



THE PREVALENCE OF OVERWEIGHT AND OBESITY IN THE CITY OF FLORIANO, PIAUÍ

¹Raíza Campos Sousa, ²Ryanne Wenecha da Silva Gomes, ³Bartholomeu Araujo Barros Filho, ⁴Ayres Fran da Silva e Silva and ^{*5}Maximiliano de Souza Zierer

¹MSc Student of the Professional Master's Degree in Teaching of Network Biology – Prof Bio, State University of Piauí, Campus Torquato Neto, Teresina, Piauí, Brazil

²Biologist, Federal Institute of Education, Science and Technology of Piauí, Campus Floriano, Piauí, Brazil

³PhD in Chemistry, Professor at the Federal Institute of Education, Science and Technology of Piauí, Campus Parnaíba, Piauí, Brazil

⁴MSc in Chemistry, PhD student of the Renorbio Program, Professor at the Federal Rural University of Amazonia, Campus Parauapebas, Pará, Brazil

⁵PhD in Biochemistry, Professor at the Federal University of Piauí, Department of Biochemistry and Pharmacology, Teresina, Piauí, Brazil

ARTICLE INFO

Article History:

Received 28th July, 2018
Received in revised form
29th August, 2018
Accepted 17th September, 2018
Published online 29th October, 2018

Key Words:

Overweight, Obesity, BMI,
Abdominal circumference.

ABSTRACT

Obesity is a chronic disease characterized by excess body mass in the individual who has no single cause and is not defined and is caused by several factors that acting together lead the individual to obesity and to develop numerous diseases that can lead the obese person to death. The research aimed to verify overweight and obesity in a population sample of 352 individuals in the city of Floriano, Piauí. Anthropometric measures were collected, such as height and weight for calculating BMI and abdominal circumference. The prevalence of overweight among those surveyed was 39.5%, and for obesity was 17%. There was a higher prevalence for males for both overweight (41.4%) and obesity (17.2%). The prevalence of overweight and obesity among women was 37.6% and 16.9%, respectively. Regarding abdominal circumference (AC), the female sex presented a higher prevalence for obesity, with 64.6%, while the male sex was only 24.1%. In the association between BMI and CA, it was observed that the female tended to be more obese, with 51.68% presenting values above normal, compared to only 23.56% of males with altered values. We found that the overweight of 39.5% of Floriano individuals was lower than the national standard. Already the prevalence of obesity was in the same level of the national standard of 17%. It is important to note that males presented a higher prevalence of both overweight and obesity, although they showed a lower pre-disposition to abdominal obesity.

Copyright © 2018, Raíza Campos Sousa et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Raíza Campos Sousa, Ryanne Wenecha da Silva Gomes, Bartholomeu Araujo Barros Filho et al. 2018. "The prevalence of overweight and obesity in the city of floriano, Piauí", *International Journal of Development Research*, 8, (10), 23167-23172.

INTRODUCTION

Obesity is a chronic disease characterized by excessive accumulation of fat in the body. In this way it becomes a health risk factor. This increase has no single cause and can be caused by several factors that act together and can lead the individual to obesity and, consequently, to develop numerous diseases that reduce the expectation and quality of life of the

***Corresponding author: Maximiliano de Souza Zierer**

PhD in Biochemistry, Professor at the Federal University of Piauí, Department of Biochemistry and Pharmacology, Teresina, Piauí, Brazil

obese (WHO, 2015). Obesity and overweight do not mean the same thing. Overweight is just a specific increase in weight, since obesity is a chronic disease distinguished as an increase in body adiposity that may generate several other diseases to the individual (TARDIDO, 2006). Obesity and overweight generate increasing expenses due to the increase in their incidence and the various health problems they cause (JUNIOR, 2008). In this way obesity can be considered as one of the greatest public health problems of mankind (MINISTÉRIO DA SAÚDE, 2008). Obesity can be evaluated as an excessive accumulation of body fat to the point of

