39 - RELATIONSHIP BETWEEN BMI, SOCIOECONOMIC STATUS, EXERCISE PARTICIPATION AND HABITUAL PHYSICAL ACTIVITY LEVEL OF FATHERS, MOTHERS AND THEIR CHILDREN

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INTRODUCTION

Overweight is becoming a problem that involves, indiscriminately, people from all social classes, ages, ethnic groups and gender. This disease generates biological consequences, economical, behavioral and social problems. Obesity generates biological complication such as: type II diabetes, insulin resistance, hypertension, orthopedic and vascular problems, chronic inflammation, sleep apnea, and so on (SAELENS & STEPHEN, 2003; VILLARES, RIBEIRO & SILVA, 2003). Economic problems are related to high costs of internment and treatments, the mean medical assistance to these people is more expensive, 36% superior compared to others patients (BUCHALLA, 2003). Behavior difficulties is another problem that includes depression, anxiety, low self-esteem and poor self-image, inclusive during childhood (VILLARES, *et al*., 2003). Finally, there are social problems that are linked to discrimination in all society and it is believed that the social and economic status can be a predictor of obesity. In some studies, obesity is inversely related to the social status in adult women (LAITINEN, POWER & JÄRVELIN, 2001).

Thinking about overweight and obesity is necessary since childhood because this phase is critical. In the first years of life the metabolism velocity is accelerated and grows new adipocyte. A obese child can have three times the fat cells than a normal child, increasing the possibility of having overweight in the adulthood (GUYTON & HALL, 1997). BAR-OR (2000) estimates that 6-yr-old children have a risk of 50% to became obese adults and for adolescents the risk is bigger (70%). When parents are obese the risk can be higher.

Besides childhood overweight and obesity, there is the diminished physical activity. Leisure activities with low energy expenditure are the most played between children - electronic toys, video game, computer and television have substituted general physical activities. This situation has huge impact in health. Moreover, the high caloric intake nowadays and the genetics (UKKOLA & BOUCHARD, 2002) can generate changes in body mass and BMI in children and adults (BERKEY et al., 2000; ROWLANDS, et al., 1999).

Although children have a higher physical activity level compared to adolescents and adults (OLIVEIRA, 1996), they are more sedentary and obese than children from the past generation. Researchers demonstrated that children, nowadays, are fatter compared to children from 20 years ago (ROSS & PATE, 1987). The situation is more complicated to female; according to some authors (ELIAKIM, et al., 2001; EPSTEIN, et al., 2001; BOREHAM, et al., 1997) there are significant differences in the amount and intensity of physical activities performed by boys and girls, in which males are more active.

Many authors (RIBEIRO, 2001; BLAAK, WESTERTERP, BAR-OR, WOUTERS & SARIS, 1992), indicate that obesity and morbidity related diseases in children and adolescents are increased by sedentary behavior.

Thus, because physical activity is directly related to the body healthy development and growth, it is necessary that children acquire an active lifestyle and take part of exercise programs to guarantee benefits such as psychological, emotional, social improvement, motor abilities and physical fitness (BAR-OR, 2000; OLIVEIRA, 1996).

The initiative of an active behavior should be taken at the family environment. Parents being active increase the possibility of children being active as well. A research by Moore (1991) showed that children of active mothers are twice more active than the ones of inactive mothers and when both parents are active, a child has 5,8 time more chances to be an active child than their count partners with inactive parents.

The relationship between parents and sons is showed also in issues related to obesity and energy expenditure and there is a variety of results to this relationship. Wurmser, et al (1998), cited by Treuth, Butte and Wong, (2000) showed that prepubescent girls that have both parents obese presented low energy expenditure. However, Treuth and colleges (2000) determine the energy expenditure through calorimetric method and double labeled water in 8-9 year old girls divided in three groups: both slim parents' girls, both obese parents' girls and one obese and the other slim parents' girls. The results of this study concluded that there were no significant differences in the energy expenditure among the three groups and the greater tendency to obesity is not related to the energy expenditure in girls.

