Original article

Efficacy of nutrition counseling in young people with diabetes

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Abstract. *Aim:* The aim of this study is to investigate if a non-prescriptive diet plan in young children with type 1 diabetes mellitus is unfavourable in comparison with classic prescriptive diet plan, paying particular attention to glycemic control, lipid profile and body mass index. *Methods:* We carried out a longitudinal and 8-year retrospective study based on a well-defined cohort of children aged < 18 years with type 1 diabetes followed-up every three months from our Unit beginning from 1999 to 2007. The study included a total of 49 patients with type 1 diabetes aged 16–19 years, the mean duration of diabetes was 13 ± 4 years. During the study all the patients continued to receive flexible multiple daily injection insulin therapy according to basal-bolus plan. In order to investigate the lipid profile we collected total cholesterol, LDL, HDL and triglyceride levels once a year and to asses the metabolic control in diabetic patients, blood samples were collected for assay of HbA1c every three months all years during the study. *Results:* No abnormalities about lipid profile were observed during the analysed years. LDL, HDL, total cholesterol and triglyceride values were normal and their trend was uniform and lower than the normal range of general people. *Conclusions:* These outcomes showed no differences between diabetics and normal people at risk to develop metabolic alterations. Non-prescriptive diet plan in children with insulin dependent diabetes mellitus is not unfavourable in comparison with classic prescriptive diet-plan, in particular with regard tos the metabolic control which reflect the international data of reference. (www.actabiomedica.it)

Key words: Metabolism, diabetes, glycemic control, BMI, diet

Introduction

Nutrition is a basic element of the therapy in diabetic children together with insulin and regular physical activity. LARN (Recommended Levels of Nutrients for Italian people) recommendations underline that the traditional Mediterranean diet meets all the criteria for a healthful alimentation (1). A diet for diabetic children (2-5) proposes a set of goals. The diet goals for diabetic children are intended to: (1) achieve and maintain normal blood glucose levels; (2) achieve and maintain a desirable blood lipid profile; (3) get a good nourishing plan; (4) keep healthy body weight. These goals may be achieved by (1) improving intakes of fibre and carbohydrate (2) restricting dietary fat, in particular saturated fat. The American Diabetes Association (ADA) affirms that the nutritional recommendations are proper for both general people and people with type 1 diabetes mellitus. Unlike general people the population with insulin dependent diabetes must adapt insulin therapy with their lifestyle (6-8). American Dietetic Association and the Dieticians of Canada concluded that an appropriately planned vegetarian diet is healthful, nutritionally adequate and provides health benefits as in the prevention and treatments of certain disease. Some studies suggest that diets rich in vegetables and fruits reduce the risk for type 2 diabetes, so vegetarian diets can meet guidelines for the prevention and treatment of diabetes (9-12).

The nutritional family counselling and involvement of all components of family is a critical step of strategy of our Diabetes Unit for Children and Adolescents to improving diet and lifestyle in diabetic patients (13-17). The model introduced is based on LARN and

Mediterranean nutritional tradition (18). It proposes a plant-based diet rich in a variety of vegetables, fruits, legumes typical of the centre of Sicily, limiting red and white meat consumption, and the exclusive use of olive oil instead of animal fat to dress foods.

Aim

Considering these preliminary remarks the aim of our study is to investigate if the non-prescriptive diet plan in young children with insulin dependent diabetes mellitus is unfavourable in comparison with classic prescriptive diet-plan, paying particular attention to glycemic control, lipid profile (LDL, HDL, triglycerides and total cholesterol) and body mass index (BMI) (19-24).

Research design and methods

We carried out a longitudinal and 8-year retrospective study based on a well-defined cohort of children aged < 18 years with type 1 diabetes followed-up every three months from our Unit beginning from 1999 to 2007. The study included a total of 49 patients (30 M; 19 F) with type 1 diabetes aged 16–19 years at the end of the study (mean age at 2007 17.4 yrs): the mean duration of diabetes was 13 ± 4 years (Table 1). The treatment schedule included 4 controls in fasting conditions every year. During the study all the patients continued to receive flexible multiple daily injection insulin therapy according to the basal-bolus plan. In particular from 1999 to 2001 regular insulin + NPH insulin, then regular insulin or rapid acting insulin analogue + NPH insulin; since 2001 regular insulin or rapid acting analogous at meal time + low acting insulin analogue, glargine prevalently. We evaluated the state of nutrition estimating BMI (Kg/m²) of each patient every three months.