causing damage to the body, such as breathing difficulties, disorders of the musculoskeletal system, spinal problems, type 2 diabetes mellitus, various types of cancer (breast, kidneys, colon, urinary tract and digestive system), cardiovascular diseases, among other diseases (PINHEIRO, 2004). The etiology of obesity is not easy to understand, with our weight, body composition and energy storage in the form of triglycerides influenced by genetic, environmental and psychosocial factors. The combination of these factors will determine our energy balance in gain or loss of weight. It is believed that the progression of obesity is due more to environmental factors, such as the greater availability and change in the composition of foods and the ease of acquiring them, than the genetic and psychosocial factors (PADEZ, 2002). In fact, it is unclear why an individual becomes obese, but it is believed that genetic, metabolic, nutritional and psychosocial factors acting together are involved in their cause by altering the individual's energy balance for a tending weight gain to an obese phenotype (RAMOS, 2003). For the Brazilian Association for the Study of Obesity and Metabolic Syndrome (ABESO), (Associação Brasileira Para o Estudo da Obesidade e Síndrome Metabólica, 2016), obesity is the result of the interaction of these factors mentioned above such as genes, environment, lifestyles and emotional factors. But of all the occasional factors of obesity already mentioned, genetic inheritance is probably the factor that would least influence the weight gain that would result in obesity.

The existing studies that correlate the genetic factor with the occurrence of obesity, the genotype can not interfere in more than a quarter of the cases of obesity (MENDONÇA, 2004). Similarly, for the Ministry of Health (2008) (Ministério Da Saúde, 2008), the genetic factor would be more as a coadjuvant in weight gain. Thus, obesity is more influenced by poor eating habits and lack of physical exercise to burn excess fat, in addition to the advances in technologies that help the population to reduce energy expenditure in daily activities (MARINHO, 2003). Despite the lack of definition of the causes of obesity, its consequences are clear and the obese person undergoes metabolic alterations that can provoke numerous pathologies in the individual (NEVES, 2009). Among the main diseases, cardiovascular and cerebrovascular problems, diabetes mellitus type 2, systemic arterial hypertension, osteoarthritis, some cancers, coronary artery disease, increased total cholesterol and triglycerides, high LDL cholesterol and low HDL (FERREIRA, 2006; WHO, 1995; PADEZ, 2002 and NEVES, 2009). Faced with the physical problems that the individual can present, the obese does not have a good physical disposition to perform everyday tasks as a healthy individual, because excess fat damages the normal functionality of your body. In addition to the physical damage that obesity causes, this disease can cause serious psychosocial damage in the individual due to the discrimination that obese individuals suffer because they are out of the current standards of beauty.

Obese individuals have a compromised social life and may have serious long-term psychological consequences, such as low self-esteem and depression (ABRANTES, 2003). To measure the body mass of an adult person and classify it as obese, the most used measure in epidemiological studies is the BMI (Body Mass Index) that aims to classify the different levels of body mass (low weight, normal weight, overweight and obesity) (WHO, 2015). Another measure widely used in population studies is the Abdominal Circumference (AC)

measure used to verify abdominal obesity. The concentration of fat in the abdominal region distinguishes abdominal obesity, which is a predisposing factor for cardiovascular diseases and the lack of control of glucose-insulin balance (VELOSO, 2010; MARTINS, 2003 and OLIVEIRA, 2008). CA along with BMI can be used to diagnose the nutritional status of the individual. The World Health Organization (WHO) considers as an increased and risk value for men greater than 102 cm AC and for women, above 88 cm (WHO, 2003). A study evaluating the prevalence of obesity in children, adolescents and adults in the Northeast and Southeast regions of the country with a sample of people from the Survey on Life Standards (PPV) of the Brazilian Institute of Geography and Statistics (IBGE) of 1996/1997 showed that 6.7% of the adult population in these regions were considered obese and 30% were overweight (ABRANTES, 2003). According to data from the Ministry of Planning, Budget and Management (MPOG, 2010), 14.8% of Brazilian adults are obese, with a 16.9% incidence for females 12.5% for males. Studies show that by 2025 there will be three billion overweight and 700 million obese people worldwide (MINISTÉRIO DA SAÚDE, 2008). This study aimed to verify overweight and obesity in a population sample of adults in the city of Floriano, Piauí.