There seems to be a constant integration between child and their parents in the lifestyle (MOORE, 1991) and in the nutritional status, according to ENGSTROM & ANJOS (1996), but in studies with the same objective are rare and this difficult the elaboration of programs to prevent sedentary behavior and obesity in childhood. Thus, the purpose of this study is to make a diagnostic if there is a relationship among BMI, socioeconomic status, exercise practice and parents´ habitual physical activity level in schoolchildren aged 7-8 years from particular school system from Curitiba/PR/Brazil.

METHODS

Sample

Fifteen 7-to 8-yr-old schoolchildren of both genders and their parents (15 mothers and 15 fathers) participated in the study. The initial sample was composed by 90 children, however only 15 meet all the criteria: being health, live with both parents, be classified as active or sedentary throughout the physical activity level, parents sign the consent form, parents agree to participate in the study. Written informed consent was obtained form parents. This study was approved by the University of Paraná Human Research Ethics Committee.

Measurement and procedures

Body mass index (BMI)

At first the body mass and stature were collected. Subjects wore comfortable clothes and no shoes and stand in the orthostatic position. Body mass was measured with “FILIZOLA” balance with an accuracy of 100g, for stature it was used a commercial stadiometer. After that, the BMI (kg/m.$^{-1}$) was calculated.

Physical activity level and exercise practice

To assess the physical activity level (PAL) that means all activities performed during the subjects´ routine, the three day diary proposed by Bouchard et al (1983) was used and modified as an interview format (MACHADO, 2002). Throughout two days of the week and one day of the weekend this diary was possible to obtain the total energy expenditure. This instrument has validity and reliable coefficient above 85%. After calculated the PAL, children were subdivided in two groups: sedentary and active groups. The first one is composed of subjects in which the PAL is less than 39,80 Kcal.kg^{-1}.day^{-1} and the second one is composed of subjects in which PAL is above 40,50 Kcal.kg^{-1}. day^{-1}. This classification was established by statistical analyses with more than 200 schoolchildren in previous studies (BRUM, 2004).

To assess the parents' exercise practice, a survey was used in which parents answer if they regularly exercise (at least twice a week and 120 minutes per week) or not. If the answer was positive they were codified as 1 and if not it was codified as 2.

Socioeconomic status

A survey was applied to establish the socioeconomic status based in the ANEP (IBGE 2001). This instrument classifies the families in seven social classes, the higher to the poorer using letters (A1, A2, B1, B2, C, D, E), according to the scholar status of the father, the mother and the families' goods (for example: television, bathroom, servant, etc.). To standardization in the statistic program the social classes were codified in a descendent way (7=A, 6=A2, 5=B1, 4=B2, 3=C, 2=D, 1=E.1). The monetary income was also included.

Statistical analysis

A one-way ANOVA was performed to assess the differences among the variables related to the children (BMI, socioeconomic status, familiar income, exercise practice and parents' PAL). Pearson's product moment correlation was used to determine the relationship among all parameters. A significance level of $p<0,05$ was selected.

RESULTS AND DISCUSSION

There were no significant differences in the comparison among familiar income, social status, BMI, exercise practice and physical activity level habitual between sedentary and active children (Tables 1 and 2).

Table 1: Values of age, familiar income, social status, BMI, % of parents that exercise and physical activity level for sedentary children.

	Mean	Minimum value	Maximal value	Standard-deviation
Child age (years)	8,15	7,27	9,41	0,63
Family income (# minimum wages)	17,88	10,00	21,00	4,88
Social status	5,50	4,00	6,00	0,76
Father's BMI ($kg.m^{-2}$)	26,47	21,71	31,92	3,30
Mother's BMI ($kg.m^{-2}$)	21,79	18,99	27,34	2,70
Child's BMI ($kg.m^{-2}$)	15,60	11,59	19,67	2,65
Father's exercise (%)	62,5	-	-	-
Mother's exercise (%)	75,0	-	-	-
Father's PAL ($Kcal.kg^{-1}.day^{-1}$)	40,87	34,62	54,91	6,73
Mother's PAL ($Kcal.kg^{-1}.day^{-1}$)	44,00	38,47	49,82	3,77
Child's PAL ($Kcal.kg^{-1}.day^{-1}$)	37,31	35,29	39,73	1,31

Table 2: Values of age, familiar income, social status, BMI, % of parents that exercise and physical activity level for active children

