا في الحدود الطبيعية بالنسبة لمؤشر كتلة الجسم. وفيما يتعلق بدرجة تركيز الهيموجلوبين بالدم، فقد كانت النتائج التي تم التوصل إليها قريبة نسبيا من المرجعية القياسية لقيمة الهيموجلوبين في الدم (متوسط مستوى الهيموجلوبين = 11.8 جرام/ ديسيليلتر). وكان معظم المراهقين (90% و 94%) لديهم معدلات طبيعية من إجمالي طاقة استيعاب الحديد ومعدل الحديد في مصل الدم على التوالي. وقد كان متوسط حاصل الذكاء 95.28 بانحراف معيارى قدره + 15.02 وهو ما يعتبر قريبا من المعدل الطبيعي لاختبار الذكاء المستخدم. ولوحظ وجود علاقات ذات دلالة معنوية بين مدة الإقامة في مركز إعادة التأهيل وبين كل من درجة تركيز الهيموجلوبين ومعدل الحديد في مصل الدم.

لقد تم تقييم المقاييس الأنتروبومترية (الطول/ العمر، والوزن/ العمر ومؤشر كتلة الجسم) وحاصل الذكاء (أى النقاط التي تم إحرازها في اختبار الذكاء) وبعض المؤشرات المتعلقة بالدم (الهيموجلوبين وإجمالي طاقة استيعاب الحديد ومعدل الحديد في مصل الدم) بالنسبة لعدد خمسين من المراهقين الذكور المقيمين في " دار التربية " في الجيزة وهى إحدى مراكز إعادة التأهيل، والذين تتراوح أعمارهم ما بين 12 و 16 سنة.

وقد أوضحت الدراسة أن حوالى ثلثى هذه الحالات (68%) كانت تعاني من قصر القامة (التقزم) . فبينما كان 34% منهم أقل من الوزن الطبيعي بالنسبة للعمر ، فإن أحدا من هؤلاء المراهقين لم يكن أكثر من المعدل الطبيعي بالنسبة الطول/ العمر أو الوزن/ العمر ، طبقا للمرجعية القياسية التي وضعتها ("منظمة الصحة العالمية عام 1995).