MATERIAL AND METHODS

The research was conducted as part of the project "Detection of suspects and prevention of type 2 diabetes mellitus: an evaluation of the incidence of cases in Floriano-PI." A total of 352 adult volunteers of both sexes, randomly selected, ranging in age from 18 to 87 years, were evaluated. Data collection took place within the Banco do Brasil branch of the center of Floriano city. Data were collected between August and December 2014. The research protocol was submitted to the Research Ethics Committee of the UFPI, before starting the research, and approved with CAAE 18538313.0.0000.5214.

The information was obtained through the application of a questionnaire containing questions with demographic (age, sex), behavioral (physical exercise) and collection of some anthropometric measures (weight and height, to calculate BMI, abdominal circumference). The height in centimeters was measured with tape measure with the bare and erect individuals leaning against a wall, with the heels leaning and arms extended to the side of the body. The weight was measured on a calibrated digital scale (Geratherm brand, Germany) with a capacity of up to 150 kg. Volunteers were instructed to take their shoes off for weight and height measurements. The abdominal circumference was measured at the height of the navel with inelastic tape without pressure on the body of the interviewee, being the same naked at the measurement site, erect and with relaxed abdomen. Weight and height measurements were used to assess BMI, and the calculation was done by dividing the weight of respondents in kg by the squared height given in m². For the individual to be classified as being underweight, he must have a BMI of less than 18.5 kg/m², for normal weight when the BMI is between 18.5-24.9 kg/m², overweight is when the BMI is between 25-29.9 kg/m² and obesity when their BMI is above 30 kg/m². Obesity can also be differentiated into three grades: in class I, the BMI is between 30-34.9 kg/m²; in class II BMI is between 35-39.9 kg/m² and in class III or morbid obesity, when BMI reaches or exceeds 40 kg/m² (WHO, 2003). The data processing was performed using the statistical program SPSS Statistics, version 10.0, and the parameters presented were absolute, relative, mean and standard deviation.

RESULTS AND DISCUSSION

A total of 352 individuals were evaluated, of which 174 (49.4%) were male and 178 (50.6%) were female. The age of the interviewees ranged from 18 to 87 years, with the mean age of participants being 47.05 ± 15.03 years. The nutritional status of the sample was determined using the BMI (Table 1). According to Table 1, 39.5% of the individuals were overweight and 17% presented some degree of obesity, totaling 56.5% of individuals with weight above normal. The prevalence of overweight in our sample was lower than the national average presented by the Ministry of Planning, Budget and Management (MPOG, 2010) in the IBGE's 2008-2009 Household Budget Survey (POF), which revealed that 49% of Brazilians were overweight, compared to 39.5% in our sample.

epidemic both in Brazil and in the world (WHO, 2015). We found 54.5% of the women with BMI above normal, being 37.6% overweight and 16.9% with obesity (Table 1). For males, 58.6% had a BMI above normal, 41.4% were overweight and 17.2% were obese (Table 1). The results obtained by sex were also higher when compared to those of Veloso and Silva (2010) in the study on the prevalence and factors associated with abdominal obesity and overweight in Maranhão adults, in which overweight and obesity were respectively 31.1% and 13% for males and 26.8% and 15.3% for females. Differently from the study by Graciola and Fortuna (2010), in which the frequencies for obesity (19.23% for males 9.52% for females) and overweight (39.95% for males and 30.76% for women) showed a significant difference between men and women, our data showed similar levels between the sexes for overweight and obesity in Florianópolis.

Table 1. Body Mass Index (BMI) by sex

BMI	Gender				Total Freq.
	Male		Female		
	Freq. (n)	M ± SD	Freq. (n)	M ± SD	
<18,5	-	-	3,4% (6)	17,35± 0,63	1,7% (6)
18,5-24,9	41,4% (72)	22,33± 1,73	42,1% (75)	22,74± 1,52	41,8% (147)
25-29,9	41,4% (72)	27,28± 1,46	37,6% (67)	27,39± 1,31	39,5% (139)
30-34,9	13,8% (24)	32,09± 1,15	11,8% (21)	32,45 ±1,53	12,8% (45)
35-39,9	3,4% (6)	36,64 ± 1,37	4,5% (8)	36,65± 1,44	3,9% (14)
>40	0,0% (0)	-	0,6% (1)	46,3± -	0,3% (1)
Total	100% (174)	26,22 ± 4,20	100% (178)	26,21 ±4,70	100% (352)