	Média	Mínimo	Máximo	Desvio padrão
Child age (years)	8,32	7,87	8,68	0,28
Family income (# minimum wages)	14,14	7,00	20,00	5,37
Social status	5,14	3,00	7,00	1,35
Father's BMI ($kg.m^{-2}$)	27,65	21,55	37,98	5,97
Mother's BMI ($kg.m^{-2}$)	23,60	18,40	38,86	7,05
Child's BMI ($kg.m^{-2}$)	18,95	13,94	32,24	6,07
Father's exercise (%)	71,4	-	-	-
Mother's exercise (%)	42,8	-	-	-
Father's PAL ($Kcal.kg^{-1}.day^{-1}$)	43,07	39,65	52,47	4,60
Mother's PAL ($Kcal.kg^{-1}.day^{-1}$)	42,67	38,43	50,18	3,83
Child's PAL ($Kcal.kg^{-1}.day^{-1}$)	42,90	40,51	45,08	1,79

The family income and the social status were not different between sedentary and active children. Social status mean was 5,0 and 5,14 for active and sedentary groups, respectively. According to the ANEP classification these families are included in the B1 and A2 status. This means that social status were not a intervenient variable in the children physical activity level.

Child's BMI and mother's BMI, in both groups, presented an ideal range. The reference values for BMI for children of this age is about 18,40 kg/m^2 (COLE, 2000) and for adults is 20-25 kg/m^2. However, the father's BMI was above this adult reference indicating an overweight status for both groups.

The physical activity data shows that there were not significant differences between the groups neither to the exercise practice nor to the PAL. In the sedentary group, mothers presented slighter superior values in the exercise adherence (75%) and PAL (44,00 $Kcal.kg^{-1}.day^{-1}$) compared to the father's groups in the same sedentary group (62,5% and 40,87 $Kcal.kg^{-1}.day^{-1}$,respectively). On the other hand, in the active group, the better values of exercise practice and PAL were obtained by the fathers. Maybe fathers exert more influence in the children's lifestyles because in the active group the percentage of fathers that exercise (71,42%) was almost twice the percentage of mothers that regularly exercise (42,85%). To confirm this hypothesis it would be necessary a bigger sample.

Pearson's product moment correlation among all variables is presented in Table 3.

Table 3. Pearson's product moment correlation

	Family income	Social status	Father's BMI	Mother's BMI	Child's BMI	Father's exercise	Mother's exercise	Father's PAL	Mother's PAL	Child's PAL
Family income	1,00									
Social status	0,30	1,00								
Father's BMI	0,37	0,17	1,00							
Mother's BMI	-0,37	-0,01	-0,31	1,00						
Child's BMI	0,43	0,11	0,27	0,05	1,00					
Father's exercise	0,31	0,05	0,39	-0,15	-0,01	1,00				
Mother's exercise	0,17	0,00	-0,02	0,21	0,30	-0,29	1,00			
Father's PAL	-0,60*	-0,25	0,27	0,04	-0,26	-0,15	-0,31	1,00		
Mother's PAL	-0,34	-0,36	0,13	0,11	-0,24	0,32	-0,23	0,36	1,00	
Child's PAL	-0,48	-0,08	0,15	0,24	0,16	-0,19	0,35	0,25	-0,17	1,00

In the correlation results there was a negative result between father's PAL and family income, meaning that the bigger the income the smaller the fathers' PAL. Maybe families with high family income have a longer father's work time, or even because the facilities generated by technology decrease the necessity to perform physical tasks and consequently they decrease total energy expenditure as well.

There is a lack of previous studies to compare our findings because the majority of this kind of research only involves mothers or is made by using surveys to ask to children about the parents' exercise and incentive to children to exercise (WESTERSTAHL, et al., 2005, VILHJALMSSON, et al., 1998).

In study by Westerstahl, et al., (2005) there is a discussion about how far the complexity of variables determines the individual physical activity behavior and the authors point out the positive influence of parents and socioeconomic status in children PAL, such variables can influence children to take part in systematic sport since early childhood. Moreover, compared adolescents from different educational programs, Westerstahl and colleges, find that PAL differences can be explained by socioeconomic status, parents' support, perception of health and negative attitudes toward free physical activity (atividade física ao ar livre). Similar results were obtained by Vilhjalmsson, et al. (1998), in which parents' and familiar's emotional support and best friend physical activity showed strong relation to PAL in Irish adolescents.