Lipid profile

In order to investigate the lipid profile of each patient we collected total cholesterol, LDL, HDL and triglyceride levels. Blood samples to test lipid were collected once a year in the morning before breakfast.

Body Mass Index (BMI)

We evaluated the state of nutrition estimating BMI (Kg/m²) of each patient every three months.

BMI growth curve of each patients was compared to growth curves promoted by SIEDP/ISPED to pediatric people (2-20 yrs) of Southern Italy and Islands. The BMI achieved values were expressed as middle values both to age and sex and these were compared to relative 50° percentile. At the end we compared middle percents of BMI between males and females (25).

Glycated Hemoglobin values (HbA1c)

In order to asses metabolic control in diabetic patients, blood samples were collected for assay of HbA1c every three months all years during the study.

From 1999 to 2007 the HbA1c normal range varied according to several scientific methods of research: from 1999 to 2001 immunoturbidimethric method ROCHE Cobas Integra (normal range: 4,4-6,4); from 2002 to 2005 Bayer DCA 2000+ (normal range: 4,5-5,7); 2006-2007 immunoturbidimethric method ROCHE Cobas Integra corrected (normal range 2,9-4,2). In order to obtain a longitudinal analy-

Table 1. Characteristics of patients

Characteristics of patients	Tot	M	F	P
N. patients	49	30	19	
Age (2007)	17,4	16,5 ± 5,45	18,9 ± 4,23	NS
Mean duration of diabetes (2007)	13 ± 4	13 ± 2,5	14 ± 2,79	NS
Mean percent differential data with reference to higher limit of HbA1c normal range per year.	18,83 ± 6,03	19,7 ± 3,15	21,5 ± 6,5	NS

sis from 1999 to 2007, the HbA1c values were expressed as mean per cent differential data with reference to higher limit of HbA1c normal range per year.

Results and discussion

Characteristics of the patients participating in each assessment are shown in table 1. No difference between the two groups (males and females) involving age, mean duration of diabetes and mean percent differential data with reference to higher limit of HbA1c normal range per year nor abnormalities about lipid profile during the collected years are present (table 2; fig. 1). LDL, HDL, total cholesterol and triglyceride values were normal and their trend was uniform and lower than the normal range of general people (26). These outcomes showed no differences between diabetics and normal people at risk to develop metabolic alterations. Therefore diabetes is not an independent risk factor of developing long-term metabolic alterations to our patients (27-30).

We evaluated the trend of glycemic profile by means of HbA1c per cent difference with reference to higher limit of normal range to years (Fig. 2).

Longitudinal analysis showed that mean different percent HbA1c total value was 18%, ranged between highest value (25%) during 2002, 2003, 2004 and lowest value (6%) during 2001. Mean HbA1c female longitudinal data was lower than male HbA1c data during 1999 (15% vs 10%; P = 0,01) and 2000 (19% vs 16%; P = 0,01) (Fig. 3). During 2001, 2002, 2003 female patients presented higher HbA1c value than male patients, respectively 2001 (20% vs 24% ; P = 0,01); 2002 (19% vs 26% ; P = 0,01); 2003 (22% vs 32%; P = 0,01). A negligible difference existed be-

Table 2. Lipid profile

Year	tot. col	min-max	tg	min-max	ldl	min-max	hdl	min-max
1999	187	(139-257)	79	(51-127)	126	(76-249)	53,6	(32-74)
2000	188	(112-253)	75	(19-235)	112	(41-194)	58,6	(36-88)
2001	180	(117-251)	81	(26-205)	82	(40-102)	65	(33-115)
2002	179	(11-240)	83	(26-495)	92	(34-141)	79	(34-422)
2003	179	(101-270)	80	(29-242)	102	(53-204)	68	(30-119)
2004	176	(57-316)	83	(34-556)	98	(49-230)	70	(35-129)
2005	160	(118-210)	56	(32-499)	95	(55-153)	68	(41-110)
2006	163	(99-249)	75	(40-526)	98	(54-153)	65,5	(40-115)
2007	162	(120-208)	65	(30-161)	100	(51-182)	67	(26-98)

