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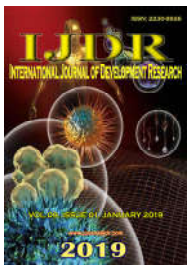

ORIGINAL RESEARCH ARTICLE OPEN ACCESS

RELATIONSHIP BETWEEN FAMILY LIFESTYLE AND OBESITY IN CHILDREN FROM FIVE TO NINE YEARS OLD

César Augustto Elias Wiezzer, Cleonice Gonçalves da Rosa and *Natalia Veronez da Cunha Bellinati

Stricto Sensu Graduate Program in Environment and Health, Planalto Catarinense University, Lages, Santa Catarina-Brazil

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ABSTRACT

This study aimed to evaluate the relationship between family lifestyle and obesity in 88 children from five to nine years of age, through a quantitative study, in a territory covered by the Family Health Strategy. The classification of the children's weight was performed by the body mass index by age and the evaluation of the socio-demographic profile and lifestyle of the family through the application of questionnaires with the legal guardians. Of the obtained results, most of the children were male (62.5%), 19.3% were obese and presented eating habits and practice of physical activity similar to the ones of their families. Childhood obesity was positively associated with the presence of associated diseases, with the fact that their guardian did not have rewarding habits and the consumption of fried food was greater than or equal to three times by the child. No analyzed variables were predictive of childhood obesity. In this regard, it is possible to affirm that there is influence of biological factors in the development of childhood obesity and the family lifestyle is a great influence on the choice of food and on the formation of healthy habits of the children.

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INTRODUCTION

Obesity receives a "global epidemic status", reaching adults and children (Organização Mundial da Saúde-OMS, 2004). In recent decades, the literature has shown an increase in childhood overweight and obesity rates worldwide, leading public health authorities to target strategies to reduce these statistics (Rivera *et al.,* 2014). In Brazil, between 2008 and 2009, one third of the children from five to nine years old were overweight according to the classification proposed by the World Health Organization (Instituto Brasileiro de Geografia e Estatística-IBGE, 2011). The South Region occupies the 2nd position, reaching the percentage of 35.9%, being preceded only by the Southeast Region, with 38.8% (Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica-ABESO, 2017). The etiology of obesity is considered multifactorial, resulting from the interaction of genetic, socioeconomic, biological, psychological, behavioral and environmental factors (Corso *et al.,* 2012). The socio-familial context, understood as the first environment of child socialization, in which eating patterns are learned and incorporated, is admitted as an important influencer in the issue of childhood obesity (Couch *et al.,* 2014). Obesity is strongly associated with increased morbidity, since it is a risk factor for several diseases, such as metabolic syndrome, dyslipidemias, type II diabetes, joint and orthopedic dysfunctions, sleep disorders, gallstone in the gallbladder, cardiac events, fatty liver disease, and a higher risk of cardiovascular, cancer or mortality outcomes (Moreira *et al.,* 2014). In addition to the associated diseases, it is possible to observe in children with overweight pictures of social discrimination, low self-esteem, depression, difficulty in composing the group or withdrawal from the group (Lobstein *et al.,* 2015). Thus, based on the literature information about the high rates of childhood obesity and its consequences, as well as the importance of the socio-familial context as an influencer in this issue, this study aimed to evaluate the relationship between family lifestyle and obesity in children from five to nine years of age.

MATERIALS AND METHODS

This is an applied, descriptive, quantitative and cross-sectional study carried out in a territory covered by the Family Health

***Corresponding author:* Natalia Veronez da Cunha Bellinati**
Stricto Sensu Graduate Program in Environment and Health, Planalto Catarinense University, Lages, Santa Catarina-Brazil.