In the present study there was no relationship between parents' PAL and child's PAL, which could mean that being active or sedentary is does not depend on the habitual parent's exercise participation. These data disagreed with the study by MOORE (1991) in which the child's PAL is influenced by parents' PAL.

The body composition result compared to PAL did not show significant results, meaning that the child's BMI is not related neither to the subject's PAL nor to the parents' BMI. Similar results were found by Treuth and colleges (2000) in which did not show relationship between energy expenditure or 8-to-9-years old girls and the parent's body composition (obese or not).

Other variables can be involved to the children lifestyle (sedentary or active). Steinbeck (2001) suggests that age, developmental status, gender, socioeconomic status, ethnic, parents being active or not, positive stimuli, aerobic fitness, obesity and genetics should be considered and the possibility of variance in such factors generates differences among children.

CONCLUSION

Socioeconomic status did not differ between the active and sedentary groups because the sample was selected from particular educational system. Moreover, the parents' scholarship, number of goods and family income was similar. Mother's BMI and child's BMI were according to the normal data, however father's BMI indicated overweight. The comparison between sedentary and active children, showed that BMI, exercise practice and parents' PAL did not differ significantly.

Except for the father's PAL and family income in this study, there was no relationship among BMI, socioeconomic status, exercise practice and habitual PAL between parents and their children, indicating existence of others intervenients variables.

One limitation of the present study is the small sample, which is an incentive for other researchers to study the factors that affect the children's lifestyle and what the contributions parents can bring to health and quality of life of their children.

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RELATIONSHIP BETWEEN BMI, SOCIOECONOMIC STATUS, EXERCISE PARTICIPATION AND HABITUAL PHYSICAL ACTIVITY LEVEL OF FATHERS, MOTHERS AND THEIR CHILDREN

ABSTRACT

The purpose of this study is to establish the relationship between BMI, socioeconomic status, regular exercise practice and daily physical activity level of children and their parents from private schools of Curitiba-PR. The sample was composed of 45 subjects (15 eight-year-old school children, 15 fathers and 15 mothers). This sample was divided in two groups: sedentary children and their parents (n=24) and active children and their parents (n=21). At first, all subjects' body mass and stature were assessed, and then the BMI was calculated. A questionnaire was used to assess the socioeconomic status, and the regular exercise practice and habitual physical activity level was determined by using, from all subjects (fathers, mothers and children), a three-day diary (BOUCHARD *et al*., 1983). Group comparisons were made by one-way ANOVA´s and *Pearson* moment product was used to verify the relationship among all variables (P<0,05). The correlation results did not show significant difference between father's physical activity level and the family income (r=0,60), which means that the higher the family income the lower the father's PAL. In this sample, the fact of being either active or sedentary children is not related to the parents´ physical activity. However, more studies, with large sample, are necessary to investigate this issue. **Key-words:** physical activity level, socioeconomic status, parents and children.

LA RELATION ENTRE LE IMC, LE NIVEAU ASSOCIÉ-ÉCONOMIQUE, LE EXERCICE PHYSIQUE ET LE NÍVEAU D'ACTIVITÉ PHYSIQUE HABITUELLE DOS PÈRE, MÉRES ET LE FILS

RESUMÈE

Objectif: vérifier la relation entre lê IMC, lê niveau associé-économique, la pratiques des exercices physiques réguliers et le niveau d'activité physique habituelle et scolaire du filet particulier de l'éducation de Curitiba, Pr et ses pères respectifs. Methodologie: Le groupe été composé pour 45 individus, étant 15 scolaire avec 8 ans, 15 pére et 15 mères. Le groupe se divise dans deux: sédentaire scolaire et ses pères (n=24) et actifs scolaire et ses pères (n=21). Ont été évalué masse corporelle, la stature et le IMC. Por la évaluation le niveau associé-économique et le pratique de l'exercice physique des pères ont été utilisées un entrevue et por la évaluation du niveau d'activité physique habituelle (NAFH) du père, la mère et le fils utilisées entrevue au sujet d'activité quotidienne (BOUCHARD *et al*., 1983). Des analyses de variance (one-way) et corrélations de moment de Pearson ont été utilisées por l'analyse des résultats, avend un niveau alpha établie en 0,05. Résultant: la corrélation il était significative entre le NAFH du père et du revenu familier (r=-0,60), ce qui signifie que plus le revenu de famille est haut plus pal du père est inférieur. Dans cet échantillon, le fait de l'enfant actif ou sédentaire à être n'est pas relié le pratique d'activité physique des pères. Cependant, mais d'études sont nécessaires, depuis l'échantillon de cette étude a été limité dans le nombre d'individus. **Mots-clé:** niveau d'activité physique, niveau associé-économique, pères et fils