Frequency = frequency; (n) = number of individuals evaluated; M ± SD = Mean and Standard Deviation

Table 2. Practice of physical activity

	N*	Frequency
Active	135	38,40%
Sedentary	217	61,60%
Total	352	100%

N*= number of individuals evaluated

Table 3. Abdominal circumference (CA) by sex

Sex	CA	M ± SD	N*	Sex Freq.	Total Freq.
Male	≤ 102cm	90,09 ± 7,63	132	75,9%	37,5%
	>102 cm	109,33± 7,06	42	24,1%	11,9%
Total			174	100%	49,4%
Female	≤88 cm	79,92 ± 6,03	63	35,4%	17,9%
	>88 cm	97,46 ± 8,25	115	64,6%	32,7%
Total			178	100%	50,6%

N* = number of individuals in the sample; M ± SD = Mean and Standard Deviation; Sex Freq.= frequency by sex; Total Freq. = total frequency.

However, the incidence of obesity for the Brazilian population in the same study was 14.8%, a lower rate than that found in Florianópolis (17% obese). With higher percentages than those presented by the 2008-2009 POF survey, the Ministry of Health (2012), (MPOG, 2016) found 53.9% of the Brazilian population with overweight and 18.9% had obesity, being that for the capital of State of Piauí (Teresina), the prevalence of overweight was 49.5%, higher than that found in our study, and the incidence of obesity was 13%, below that found for Florianópolis. In the study by Holanda *et al.* (2011) performed in Teresina, Piauí, to verify excess weight and central adiposity in adults, the prevalence for overweight and obesity was 30% and 7.7%, respectively, well below the studies reported here. Our data showed an incidence of overweight in Florianópolis that is lower than the national average, but on the other hand a slightly higher incidence for obesity than the national average, a cause of concern, since obesity is currently a rapidly growing

However, the incidence of overweight was slightly higher among men and the difference in prevalence of obesity between the sexes was not significant (Table 1). In relation to the practice of physical activity, only 38.4% of respondents (135 individuals) reported regularly practicing physical activity, while 61.6% (217 individuals) stated that they did not practice any type of exercise, being therefore the majority of our sample composed of sedentary people (Table 2). The prevalence of overweight and obesity found in Florianópolis (56.5% of individuals weighing above normal, Table 1) may be related to this high sedentary index (61.6%, Table 2). The researches in Brazil point to a frequency of sedentarism among adults varying from 55.8% to 80.8% (23). In the national study of the Ministry of Health (2012) (MPOG, 2016), on the practice of physical activity, only 35.3% of the surveyed teresinenses answered that they practice physical activity in their free time

Table 4. Relationship of BMI to abdominal circumference (CA) by sex

	CA	BMI*					TOTAL	
		LWT	NWT	OWT	OB1	OB2		OB3
Male ^a								
	≤102	-	53,8%(71)	44,7%(59)	1,5%(2)	0%(0)	-	100%(132)
	>102	-	2,4%(1)	31%(13)	52,3%(22)	14,3%(6)	-	100%(42)
Total	-	-	41,4%(72)	41,4%(72)	13,8%(24)	3,4%(6)	-	100%(174)
Female ^b								
	≤88	9,5%(6)	82,5%(52)	8%(5)	0%(0)	0%(0)	0%(0)	100%(63)
	>88	0%(0)	20%(23)	53,9%(62)	18,3%(21)	7%(8)	0,8%(1)	100%(115)
Total	-	3,4%(0)	42,1%(75)	37,6%(67)	11,8%(21)	4,5%(8)	0,6%(1)	100%(178)

a-X² = 100.43 and p = 0.00 and b-X² = 88.03 and p = 0.00. BMI = body mass index; () = number of individuals evaluated; LWT = low weight (BMI <18.5), NWT = normal weight (BMI of 18.5 to 24.9); OWT = overweight (BMI 25 to 29.9); OB1 = class 1 obesity (BMI of 30 to 34.9), OB2 = class 2 obesity (BMI of 35 to 39.9); OB3 = class 3 obesity (BMI ≥40)

