

Anthropometric and cardiac function difference between children from orphanage and children with wards

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Short running title: Cardiac function and Anthropometry in orphans

Abstract

Does, being an orphan affect the anthropometric characteristics and cardiac function of an individual? The aim was to assess the anthropometry in terms of height (cm), weight (kg), chest circumference (cm) and body mass index (BMI) (Kg/m²); and to assess the cardiac function by recording heart rate (bpm), blood pressure (mmHg) and rate-pressure product before and after exercise. This comparative study was carried out on orphans in a residential school of Bagalkot. 30 apparently healthy orphan boys aged between 7-17 years were included in the study. They were matched with equal number of boys with wards in the same residential school. Height (cm), weight (kg) chest circumference (cm) and BMI (Kg/m²) were recorded as physical anthropometric parameters. Heart rate (bpm), blood Pressure (mm Hg) and rate-pressure product were recorded before and after exercise. The parameters were analyzed by Student t test. Weight, BMI and chest circumference were all lower in orphans, but the difference in chest circumference was not statistically significant. Rate –pressure product after exercise which directly depicts the myocardial functioning, was also lower in orphans, as compared to controls, although not statistically significant. It can be concluded that the orphans are deprived of their normal anthropometry and cardiac function and hence, a step in this regard has to be put forward, to help these innocent ones to combat the emotional disturbances, which could be the route cause.

Key-words: Orphans, anthropometry, rate-pressure product, myocardial function
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Introduction

Does, being an orphan, affect the anthropometric characteristics and cardiac function of an individual? Foster care Institutions in the developing countries function importantly in protecting and caring for children who are orphaned, abandoned, abused or placed under state probation [1]. Exercise testing elicits the body reaction to measured increases in acute exercise. The changes in heart rate, blood pressure and perceived level of exertion provide data that permit quantitative estimation of cardiovascular functioning and conditioning [2]. Rate-pressure product (RPP) is the product of heart rate and systolic blood pressure (SBP). It is an important indicator of ventricular function, which is also called as Robinson index [3]. Heart rate and blood pressure are indices of parallel changes in coronary blood flow (CBF) and in maximum oxygen consumption (MVO₂) [4].

Anthropometry is used to characterize growth patterns. Growth patterns may be affected by nutrition in children and also non-nutritional causes like emotional insecurity. They are important in developing interventional programmes [5].

This study was taken up as review of literature reveals less data on cardiac functioning and anthropometry in orphans. The objectives were :

- to assess the anthropometry in terms of height (cm), weight (kg), chest circumference (cm) and body mass index (BMI) (Kg/m²); and
- to assess the cardiac function by recording heart rate (bpm), blood pressure (mmHg) and rate-pressure product before and after exercise

Material and Methods

This is a comparative study done in residential school of Bagalkot involving thirty apparently healthy orphan boys aged between 7-17 years (Cases), who were matched with equal number of boys with wards (Controls) in the same residential school. Ethical clearance was obtained from the institution. Informed consent was obtained from the school authority. Children with history of any systemic illnesses or disorders were excluded from the study. Height (cm), Body weight (kg), and Chest circumference (cm) were recorded. BMI (kg/m²) was calculated. Heart rate (HR) and Blood Pressure (BP) were recorded in a resting state (before exercise). Electrocardiogram (ECG) in Lead II was taken using an ECG machine (Cardiart), R-R interval measured and heart rate calculated. Blood pressure was recorded using a mercury sphygmomanometer (Diamond). Heart rate and blood pressure were also recorded after exercise (Queen's college step test) [6]. Rate-Pressure Product was calculated [3]. Data was presented as Mean \pm S.D.

Statistical analysis was done by student's t-test. P value < 0.05 was considered statistically significant.

Results

The distribution of cases and controls is depicted in Fig-ure 1. The anthropometric characteristics are shown in table 1 and figure 2. Height, weight, BMI and chest circumference were all lower in orphans, but the differences in height and chest circumference were not statistically significant. The cardiovascular parameters before and after exercise are shown in table 2 and figure 3. Rate – pressure product after exercise which directly depicts the myocardial functioning, was also lower in orphans, as compared to controls, although not statistically significant.

Table 1. Anthropometric characteristics

Characteristics	Cases (n = 30)	Controls (n = 30)	t- value	P-value
Height (cm)	138 \pm 10.6	143 \pm 14.13	1.5	>0.05
Weight (kg)	28 \pm 5.6	32.8 \pm 9.7	2.4	<0.05*
BMI (kg/m ²)	14.4 \pm 1.5	15.5 \pm 2.3	2.2	<0.05*
Chest circumference (cm)	60.5 \pm 5	62.4 \pm 6	1.35	>0.05

*significant p<0.05

Table 2. Cardiovascular parameters before and after exercise

	Before exercise (resting)				After Exercise			
	Cases	Controls	t	p	Cases	Controls	t	p
Heart rate (bpm)	93.5 \pm 11.6	90.5 \pm 11.5	1	>0.05	108.7 \pm 11.4	105.7 \pm 13.3	0.94	>0.05

