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Research Article

Anthropometric Profile of Type1 Diabetic Children (Aged 7-12years) of Ajmer City of Rajasthan (India)

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Abstract

Anthropometric parameters have been widely used as reliable indicators for predicting the incidence of diabetes mellitus in children. Growth parameters are important indicators of a child's overall health and growth patterns, and they are influenced by factors like blood glucose levels in diabetic children. A number of studies have shown correlations between anthropometry and other metabolic disorders. Various studies have shown that anthropometric parameters such as height, weight, BMI, waist circumference (WC), waist hip ratio (WHR), and waist height ratio (WHR) are useful indicators for predicting incidence of type I diabetes. This study aims to study the health status and growth pattern of diabetic children using anthropometric measurements.

Keywords: Anthropometry; Diabetic children; Type1 Diabetes; BMI

Introduction

Diabetes Mellitus is the most common endocrine disorder of glucose intolerance in children which is now becoming a global health problem. It is also known as Insulin-dependent Diabetes Mellitus leading to increased risk of cardiovascular diseases, Hyperglycaemia hypertension and dyslipidemia in children. Type I diabetes may develop due to genetic, environmental and immunological factors leading to the destruction of beta cells of islets of langerhans of pancreas. Type I diabetes affects the physical and mental growth of children and hence monitoring of glucose levels becomes an integral part of treatment. Assessment of nutritional status becomes necessary to determine the severity of the disease. To evaluate the nutritional status of subjects various screening methods have been developed like: (i) assessing clinical signs and symptoms, (ii) biochemical indicators (iii) dietary survey and (iv) anthropometric measurement Anthropometry is the best method of assessing the nutritional and health status of children as it provides the detailed information regarding the different components of body structure, especially muscular and fat components. Calculation of BMI (Body mass index) is considered as a good indicator and is used for the assessment of energy metabolism. BMI is correlated with fat and fat-free mass and so the protein and fat reserves of the body can be estimated [1-6].

Objectives of the study

- To assess the anthropometric profile of children suffering from Type 1 diabetes mellitus
- To assess the BMI of children suffering from diabetic subjects
- To assess the health status of diabetic children.

- Comparison of anthropometric data of juvenile diabetic children with IAP and WHO standards.

Materials and Methods

Inclusion criteria:

This study included children of age group 7-12 years with confirmed cases of type 1 diabetes. An approval from the Institutional ethical committee was taken for the present research work. The consent was obtained from parents/guardians of the juvenile diabetic patients for obtaining the information regarding the study.

Selection of samples

The study was carried at various diabetic clinics of the Government and private hospitals of Ajmer City. A total of 100 Patients were enrolled from the patient population who attended the outpatient clinic of Diabetology, were included in the study. 50 boys and girls of age group 7-9 years (Group A) and another group of 50 boys and girls of age group 10-12years (Group B) were selected for the study.

After the selection of the samples the height, weight, MUAC, head circumference and waist circumference were measured and the data was compared with the WHO and IPA standards to see whether growth is affected by diabetes. The BMI of the juvenile diabetic subjects was calculated based on the height and weight of the child and the formula used for the calculation was

BMI = weight in kilograms/[height in meters x height in meters]

Review of related literature

Khadilkar Khadilkar., *et al*. conducted a study to see the Growth status of children and adolescents with type 1 diabetes mellitus found that Mean age of diabetic children and age gender matched controls was 9.7 ± 4.4 years. Diabetic children were shorter (128.3 ± 24.3 cm vs. 133.6 ± 24.7 cm) and lighter (29.2 kg ± 15.3 vs. 31.3 ± 15.4 kg). HAZ (-1.1 ± 1.2 vs. -0.2 ± 0.8) and WAZ (-1.2 ± 1.3 vs. -0.7 ± 1.3) were significantly lower in diabetic children ($P < 0.05$). Children on both insulin regimes (intensive and conventional) were shorter than controls (HAZ-intensive -1.0 ± 1.0, conventional -1.3 ± 1.3, control -0.2 ± 0.8, $P < 0.05$). HAZ of children who were diagnosed at <3 years of age was the least (-1.6 ± 1) amongst all diabetic children while those diagnosed after puberty (> 14 years) were comparable to healthy controls. They concluded that growth was compromised in diabetic children in comparison to controls. Children diagnosed at younger age need more attention to optimize growth.

Dr Arslanian, Menon., *et al*. conducted a study to evaluate growth hormone binding protein (GHBP) levels in newly diagnosed patients with Type 1 diabetes before and after insulin therapy and to determine the relationship of GHBP to glycaemic control, C-peptide level and blood pH. GHBP, expressed as a percentage of GH bound, was determined in 33 patients with Type 1 diabetes found that circulating GHBP is low in newly diagnosed patients with Type 1 diabetes, and increases after 3 months of insulin therapy but does not normalize and (2) the severity of biochemical derangement and residual β-cell function at diagnosis may determine GHBP status and its recovery and that insulin is an important modulator of GH binding protein in newly diagnosed children with Type 1 diabetes.

Youth-onset type 2 diabetes is an emerging disorder in children, adolescents, and young adults with unique challenges in both research and clinical care. The duration of diabetes and glycemic control are closely associated with the development of microvascular complications in type 1 diabetes and in adult-onset type 2 diabetes. However, evidence of microvascular complications and risk markers for macrovascular complications are often present at the time of diagnosis of type 2 diabetes in youth. At enrolment into the present study, 14% of participants had a blood pressure at the 95th percentile or greater, 13% had microalbuminuria, 80% had a low HDL cholesterol level, and 10% had high triglycerides.