Strategy (ESF) of a municipality of the Santa Catarina's Serrano Plateau. Eighty-eight children of both genders in the age group from five to nine years old and ESF users agreed to participate with their guardians, after an explanation andthe signing of the consent term and the informed consent term, respectively, approved by the Ethics Committee in Research on Human Beings of the Planalto Catarinense University (Opinion No. 2.009.834). From the location and home-based approach of the participants, the anthropometric measurements of the child were carried out by digital weighing (Britânia® brand, electronic model BE3, capacity for 150 kg or 330 pounds), standing, barefoot and wearing a T-shirt and shorts; and stature measurement through the stadiometer (barefoot children on the platform, positioned with their backs to the rod, with their feet joined and standing erect). Obesity was defined as the body mass index (BMI) equal to or higher than the 97th percentile for age and gender, and the cutting points were adopted. Z-score curves for BMI (z-BMI) were also used.[1]Two questionnaires were then applied to the person responsible for the child: the first one, seeking to know the socio-demographic characterization (age, gender, marital status, level of education, occupation, family income and number of people in the household) and the second one aiming to evaluate the family lifestyle. The second questionnaire, created by the researchers from scientific readings on the subject, consisted of 17 (seventeen) questions about the eating, physical, domestic, and behavioral habits of the family members and of the child. These questionnaires were applied in the form of interview by the researchers, who pointed out in the instrument the answers of the interviewees. For the data analysis, a descriptive analysis of the variables related to the children and the characterization of the families in relation to the social, economic and environmental aspects were carried out. Afterwards, the children were divided into two groups according to the z-BMI index: presence of obesity (above +2) and absence of obesity (overweight from +1 and below +2, normal from -2 and below +1, underweight below -2). For the analysis of the factors associated with the presence of obesity, binary logistic regression analysis was used (chi-squared test with significance level of 5%), in order to verify how each independent variable interferes with the child's chance of developing obesity. The dependent variable of the study was the presence or absence of obesity. The independent variables were grouped into biological, socioeconomic and socio-behavioral factors of the child and of the family, as described below:

- Biological factors: gender (female/male), obese people in the family (obese first-degree relatives), obesity-related diseases (qualitative and quantitative analysis of the associated disease report).
- Socioeconomic factors: level of education of the guardian and family income, marital status of the guardian and number of people living in the residence.
- Familial socio-behavioral factors: eating habits (frequency of consumption of fruits, greens/vegetables and sweets/snacks/fried food), physical habits (frequency of practice of systematic physical exercises), domestic habits (eating hours), rewarding habits (offer of rewards if they eat all the food on their plates), datacollected through individual interviews with those responsible for the children by the researchers.
- Socio-behavioral factors of the child: eating habits (history of breastfeeding, frequency of consumption of fruits, greens/vegetables and sweets/snacks/fried food), physical habits (frequency of practice of systematic physical exercises), domestic habits (qualitative and quantitative habits of watching TV, playing videogames, using a computer, playing outdoors) and compulsion/anxiety eating, data collected through individual interviews with those responsible for the children by the researchers.

The variables with $p < 0.20$ in the bivariate analysis were selected for the multiple analysis. An analysis of the association among the independent variables was also carried out to evaluate multicollinearity. The model fit was evaluated by -2 Res Log Likelihood (lower value, better model fit) and p-value (≤ 0.05). The statistical software SPSS version 22.0 was used for analysis.

RESULTS

The socio-demographic characterization of the studied population shows that the mother represents the majority of those responsible for the children (81.8%), witha mean age between 26 and 45 years old (75%), low family income (86.4%) and low level of education, 53.4%). Regarding the children, the majority are male (62.5%), with a mean age of 6.96 ± 1.37 years and classified according to the BMI with normal weight (59.1%).

Table 1. Characteristics of family members and children participating in the study

Data of family members	n (%)
Degree of kinship (respondent)	
Mother	72 (81.8%)
Father	10 (11.4%)
Grandmother/grandfather	5 (5.7%)
Sister	1 (1.1%)
Age	
Between 18 and 25 years	13 (14.8%)
Between 26 and 45 years	66 (75%)
Between 45 and 55 years	4 (4.5%)
Above 55 years	5 (5.7%)
Gender	
Female	77 (87.5%)
Male	11 (12.5%)
Level of education	
Until elementary school	47 (53.4%)
High school or more	41 (46.6%)
Marital status	
Single	10 (11.4%)
Married	32 (36.4%)
Living with a partner	34 (38.6%)
Separated or divorced	9 (10.2%)
Widow(er)	3 (3.4%)
Family Income	
Up to three minimum wages	76 (86.4%)
More than three minimum wages	12 (13.6%)
Occupation	
Worker	45 (51.1%)
Unemployed	2 (2.3%)
Retired	2 (2.3%)
Housewife	39 (44.3%)
Number of people in the residence	
Less than four	37 (42%)
More than or equal four	51 (58%)
Data of the Child	n (%)
Gender	
Male	55 (62.5%)
Female	33 (37.5%)
Age (Mean ± SD)	6.96 ± 1.37 years
Obesity	
Obese	17 (19.3%)
Overweight	16 (18.2%)
Normal weight	52 (59.1%)
Underweight	3 (3.4%)

