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EVOLUTION OF CHILDREN AND ADOLESCENTS WITH EXCESS BODY WEIGHT IN OUTPATIENT CARE

EVOLUÇÃO DE CRIANÇAS E ADOLESCENTES COM EXCESSO DE PESO EM ACOMPANHAMENTO AMBULATORIAL

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ABSTRACT

The objective of this study was to assess the evolution of anthropometric, blood pressure and laboratory tests of children and adolescents with excess body weight in the outpatient follow-up. This is a cohort study, conducted from May, 2013 to May, 2016, with 146 patients with excess body weight (57.5% male), from 2 to 19 years of age. The anthropometric, blood pressure and laboratorial variables were collected in the initial consultation and in the final evaluation in the hospital chart. On average, participants had 5.3 (± 3.4) visits during the study period. Increased weight, height and waist circumference were identified. However, the mean BMI z-score decreased significantly at the subsequent consultation, consequently increasing the prevalence of patients with overweight and decreasing the prevalence for those with severe obesity. There was a decrease in the systolic / diastolic blood pressure percentile, as well as the percentage of patients with abdominal circumference higher than the 90th percentile. The desirable levels of triglycerides, total cholesterol, LDL and HDL increased with significant differences ($p<0.05$) between the two evaluations, even though 47.4% of patients still maintained HDL below the desirable level. It was concluded that outpatient follow-up of children and adolescents with obesity and their families was positive. It also represented a growth in height and weight continuation with a decrease in BMI z-score and obesity, hypertension and levels of laboratory tests. In addition, the importance of specialized medical care and the need to evaluate service delivery are emphasized for more effective actions.

Keywords: Pediatric obesity, Anthropometry, Dyslipidemia, Blood pressure, Continuity of patient care.

RESUMO

O objetivo deste estudo foi avaliar a evolução antropométricas, da pressão arterial e dos exames laboratoriais das crianças e adolescentes com excesso de peso em seguimento ambulatorial. Trata-se de coorte, com coleta retrospectiva realizado de maio de 2013 a maio de 2016, com 146 pacientes com excesso de peso (57,5% sexo masculino), de 2 a 19 anos de idade. As variáveis antropométricas, pressóricas e laboratoriais foram coletadas na consulta inicial e na última avaliação existente no prontuário hospitalar. Em média os participantes tiveram 5,3 (± 3,4) consultas no período estudado. Houve aumento do peso, estatura e circunferência abdominal, no entanto, a média do z-score do IMC diminuiu significativamente na consulta subsequente, consequentemente aumentou a prevalência de pacientes com sobrepeso e diminuiu os com obesidade grave. Houve queda do percentil da pressão arterial sistólica/diastólica, bem como o percentual de pacientes que apresentavam circunferência abdominal maior que o percentil 90. Os níveis desejáveis dos triglicerídeos, colesterol total, LDL, HDL aumentaram significativamente ($p<0,05$) entre as duas avaliações, embora 47,4% dos pacientes ainda mantiveram o HDL abaixo do nível desejável. Conclui-se que o acompanhamento ambulatorial das crianças e adolescentes com obesidade e suas

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famílias foi positivo e representou a continuação do crescimento em estatura e peso, mas com diminuição da obesidade, hipertensão e níveis dos exames laboratoriais. Além disso, enfatiza-se a importância de serviço especializado e a necessidade de sua avaliação, visando ações ainda mais efetivas.

Palavras-chave: *Obesidade pediátrica, antropometria, dislipidemia, pressão arterial, continuidade de assistência ao paciente.*

INTRODUCTION

The progressive increase of obesity prevalence in children and adolescents has become a concerning public health issue worldwide, including in developing countries (ROBERTO *et al*., 2015). The urbanization of populations experiencing lifestyle changes favors the consumption of high-energy value food (SOUZA; ENES, 2013). In addition, the time spent on electronic devices in which unhealthy food products are being advertised and sold is an environmental influence that contributes to BMI increase and sedentary lifestyle (FALBE *et al*., 2013).The fight against excessive weight in the pediatric population is a priority, and health care professionals need to be prepared to face it, using this important opportunity to reduce current and future health issues, such as diabetes, heart diseases and high blood pressure (AFSHIN *et al*., 2017).

Among the factors related to obesity etiology, only behavior and environmental factors can be changed, therefore, they shall be the focus of interventions both in the primary care and in specialized clinics (SPEAR *et al*., 2007). Many outpatient approaches based on these factors have been developed for the treatment of children, adolescents and their families. The proposed treatments are diverse, from individual or group assistance, developed by only one health care professional or by a team with multiple professionals (HILLIER-BROWN *et al*., 2014) community and societal. Even though well documented multidisciplinary programs can be found, the best practices are not well defined.