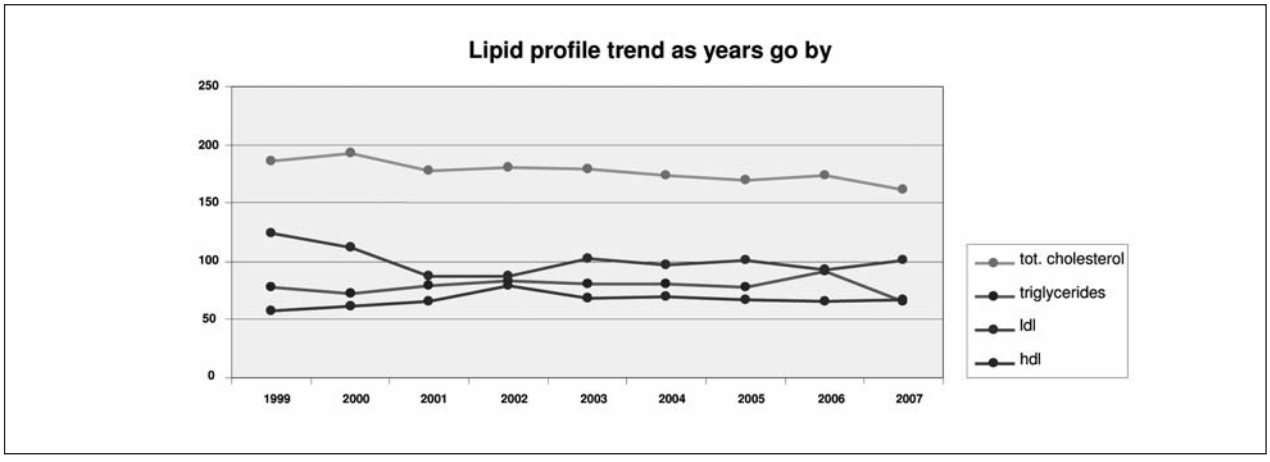

Figure 1. Lipid Profile

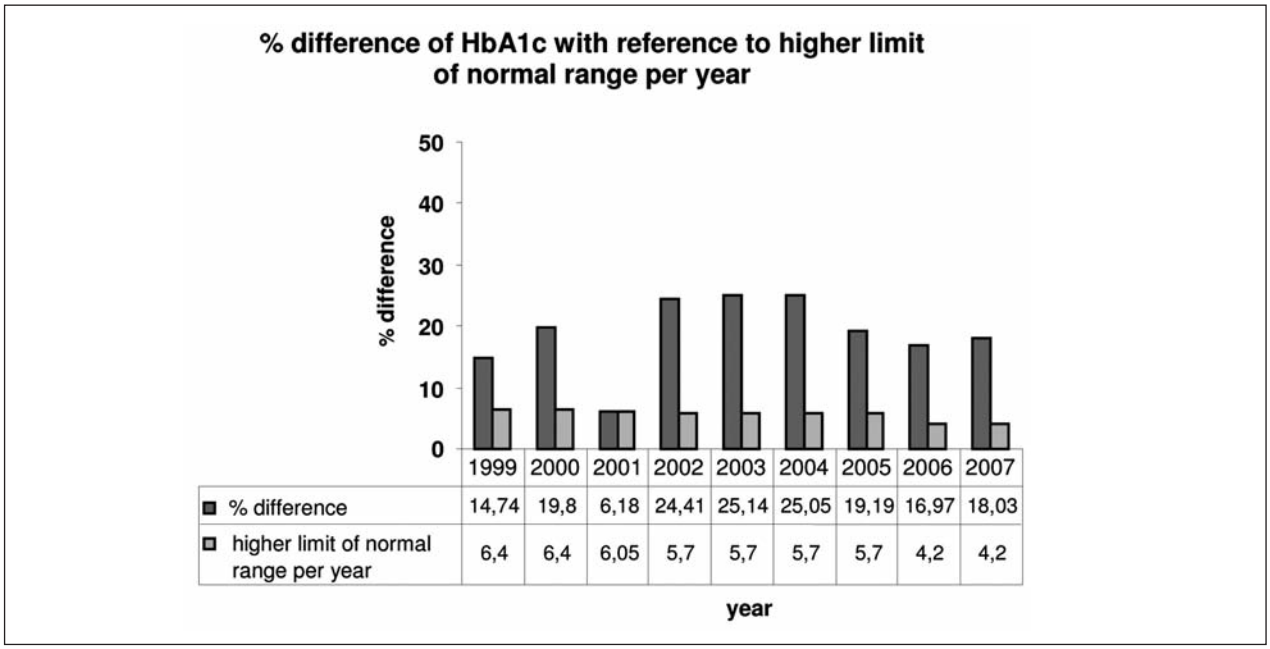

Figure 2. **HbA1c per cent difference**

tween female and male patients during 2007 (16% vs 19%; P = 0,05). No significant difference in HbA1c data between female and male patients during 2004, 2005, 2006 was present (Fig. 3). The collected data reflected those edited by the multi centric study MCDC Italy and by the international literature (27, 31-33).