n= number of respondents

Table 2. Eating habits and physical habits of the family and of the child

	Family n (%)		Childrenn (%)	
	<3x	≥3x	<3x	≥3x
Fruit Consumption	41 (46.6%)	47 (53.4%)	45 (51.1%)	43 (48.9%)
Vegetable Consumption	46 (52.3%)	42 (47.7%)	59 (67%)	29 (33%)
Sweets Consumption	77 (87.5%)	11 (12.5%)	71 (80.7%)	17 (19.3%)
Fried Food Consumption	75 (85.2%)	13 (14.8%)	81 (92.0%)	7 (8.0%)
Practice of Physical Activity	80 (90.9%)	8 (9.1%)	83 (94.3%)	5 (5.7%)

n = number of respondents; <3x = less than three times a week; ≥3x = three or more times a week.

Table 3. Behavioral factors of the family and of the child

	Yes n (%)	No n (%)
FAMILY		
Eating routine	74 (84.1%)	14 (15.9%)
Use of rewards	17 (19.3%)	71 (80.7%)
CHILDREN		
Eating behavior in relation to emotional changes	21 (23.9%)	67 (76.1%)
Exclusive breastfeeding for at least six months	42 (47.7%)	46 (52.3%)
Use of videogame	3 (3.4%)	85 (96.6%)
Use of computer	6 (6.8%)	82 (93.25%)
Use of mobile phone	15 (17%)	73 (83%)
Use of television	35 (39.8%)	53 (60.2%)
Playing outdoors	77 (87.5%)	11 (12.5%)

n= number of respondents; <3x = less than three times a week; ≥3x= three or more times a week.

Table 4. Bivariate analysis of the association of biological, socio-behavioral, socioeconomic and familialsocio-behavioral factors with obesity

Factors	Relative Risk	CI (95%)
Biological Factors		
Gender (male)	1.16	0.81 – 1.67
Gender (female)	0.74	0.33 – 1.64
Has cases of obesity in the family	1.43	0.92 – 2.21
Report of diseases associated with obesity	3.58	1.38 – 9.28
Socioeconomic factors		
Level of education of those responsible (high school or more)	1.17	0.70 – 1.96
Family income (> 3 minimum wages)	0.83	0.20 – 3.46
Marital status of the guardian (married or cohabitation)	1.02	0.76 – 1.37
Residents (> 4 people)	0.80	0.40 – 1.62
Familial social-behavioral factors		
Fruit consumption (≥3x/week)	0.98	0.60 – 1.62
Vegetables/greens consumption (≥3x/week)	1.48	0.95 – 2.30
Sweets/snacks consumption (≥3x/week)	2.38	0.78 – 7.23
Fried food consumption(≥3x/week)	2.61	0.97 – 6.98
Practice of physical activity (≥3x/week)	0.59	0.79 – 4.53
Has an eating routine (3 meals/day)	0.89	0.67 – 1.17
Does not have rewarding habits	1.31	1.15 – 1.49
Socio-behavioral factors of the child		
Breastfeeding for at least six months	1.53	0.98 – 2.38
Fruit consumption (≥3x/week)	0.95	0.54 – 1.66
Vegetables/greens consumption (≥3x/week)	1.59	0.85 – 2.95
Sweets/snacks consumption (≥3x/week)	2.27	0.98 – 5.28
Fried food consumption (≥3x/week)	5.55	1.37 – 22.58
Practice of physical activity (≥3x/week)	1.04	0.12 – 8.75
Eating behavior in relation to emotional changes	2.08	0.99 – 4.36
Participation in Games	0.84	0.64 – 1.11
Watching TV for a long time	1.44	0.84 – 2.49
Excessive use of computer	0.83	0.10 – 6.69
Excessive use of video game	8.35	0.80 – 86.83
Excessive use of mobile phone	1.52	0.55 – 4.19

CI= Confidence interval; <3x/week = less than three times a week; ≥3x/week= three or more times a week.