The treatment in the first phases of life is more efficient and less onerous; however, it is still a challenge for health care professionals(DANIELS; HASSINK, 2015). According to health care professionals, the treatment is not an easy task, mainly due to many involved factors, and outcomes obtained show that about two-thirds of children cannot control their weight (DORNELLES; ANTON; PIZZINATO, 2014; MEAD *et al*., 2017)and can be associated with significant short- and long-term health consequences. This is an update of a Cochrane review published first in 2003, and updated previously in 2009. However, the update has now been split into six reviews addressing different childhood obesity treatments at different ages. OBJECTIVES To assess the effects of diet, physical activity and behavioural interventions (behaviour-changing interventions. There are still few studies related to the most efficient techniques to prevent or treat obesity in children and adolescents, mainly with long-term results. However, many approaches are recommended with the consent of specialists, based on clinical experience from observing behaviors associated with obesity (BARLOW, 2007).

The objective of this study was to assess the evolution of anthropometric, blood pressure and lab test variables of children and adolescents with excess body weight being followed-up in a specialized outpatient clinic.

METHOD

This is a descriptive study, with retrospective data obtained from a cohort with children and adolescents, both genders, diagnosed with overweight and obesity and followed-up in the Ambulatório de Obesidade Criança e Adolescente [Obesity Outpatient Clinic for Children and Adolescents] in a university hospital in the Southern region of Brazil, between May 2013 and May 2016. All children and adolescents that went to consultations in the period of 3 years and those that went to at least two consultations in the period of 6 months were enrolled in the study. Children under two years of age experiencing endocrine diseases, osteomuscular changes and genetic syndromes were excluded, as well as those examined in the final period of the study, so there would not be time to make the follow-up visit.

Data were collected from charts and included: age, sex, place of birth, number of consultations, weight, height, body mass index (BMI), waist circumference (WC), blood pressure (BP) and lab tests (fasting blood glucose, total cholesterol and fractions, triglycerides). Children were those between 2 to 9 years of age and adolescents were those between 10 and 19 years of age.

The classification of participants with overweight and obesity was made as per reference curves of the World Health Organization (WHO). For children between 2 and 5 years of age, overweight was considered as BMI z-score between +2 and +3, and obesity, when it was over +3. For children over 5 years of age and adolescents, overweight was considered as BMI z-score between +1 and +2, obesity between +2 and +3, and severe obesity when over +3. The percentile evaluation of the blood pressure was made as per reference tables of the *National High Blood Pressure* for sex, age and height.

Lab tests were considered abnormal when: total cholesterol (TC) ≥170 mg/dl; LDL-cholesterol ≥130 mg/dl; triglycerides (TG) ≥130 mg/dl; HDL-cholesterol ≤45 mg/dl; blood glucose >100mg/dl; in the borderline: TC between 150-169 mg/dl; LDL: 100-129 mg/dl; TG: 100-129 mg/dl.

The data were analyzed by descriptive statistics, with mean and standard deviations were calculated for quantitative variables and percentages for qualitative variables, by using *Stata 10* statistics program.

This study was approved by the Ethics Committee of the Franciscan Univeristy, the confidentiality form was signed and the informed consent form was exempted (CAAE no. 55500616.1.0000.5306).

RESULTS

A total of 204 patients has been registered during the period of study. From these, 10 patients were excluded, since they did not meet the criteria considered for the study. Six of them were less

than two years old and three experienced some diseases that were featured in the exclusion criteria. Therefore, there was a total of 194 patients. Among these, 146 patients m*et al.*l the inclusion criteria, reaching a percentage of 75.3% of the initial sample. The remaining 24.7% did not make the follow-up and were considered as withdrawals. 57.4% of the participants were male, 53.4% were children and 56.9% were born in the city of Santa Maria. The participants had an average 5.3 (± 3.4) consultations, ranging from 2 to 15 during three years as shown in (Table 1).

Table 1 - Characteristics of children and adolescents in outpatient care for obesity (n=146)

Variables	N (%)
Sex	
Male	84 (57.5)
Female	62 (42.5)
Age group	
Child	78 (53.4)
Adolescent	68 (46.6)
Referral	
Santa Maria	83 (56.9)
Region	59 (40.4)
Other	4 (2.7)

The weight, height and waist circumference have increased from the first to the subsequent consultation, with a significant statistical difference for weight and height ($p<0.001$). BMI and mean z-score have decreased, but with a significant statistical difference only for Z-score. There was a percentile decrease of systolic/diastolic blood pressure in 120 patients, as well as in Triglycerides, Total Cholesterol and LDL tests. Fasting blood glucose and HDL dosages were similar, but mean blood glucose decreased and mean HDL increased (Table 2).