Results and Discussion

The present study was done to assess the anthropometric profile of juvenile diabetic subjects aged 7-12 years. For the present study confirmed juvenile diabetic subjects were selected for the study and were divided into two groups according to their age i.e., 7-9 and 10-12 years. The results of the study are discussed below.

To assess the anthropometric profile of children height, weight, mid upper arm circumference and head circumference measurements were taken of the diabetic subjects. In group A (7-9 years) the mean height of boys was 124.33cms and that of girls was126cms and the same age group the mean weight of girls was 25.66 kg and that of boys was 26,33kgs Table 4.1 and 4.2 shows the comparison of height and weight of diabetic children with WHO

and IPA standards. On the other hand the mean height of boys in the age group 10-12 years was 148cms and it was same for the girls too, the mean weight of the boys in the same age group was 39kgs and that of girls was 39.8kgs.. The BMI of the diabetic children was also calculated on the basis of the height and weight, the mean BMI of boys in the age group 7-12 years was15.05 and of girls was 16.35. The mean BMI of children in the age group 10-12 years was 14.10 (boys) 14.69 (girls). The mean BMI of children in both the age groups was within the normal range.

In the present study when the anthropometric data of the juvenile diabetic was compared and analyzed with the WHO and IPA standards it was observed that there was no significant difference in the growth parameters of the juvenile diabetic subjects hence it can be concluded from the present study that Type 1 Diabetes does not affect the growth and health status of diabetic children.

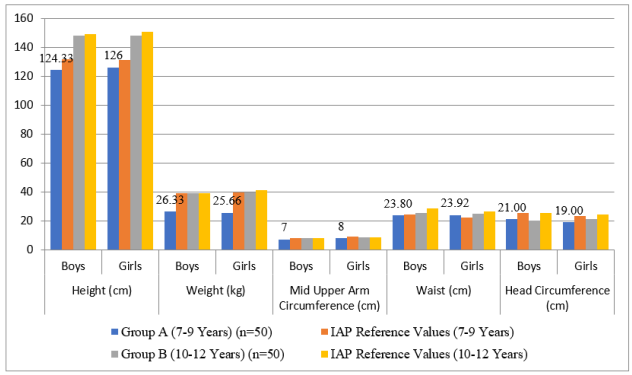

Figure 1

Mean Anthropometric Data		Group A (7-9 Years) (n = 50)	IAP Reference Values (7-9 Years)	Group B (10-12 Years) (n = 50)	IAP Reference Values (10-12 Years)
Height (cm)	Boys	124.33	131.8	148.4	149
	Girls	126	131.4	148.4	151
Weight (kg)	Boys	26.33	39	39	38.9
	Girls	25.66	39.8	39.8	41.1
BMI (kg/m2)	Boys	15.05	18-25	14.10	18-25
	Girls	16.35	18-25	14.69	18-25
Mid Upper Arm Circumference (cm)	Boys	7	8.25	8	8
	Girls	8	9.25	8.5	8.5
Waist (cm)	Boys	23.80	24.50	25.45	28.50
	Girls	23.92	22.50	24.97	26.50
Head Circumference (cm)	Boys	21.00	25.50	20.00	25.25
	Girls	19.00	23.50	21.00	24.50

Table 1: Anthropometric data of juvenile diabetic subjects with reference to IAP standards 2015.

Anthropometric Data		Group A (7-9 Years) (n = 50)	WHO Reference Values (7-9 Years)	Group B (10-12 Years) (n = 50)	WHO Reference Values (10-12 Years)
		Mean			
Height (cm)	Boys	124.33	133	153.21	149
	Girls	126	133	145.5	151
Weight (kg)	Boys	26.33	28.1	33	38.9
	Girls	25.66	28.2	31	41.1
BMI (kg/m2)	Boys	15.05	18-25	14.10	18-25
	Girls	16.35	18-25	14.69	18-25
Mid Upper Arm Circumference (cm)	Boys	7	8.5	8	8
	Girls	8	9.5	8.5	8.5
Waist (cm)	Boys	23.80	25.50	25.45	28.50
	Girls	23.92	24.50	24.97	26.50
Head Circumference (cm)	Boys	21.00	23.25	20.00	25.25
	Girls	19.00	22.50	21.00	24.50

Table 2: Anthropometric Data of Juvenile Diabetic Subjects with Reference to Who Standards 2015.

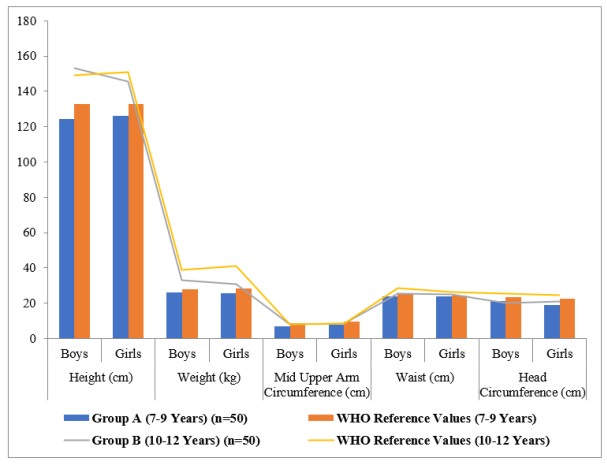

Figure 2

Summary and Conclusion

The rising incidence of type 1 diabetes in young children is affecting mostly the poor and becoming a threat to the health systems in most developing countries. Most children who develop diabetes at a early age are more at risk of developing long-term complications. Therefore continuous monitoring and medical care of patient is required in order to prevent further acute complications. Growth monitoring of diabetic children is an integral part of diabetic management and hence it becomes essential to keep a regular check on the anthropometric profile of children to avoid further complications and health status of diabetic children.

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