However, around 40% of the studied children were overweight or obese. The socio-demographic characteristics of the children analyzed in the study, as well as their relatives, are described in Table 1. The evaluation of the family lifestyle showed that the children present eating habits and practice of physical activity similar to the ones of their family members. The results of the evaluation of eating, physical and behavioral habits of the family and of the child may be observed in Tables 2 and 3. Table 4 shows the results of the association of biological, socio-behavioral, socioeconomic and familial socio-behavioral factors with childhood obesity. Obesity was positively associated with the presence of associated diseases reported by those responsible (p= 0.008), the non-use of rewarding habits for the intake of all the food on the plate (p= 0.025) and the consumption of fried foods higher than or equal to three times per week, by the child (p= 0.008). For the other variables, the associations found were not significant. In the evaluation of possible predictive factors for childhood obesity, through the logistic regression model, no variables were predictive of obesity (data not shown).

DISCUSSION

In the present study, the socio-demographic characterization of the studied families shows that the mother represents the majority of those responsible for the children, with low family income and low level of education. The children are mostly males and classified from the body mass index with normal weight. However, around 40% of the children are overweight or obese. The literature shows that the labor supply and demand indexes among the female public are on the rise (Texeira, 2009). Despite this reality, women need to associate their working time with domestic tasks, culturally attributed to the female public. Thus, the female insertion in labor activities with shorter working hours is observed, serving as a barrier to professional growth in certain positions, which would require a greater workload (Lelis *et al.,* 2012). In the present study, when the guardians were questioned about their occupation, different activities, such as clerk, attendant, kitchen assistant and carpenter, domestic worker, teacher, psychologist, cook and cashier were highlighted. This may be reflected in the low family income found (considering that most families had income of up to 3 minimum wages, with 4 or more people living in the household, showing a relatively low per capita income). To obtain better positions and salaries, a higher level of education is also required, with investment in qualification (Balassiano *et al.,* 2005). Thus, the low level of education may also be an obstacle to obtain a job with higher payment, reflecting the low family income. In addition, the presence of women in the labor market may be a factor that hinders their full dedication to family care, such as the issue of a more elaborate and, consequently, healthier diet. In middle and lower income families there may be a need to insert both men and women in the labor market in order to increase family income, which may still be insufficient (Lelis *et al.,* 2012). The social and health benefits provided by a better family income are undeniable. Nevertheless, this is not always accompanied only by positive changes, since a better socioeconomic situation makes it possible to increase the consumption of foods with a high energy content and reduced nutritional value, leading to obesity (Netto-Oliveira *et al.,* 2010). Paradoxically, the ultra-processed and consequently hyper caloric foods can be easily obtained by the less favored families, due to their low price (Organização das Nações Unidas para aAlimentação e a Agricultura-FAO e Organização Pan-Americana da Saúde-OPAS, 2017).

In the results of evaluating the family's and the child's lifestyle, in general, it is possible to observe that there is a tendency for the children to present eating habits and practice of physical activity similar to the ones of their relatives. Thus, the lifestyle of the parents or guardians and the characteristics of each family are shown as essential factors in the formation of their children's habits (Rossi *et al.,* 2008). Most interviewed families state that they have an eating routine, meaning that all family members perform the three main meals of the day (breakfast, lunch and dinner) together. Family meals are associated with increased intakes of fruits, vegetables, grains, and foods rich in calcium and fiber. Moreover, such practice provides the opportunity for parents to monitor and shape children's eating patterns (Jansen *et al.,* 2014). However, the participants of this research (children and guardians) showed that they did not have a healthy diet, with low fruit and vegetable intake and high fried food intake, in addition of not practicing regular physical exercises. The use of gratification, another evaluated familial behavioral factor, evidenced that the majority of those responsible for the children do not offer bonuses for the child to eat all the food on the plate. In families where such reward took place, it was observed a higher occurrence of the issue of dessert after lunch, the acquisition of toys, carrying out walks and trips to the park in the neighborhood. Misplaced parental eating practices regarding children's diet have been a cause for concern. The lack of parental perception, both for signs of hunger and signs of satiety, results in overeating and overweight practices in children (Cross *et al.,* 2014). Furthermore, the difficulty in establishing good satiety control is a risk factor for developing obesity, both in childhood and in adult life (Mello *et al.,* 2004). Regarding breastfeeding, this practice is advocated by the WHO exclusively up to six months of age. In the present study, exclusive breastfeeding up to six months of age was absent in most children (OMS, 2004). Breastfeeding in the first months of life can affect the individual's weight. The odds of an individual being overweight in childhood are twice as high in children who received exclusive breastfeeding for only one month when compared to infants who were exclusively breastfed for six months (Horta *et al.,* 2007; Masquio *et al.,* 2014). The hormonal components of breast milk may also influence the development of overweight (Santos *et al.,* 2016). In addition, exclusive breastfeeding is replaced by the insertion of infant formulas, which generally have high caloric and protein levels. The protein concentration contained in most infant formulas exceeds that of breast milk, and the intake of high protein amounts by babies is linked to the increase in weight gain in the first two years of life. Excess protein in the first two years of life is associated with increased production of insulin and IGF-1, hormones linked to adipocyte differentiation and fat accumulation (Langley-Evans, 2015).