Table 2 - Evolution of anthropometric, blood pressure and lab variables of children and adolescents in outpatient care for obesity.

Variables	N	Assessment		P*
		Baseline	Subsequent	
Anthropometric	**146**			
Weight (kg)		59.3 (±21.1)	63.2 (±21.0)	<0.001
Height (m)		1.42 (±0.18)	1.47 (±0.17)	<0.001
BMI (Kg/m²)		28.8 (±4.8)	28.2 (±4.8)	0.280
Z-score		2.4 (±0.7)	2.2 (±0.7)	<0.001
Waist Circumference (cm)		90.8 (±11.8)	91.0 (±11.62)	0.384
Blood Pressure Percentile	**120**			
Systolic pressure		69.7 (±25.0)	63.9 (±27.0)	0.008
Diastolic pressure		56.1 (±25.9)	48.3 (±25.5)	0.002
Practice				
Blood glucose	73	91.6 (±7.8)	90.1 (±7.9)	0.072
Triglycerides	77	108.6 (±65.0)	90.7 (±50.6)	<0.001
Total Cholesterol	78	164.5 (±30.4)	158.5 (±24.5)	0.013
LDL	76	100.4 (±30.6)	95.6 (±24.1)	0.019
HDL	76	44.7 (±13.8)	45.6 (±13.1)	0.900

** Student test*

Table 3 shows the distribution of children and adolescents as for the classification of overweight, waist circumference, blood pressure and lab tests. It was noted an increase in overweight prevalence and decrease in severe obesity from 17.1% to 28.8% and 8.9% to 7.5%, respectively, with significant statistical difference. The percentage of patients with waist circumference over the 90th percentile decreased from 90.3% to 71.2%. As for the blood pressure, 23.7% were considered with high blood pressure levels in the initial evaluation, and in the subsequent evaluation, there was a decrease to 4.2% in the 120 patients evaluated for this item. About 90% of the patients had normal blood glucose levels in both evaluations. There were also significant differences between the initial and subsequent evaluations of triglycerides, total cholesterol, LDL and HDL levels, with a desirable level increase in the second evaluation, even though 47.4% of the patients still had HDL under the desirable level.

Table 3 - Initial and final classification of children and adolescents as for anthropometric and lab variables.

Variables	N	Assessment		P*
		Baseline N (%)	Subsequent N (%)	
Overweight classification	**146**			**<0.001**
Overweight		25 (17.1)	42 (28.8)	
Obese		108 (74.0)	93 (63.7)	
Severe obesity		13 (8.9)	11 (7.5)	
Waist Circumference Percentile	**102**			**<0.001**
<50		0 (0.0)	2 (1.9)	
50 - 90		12 (9.7)	28 (26.9)	
>90		112 (90.3)	74 (71.2)	
Blood pressure	**120**			**<0.001**
Normal		73 (61.9)	88 (74.6)	
Pre-high blood pressure		17 (14.4)	25 (21.2)	
Hypertension		28 (23.7)	5(4.2)	
Blood glucose	**73**			**0.829**
Desirable		65(89.0)	66(90.4)	
Increased		8(11.0)	7(9.6)	
Triglycerides	**77**			**0.002**
Desirable		42 (54.6)	56 (72.7)	
Borderline		15 (19.5)	7 (9.1)	
Increased		20(26.0)	14 (18.2)	
Total Cholesterol	**78**			**<0.001**
Desirable		26 (33.3)	28 (35.9)	
Borderline		20 (25.7)	26 (33.3)	
Increased		32 (41.0)	24 (30.8)	
LDL	**76**			**<0.001**
Desirable		39(51.3)	48(63.2)	
Borderline		29 (38.2)	23 (30.3)	
Increased		8(10.5)	5 (6.5)	
HDL	**76**			**<0.001**
Desirable		34(44.7)	40 (52.6)	
Decreased		44 (55.3)	36 (47.4)	

** the chi-squared test*

DISCUSSION

The University Hospital, where the study was conducted, has regional scope. The Children and Adolescents' Overweight and Obesity outpatient clinic receives patients from two Coordenadorias de Saúde [Health Coordinating Offices] (the 4th and 10th) of the state of Rio Grande do Sul. This outpatient clinic's aim is to work together with patients and their families, identifying risk factors, inadequate feeding habits, sedentary lifestyle and comorbidities. In the first consultation, carried out by a pediatric physician, with residents and interns of the Medicine program, lab tests are requested, according to the assistance protocol. In addition, guidance regarding changes in the lifestyle of the patients and their families are provided. It is worth noting the essential role of the caregivers/guardians for the success of the interventions, which aim at behavior changes, mainly those considered as obesogenic (KITZMAN-ULRICH *et al*., 2012).