BMI

We analyzed female and male BMI values (Fig. 4a-4b; Fig 5a-5b) according to percent to age, sex and geographic area. Female and male BMI values of every age were between 50 and 75 percentile. No presence of obese or overweight patients in our cohort was observed. BMI values of both male and female groups were compared (Fig. 6). The mean BMI values were little higher in females according to puberty. The BMI of our patients was better than BMI of their non diabetic contemporaries (34, 35) living in our region and than BMI of patients in the scientific literature (27, 31, 33, 36, 37).

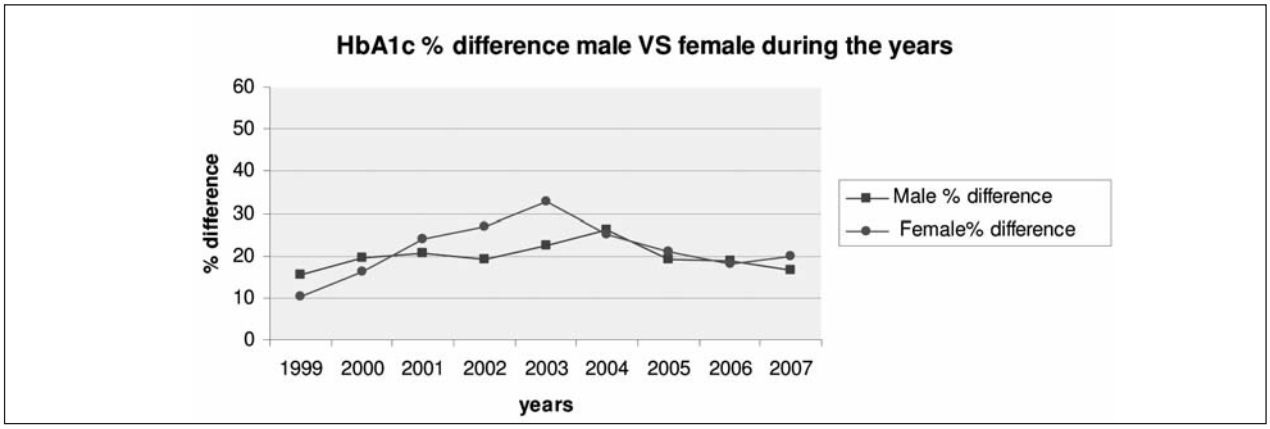

Figure 3. HbA1c per cent difference male vs female

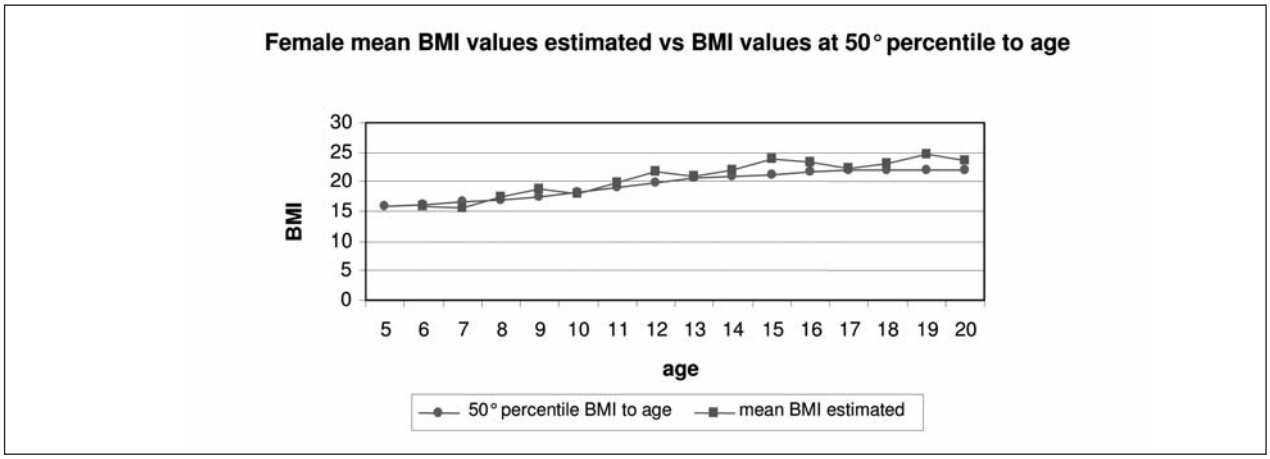

Figure 4a. Female BMI values estimated vs BMI at 50° percentile to age.