Regarding the evaluation of the children's activities, it was possible to observe that most play outdoors, with little use of videogame, computer, mobile phone and television. Games involving the requirement of body kinetics and interpersonal interaction, such as soccer, playing with dolls, cycling, playing with toy cars and tag were predominant. The movements involved in these games promote calorie expenditure and contribute to the gain of motor coordination, bringing benefits through playfulness and health promotion (Amaral *et al.,* 2014). Contrary to the current study, the literature shows that recreational outdoor play has been steadily declining in recent decades. This may be explained by the increase in street violence or the development of technology. In this perspective, it is necessary for parents to encourage and provide the means for their children to play outdoors, for them to move and spend energy (Oliveira *et al.,* 2014). Obesity in childhood constitutes a risk factor for adult morbidity and mortality, such as cardiovascular disease, hyperlipidemic diseases, type II diabetes, among others (Moreira *et al.,* 2014). Among the diseases associated with obesity reported by the guardians for the present study, dyslipidemia was highlighted. This is the major risk factor for atherosclerosis, and it has a strong association with the occurrence and severity of cardiovascular risks (Magalhães *et al.,* 2015). Childhood obesity has a connection with the child's and the family's eating habits, as well as the practice of physical activities. The increase in the consumption of foods rich in simple sugars and fats, with high caloric density and sedentary lifestyle are the main factors related to the environment (Enes and Slater, 2010). Bad eating habits, such as not eating breakfast, ingesting a limited variety of foods and preparations and in large portions, consuming excess caloric beverages and having an inadequate early eating

practice are both harmful and inducers of obesity. Moreover, it is in the early years of the child's life that food preferences and aversions are established, and the family environment is one of the main influences (Mahan *et al.,* 2013). The unhealthy diet with high ingestion of fried food associated with obesity in the present study may be attributed to its easy preparation, attractive appearance and high palatability. Sedentary habits, such as the time the child is exposed to screens (television, tablets, mobile phones, electronic games), contribute to a decrease in daily caloric expenditure, also contributing to the development of obesity. In addition, the media influences the formation of infant eating habits, leading the current generation to excessive consumption of the fourth level of the food pyramid, which is composed of food groups rich in simple sugars and saturated fats (Santana *et al.,* 2015). Furthermore, family interaction becomes very restricted due to the limited time available for close contact (Dornelles *et al.,* 2014). However, in the present study, such practices were not associated with obesity. This may be explained by the low purchasing power of the studied population, who do not have access to this technology. The absence of biological, socioeconomic and socio-behavioral factors of the child and of the family as predictive factors of childhood obesity indicates that the characteristics found associated with obesity are typical of the studied population. As a limitation of the study, we highlight the use of the questionnaire developed by the researchers. We suggest the use of validated questionnaires and new researches to elaborate intervention strategies for prevention and reduction in cases of childhood obesity. Thus, concerning the community studied in this study, it is concluded that there is the influence of biological (associated diseases), environmental and socio-behavioral factors of the family (not having rewarding habits) and of the child (consumption of fried foods) in the development of childhood obesity. The family lifestyle is a major influence in the choice of food and in the formation of healthy habits, with the family playing a decisive role in promoting health and preventing childhood obesity.

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