In the follow-up consultations, anthropometric variables, blood pressure and lab test results are once again evaluated, and difficulties faced to implement the changes agreed in the previous consultation are discussed with the patient and his/her family. In some cases, economic and cultural factors may limit the family's ability or willingness to make changes in lifestyle. In addition, misperception of the child's weight status may affect a family's ability to address the problem, effectively (DANIELS; HASSINK, 2015). These facts that are difficult to evaluate are all contributing factors contributes for the limitation of this retrospective collection study.

In this study, there were more men than women, probably representing what is already described in studies conducted in Brazil, in which the male pediatric population has a greater obesity prevalence over the female (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTASTÍSTICA, 2014; TORNQUIST; TORNQUIST; BURGOS, 2015). After the first consultation, 48 patients (24.7%) did not make the outpatient follow-up and were considered as withdrawals. Previous researches showed discouraging results referring to the compliance with weight control programs by the participants. Nobles *et al.* (2016) described that approximately 50% of the pediatric patients did not complete their respective programs, and young persons with higher BMI experienced increased risk due to not completing theirs. A Brazilian study evaluating two years of follow-up in a specialized outpatient clinic of Hospital de Clínicas in Campinas-SP, with 150 pediatric patients, showed a withdrawal rate of 43% (ZAMBON MARIANA PORTO, ANTÔNIO MARIA ÂNGELA R. G. M., MENDES RBERTO TEIXEIRA, 2008) higher than the one observed in this study.

Several factors may be related to the withdrawal from the obesity treatment, such as obstacles for the parents or caregivers/guardians attendance in the consultations, lack of commitment by children and adolescents, the understanding that the proposal was something more magical than real and the family not willing to change habits (MELLO; LUFT; MEYER, 2004). On the other hand,

programs involving parents and children simultaneously, in small groups, practice culinary sessions, visits to buy food, phone calls and cell phone messages reinforcing the objectives of the program are factors that have a positive impact in the family's participation (TEEVALE; TAUFA; PERCIVAL, 2015)a change in job shift, family illnesses (both acute and those requiring chronic management.

Results verified in the significant decrease ($p<0.001$) of BMI z-score in the subsequent consultation. BMI z-score monitoring has been shown to be the most appropriate for the improvement evaluation, since they do not consider only data based on age and gender of the child, but also the distribution in the reference curves. Even though methodology differences exist, these results may be compared to other cohort studies that resulted in a decrease of this variable. Maggio *et al.* (2013) evaluated an individual intervention of about 11 months with a pediatric physician in a specialized site, and 49.5% of participating children and adolescents had a decrease in the mean body mass index (-0.18 ± 0.40, $p <0.001$). As for Bock *et al.* (2014), after a 1-year program, BMI z-scores of the participants and the quality of life improved; however, other measurements related with the adipose tissue of the body remained unchanged.

The presence of high blood pressure in about one-fourth of the young persons in the first consultation supports several analyses with pediatric populations, in which is described an association of obesity with high blood pressure (MOREIRA *et al.*, 2013; REUTER *et al.*, 2013; TORNQUIST; TORNQUIST; BURGOS, 2015) . In the same way, tests presented high levels, showing that in the infancy and adolescence periods, dyslipidemia, obesity, high blood pressure, sedentary lifestyle and diabetes are risk factors for cardiovascular diseases in adult life. With these descriptors, a Brazilian systematic review assessed 28 papers published from 2001 to 2011, and the results support the occurrence of several risk factors already in the pediatric age. In this way, many programs have been described as sufficient to improve pediatric obesity and its complications (ALVES BIANCHINI, J. A; FERNANDES DA SILVA, D; LOPERA, C. A; RUI MATSUO, A; ANTONINI, 2013; ANTUNES, BARBARA DE MOURA; MONTEIRO, PAULA ALVES; SILVEIRA, LOREANA SANCHES; CAYRES, SUZIANE UNGARI; SILVA, CAMILA BUONANI; FORTE, 2013; WALSH *et al.*, 2014). It also observed in this study that there was a significant decrease of high blood pressure and dyslipidemia with the outpatient follow-up.

The results of this study reinforce the relevance of obesity in children and adolescents being recognized as a chronic disease, and the effective outpatient care of the patients and their families, at least in short-term, since children kept the height and weight growth rhythm, while obesity, high blood pressure, total and fraction cholesterol levels presented a decreasing trend, thus resulting in the reduction of risk factors for cardiovascular diseases. The results also demonstrated the importance of programs involving children and adolescents with excess body weight and highlighted the need to evaluate the service provided, aiming at even more effective actions.

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