LA RELACIóN ENTRE EL IMC, EL NIVEL SOCIO-ECONOMICO, EJERCICIO FISICO E EL NIVEL DE ACTIVIDAD FíSICA HABITUAL DE LOS PADRES, MADRES E HIJOS.

RESUMEN

El objectivo de este estúdio fue verificar la relación entre el IMC, el nível sócio-económico, la practica habitual de ejercicio físico, el nivel de actividad física diaria de alumnos de la red particular de enseñanza en Curitiba, Paraná y el de sus respectivos padres. La muestra fue compuesta por 45 individuos, siendo 15 alumnos de 8 años de edad, 15 padres y 15 madres. Esta muestra fue dividida em 2 dos grupos: alumnos sedentários y sus padres (n=24) y alumnos activos y sus padres (n=21). Inicialmente se evaluaron la masa corporal y la estatura de todos los indivíduos obteniendo el IMC, para el nivel socio-económico e la prática de ejercicio físico de los padres fue usado um cuestionario y para la evaluación del nível de la actividad física habitual (NAFH) del padre, de la madre y del hijo fue usado um recordatorio propuesto por BOUCHARD et al., (1983). Em la análisis estadística fueron calculados las medias y el desvio-patrón ANOVA (one-way) y Correlación de Pearson, com el nível alpha de 0,05. En los resultados de la correlación hubo significación entre el NAFH del padre y el total de lo que gaña la família (r= - 0,60), o sea, cuanto mas grande el poder adquisitivo de la família menos es el NAFH del padre. En esta muestra, el facto del nino ser o activo o sedentário no está relacionado a la práctica de actividad física de los padres. Entretanto, mas estúdios son necesarios, visto que la muestra deste estúdio fue restrita em número de indivíduos.
Palabras-Clave: nivel de actividad físico, nível sócio-económico, padres y hijos

RELAÇÃO ENTRE O IMC, NÍVEL SÓCIO-ECONÔMICO, EXERCÍCIO FÍSICO E NÍVEL DE ATIVIDADE FÍSICA HABITUAL DOS PAIS, MÃES E FILHOS

RESUMO

Objetivo: verificar a relação entre o IMC, o nível sócio-econômico, a prática de exercícios físicos regulares e o nível de atividade física diário dos escolares da rede particular de ensino de Curitiba/Pr e de seus respectivos pais. Métodos: amostra foi composta por 45 indivíduos, sendo 15 escolares com 8 anos, 15 pais e 15 mães, divididas em dois grupos: escolares sedentários e seus pais (n=24) e escolares ativos e seus pais (n=21). Inicialmente avaliou-se a massa corporal e a estatura obtendo-se o IMC, para o nível sócio-econômico e a prática de exercício físico dos pais foi utilizado um questionário e para avaliação do nível de atividade física habitual (NAFH) do pai, da mãe e do filho (a) utilizou-se um recordatório (BOUCHARD *et al*., 1983). Na análise estatística foram calculados as médias e desvio-padrão, ANOVA (*one-way*) e Correlação de *Pearson*, com nível *alpha* de 0,05. Resultados: na correlação houve significância entre o NAFH do pai e a renda familiar (r=-0,60), ou seja, quanto maior o poder aquisitivo da família menor é o NAFH do pai. Conclusão: o fato da criança ser ativa ou sedentária não está relacionado a prática de atividade física dos pais. Entretanto, mais estudos são necessários, visto que a amostra deste estudo foi restrita no número de indivíduos.
Palavras-chave: nível de atividade física, nível sócio-econômico, pais e filhos.