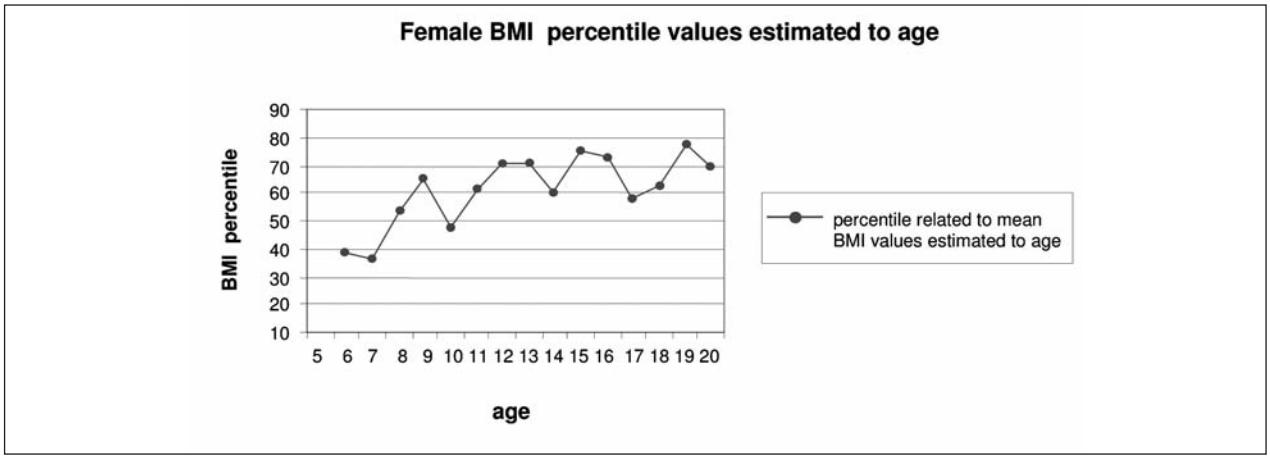

Figure 4b. Females mean BMI percentile values estimated to age

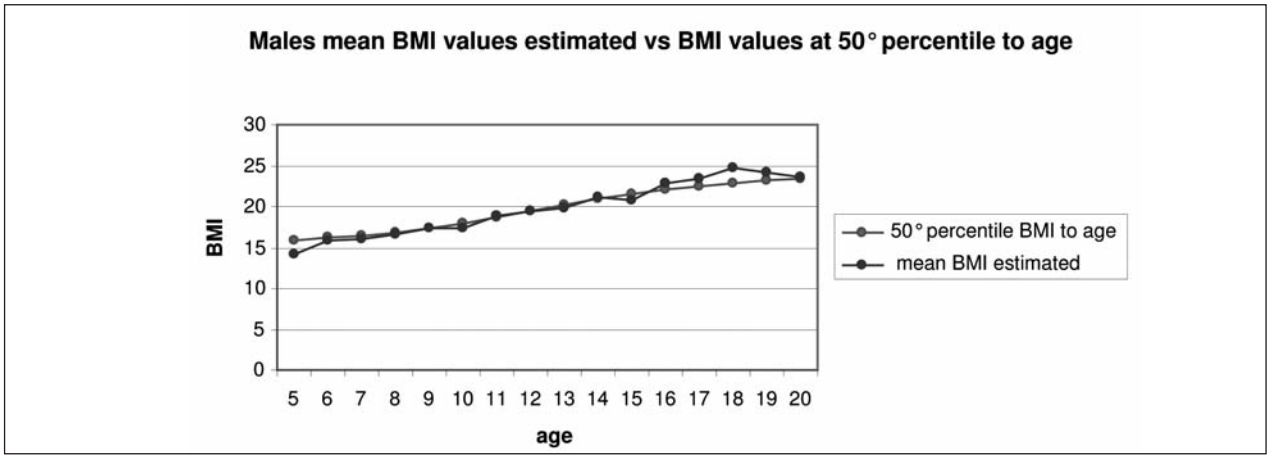

Figure 5a. Males BMI values estimated vs BMI at 50° percentile to age

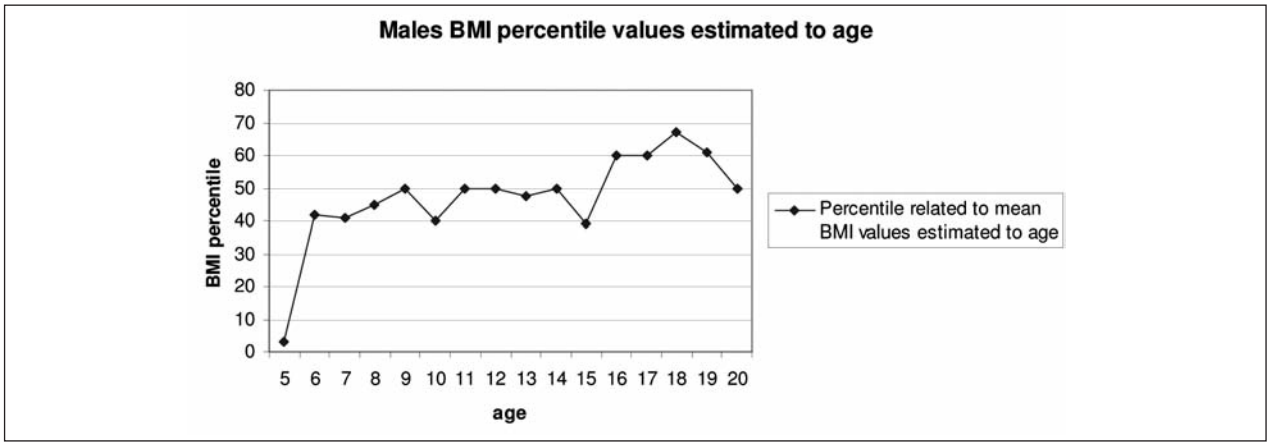

Figure 5b. Males mean BMI percentile values estimated to age

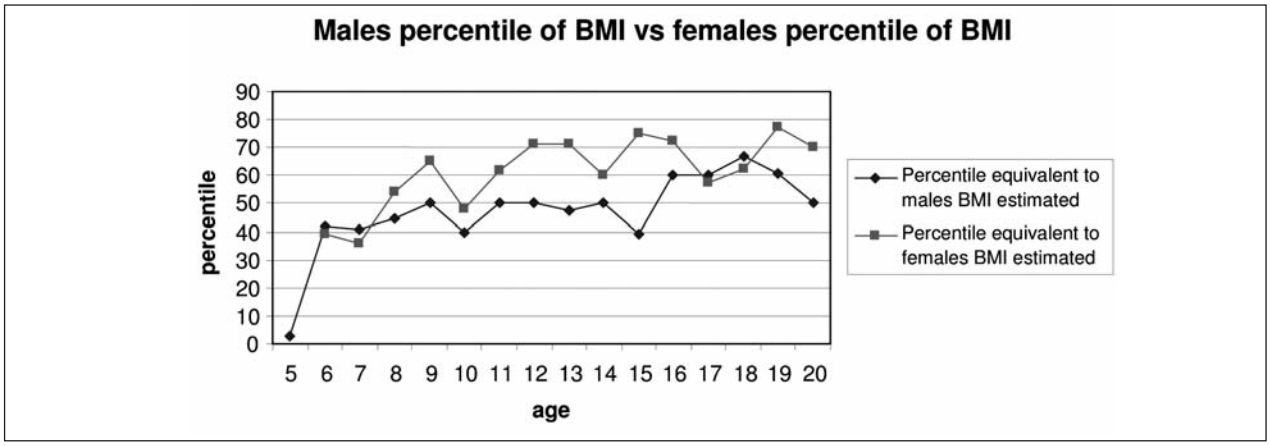

Figure 6. Males BMI percentile values vs Females BMI percentile values

Conclusions

Clearly non-prescriptive diet plan in young children with insulin dependent diabetes mellitus is not unfavourable in comparison with classic prescriptive diet-plan, in particular regards the glycemic control which reflects the international data of reference.

Our patients also show a better lipid profile and BMI values than general people according to age, sex and geographic location.

Probably non-prescriptive diet plan in young children with diabetes mellitus matches a good psychological approach to disease, a prevention of metabolic syndrome and a lower cardiovascular risk than general population [8, 38].

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