without weekly frequency), with 68% of sedentary people in Teresina. It is known that physical activity promotes the burning of calories, helping in weight control and reducing body fat. Many studies indicate that the frequency of physical activity helps to control weight (MINISTÉRIO DA SAÚDE, 2005), substantially reducing the risk of diseases due to overweight, such as cardiovascular and joint diseases (World Health Organization, 2015). Even better is the association of physical exercises with a balanced diet for maintaining weight at a healthy level, reducing the chances of individuals being affected by chronic noncommunicable diseases (CNCD). Despite the growing awareness of the benefits that physical exercise brings to the body's well-being and body weight control, the high level of sedentary lifestyle remains a public health problem that needs to be addressed in our society (LOPES, 2010). Abdominal Circumference (AC) data between the sexes are shown in Table 3. We identified that 44.6% of the total of individuals presented abdominal obesity, being 11.9% male and 32.7% female. These values are higher than those found by Sousa *et al.* (2003), who identified an abdominal obesity rate of 35.1% of the individuals analyzed in the city of Campos, State of Rio de Janeiro. Increased abdominal circumference characterizes so-called centralized obesity and is associated with an increased risk for developing cardiovascular diseases and disorders in the control of glucose-insulin, dyslipidemias and metabolic syndrome (MARTINS, 2003). The result by sex was 24.1% of the total number of men with increased abdominal circumference (42 individuals) and 64.6% of the total number of women with increased AC (115 individuals), and there was a significant difference for AC altered between the sexes (Table 3). We found that for the female sex, only 35.4% (63 individuals) presented normal CA, whereas for the male, the absolute majority with 75.9% (132 individuals) presented normal CA. In the study by Perozzo *et al.* (2008)²⁸ that dealt with the association of dietary patterns with general and abdominal obesity in women living in southern Brazil, an index of only 23.3% of women with abdominal obesity was identified, a much lower number to what we find in Floriano. However, women are at higher risk of developing abdominal obesity (MARTINS, 2003). According to scores obtained from abdominal circumference (Table 4), the results indicated a general prevalence of normal weight, overweight and class 1 obesity of 41.4%, 41.4% and 13.8%, for male, respectively. For females, the overall prevalence was 42.1%, 37.6% and 11.8% for normal weight, overweight and class 1 obesity, respectively.

For males, there was a larger normal weight dimension for an abdominal circumference ≤102 cm with 53.8%, the overweight of 31% was lower for an abdominal circumference >102 cm, and a greater extent for class 1 obesity of 52.3% in males, with abdominal circumference >102 cm. Analyzed the female sex: 1) the largest magnitude for normal weight with 82.5% was for an abdominal circumference ≤88 cm. 2) for overweight the highest proportion with 53.9% for an abdominal circumference >88 cm and 3) for class 1 obesity the highest prevalence, with 18.3%, for an abdominal circumference >88 cm. In all analyzed cases there was a significant difference with p = 0.00 (Table 4). This shows that for overweight the female sex has a strong connection with high abdominal circumference, and our data corroborate with the research performed (MARTINS 2003). Despite the differences found between the sexes, data from our study point to a close relationship for female sex on central fat concentration (AC) according to Graciola and Fortuna (2010).

Conclusion

We found that the overweight level of 39.5% for Floriano was lower than the national standard of 49% found by the Ministry of Planning, Budget and Management (2010), with a sample from all over the country. However, the prevalence of obesity we found was at the same level of 17% of said national sample. Considering overweight and obesity together, more than half of the sample studied (56.5% of individuals) were overweight. Only 38.4% of the respondents said they practiced some kind of physical activity, a low index, which may be related to a high index (56.5%) of individuals surveyed with excess weight. In our study, males presented a higher prevalence of both overweight and obesity (41.4% and 17.2%, respectively), whereas for females we found 37.6% for overweight and 16.9% for obesity. The female sex presented higher CA than the male sex (64.6% and 24.1%, respectively). In relation to CA and BMI, it was observed that females showed a higher propensity to abdominal obesity, with 51.68% (92 females) presenting values above normal, compared to only 23.56% (41 males) with altered values. Given that diseases caused by overweight increase public health costs in Brazil, in addition to having a direct impact on the quality and life expectancy of those affected, and considering the constant growth of obesity figures in the country, our data point to the urgent need for public policies that promote the adoption of healthy living habits, including the practice of physical exercises and the control of body weight through a balanced diet.