SBP (mmHg)	107.6±7.7	107.4±7.5	0.1	>0.05	122.2±8.97	122.2±8.2	0	>0.05
DBP (mmHg)	62.4 ±8.4	65.6 ±10.1	1.36	>0.05	61.6±9.22	63.0±7.94	0.6	>0.05
RPP	10.13±1.38	9.69 ±1.2	1.2	>0.05	13.24±2.02	12.93±1.92	0.6	>0.05

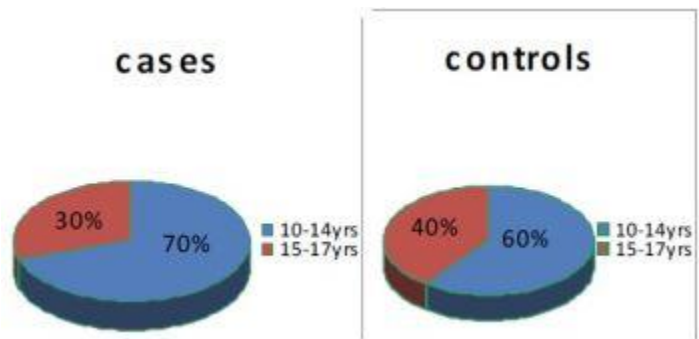


Figure 1. Distribution of cases and controls

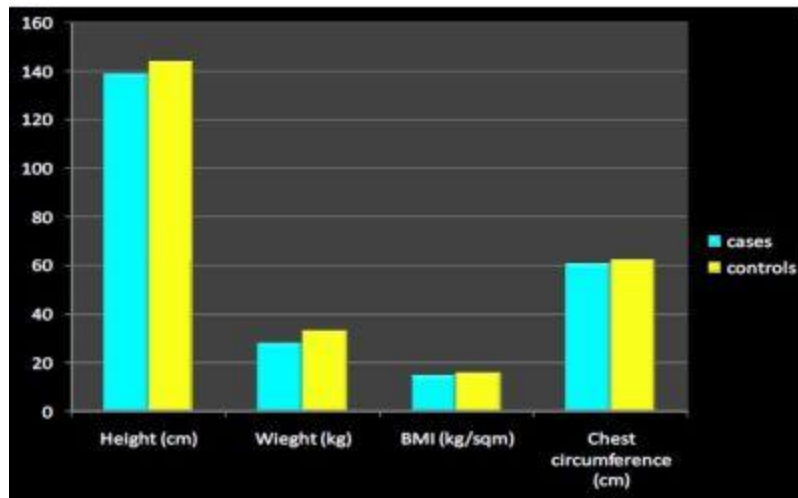


Figure 2. Anthropometric characteristics

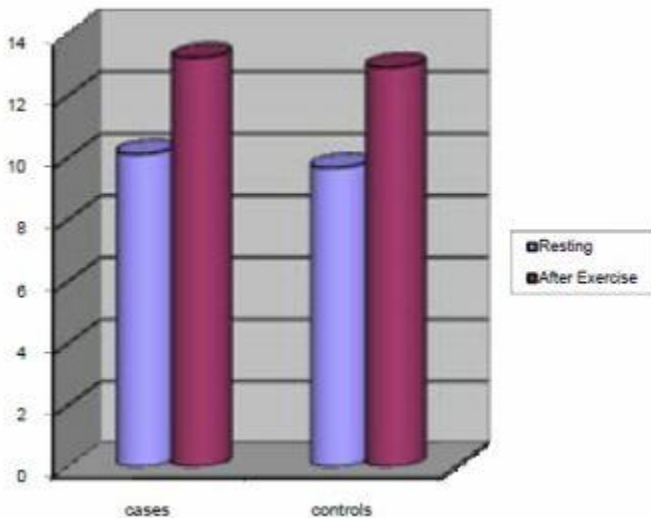


Figure 3. RPP before and after exercise

Discussion

This comparative study was done to assess the anthropometry and cardiovascular functioning of orphans and thereby, take necessary steps in this regard. It is a well-known fact that height and weight of a child are the indices of development [5] and so is the importance of body mass index (BMI). Results of the present study showed that the orphan boys have poor BMI, and weight as compared to their counterparts, which was similar to a previous study [1] and this could be due to lower primary attachment figures (parents and guardians) and often traumatic histories of the children, which could have hampered their growth [1].

Rate pressure product (RPP) after exercise, which directly depicts myocardial functioning, increases after exercise due to increase in sympathetic discharge [3]. RPP increased in our study in both the groups, but the percentage increase in orphans was less as compared to controls, although not statistically significant, signifying poor myocardial functioning.

Therefore, this study shows the urgency to improve the growth and development of orphans who are the innocent victims of unknown fault, by emphasis on regular health monitoring, frequent and effective social interaction between children and care givers.

The limitations of this study was the less sample size – this could be the reason for not getting a statistically significant difference in height, chest circumference or the rate pressure product, although they were lower in orphans as compared to controls.

It can be concluded that the orphans are deprived of their normal anthropometry and cardiac function and hence, a step in this regard has to be put forward, to help these innocent ones to combat the emotional disturbances, which could be the route cause.

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