Acknowledgment

This research was financed with resources obtained from the Support Program for Scientific and Technological Research through the Pro-Rectorate of Research of the Federal Institute of Piauí (IFPI).

REFERENCES

- MINISTÉRIO DA SAÚDE. *Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico*. Estimativas sobre frequência e distribuição sócio-demográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2015. Brasília, DF, 2016. Extraído de [http://bvsms.saude.gov.br/bvs/publicacoes/vigitel_brasil_2015.pdf], acesso em [01 jan. 2016].
- Abrantes, M. M.; Lamounier, J. A.; Colosimo, E. A. Prevalência de sobrepeso e obesidade nas regiões Nordeste e Sudeste do Brasil. *Rev. Assoc. Med. Bras.* 2003; 49(2), p. 162.
- ASSOCIAÇÃO BRASILEIRA PARA O ESTUDO DA OBESIDADE E SÍNDROME METABÓLICA. *Diretrizes brasileiras de obesidade 2016/ABESO*. São Paulo, SP, 2016. Extraído de [<http://www.abeso.org.br/uploads/downloads/92/57fcc403e5da.pdf>], acesso em: 01 fev. 2016.
- CARVALHO, E. M. G.; RABELO, J. N. Identificação, prevenção e tratamento dos fatores de risco associados à síndrome metabólica em pacientes atendidos no programa integrado de atividade física, esporte e lazer para todos os servidores da UFV campus Florestal: estudo piloto-PIAFEL-EP. *Revista digital FAPAM*. 2009; v.1, n.1, p. 355-366.
- Extraído de [<http://portalsaude.saude.gov.br/dicas-de-saude/404.html>], acesso em: 15 dez. 2015.
- FERREIRA, V. A.; MAGALHÃES, R. Obesidade no Brasil: tendências atuais. *Revista Portuguesa de Saúde Pública*. 2006; vol. 24, n. 2, p.71-81.
- GRACIOLA, C.; FORTUNA, F. V. Descrição do perfil nutricional e alimentar dos funcionários de um serviço público. *ConScientiae Saúde*. 2010; p.39-46.
- HOLANDA, L. G.M. ; MARTINS, M. C. C.; FILHO, M. D. S.; CARVALHO, C. M. R. G.; ASSIS, R. C.; LEAL, L. M. M.; MESQUITA, L. P. L.; COSTA, E. M. Excesso de peso e adiposidade central em adultos de Teresina- PI. *Rev Assoc Med Bras*. 2011; 57(1), p.50-55.
- JUNIOR, J. C. F.; SILVA, K. S. Sobrepeso/Obesidade em Adolescentes Escolares da Cidade João Pessoa-PB: Prevalência e Associação com Fatores Demográficos e Socioeconômicos. *Rev. Med. Esporte*. 2008; vol. 14, n. 2, p.104-108.
- LOPES, V. P.; RODRIGUES, V.; COELHO, E.; MONTEIRO, M. J. *Promoção da Saúde e Atividade Física*: Contributos para o desenvolvimento humano. Centro de Investigação em Desporto, Saúde e Desenvolvimento Humano, p. 1-682. 2010. Extraído de [http://bibliotecadigital.ipb.pt/bitstream/10198/3245/1/Lopes%2c%20Rodrigues%2c%20Coelho%2c%20Monteiro%282010%29_Promo%2c%20a7%2c%20da%20Sa%2c%20bade%20e%20Actividade%20F%2c%20adsica_CIDESD.pdf], acesso em [30 mai. 2015].
- MARINHO, S. P.; MARTINS, I. S.; PERESTRELO, J. P. P.; OLIVEIRA, D. C. Obesidade em adultos de segmentos pauperizados da sociedade. *Rev Nutr*. 2003; 16(2) p. 195-201.
- MARTINS, I. S.; MARINHO, S. P. O potencial diagnóstico dos indicadores da obesidade centralizada, *Rev Saúde Pública*. 2003;37(6), p. 760-767.
- MENDONÇA, C. P.; ANJOS, L. A. Aspectos das práticas alimentares e da atividade como determinantes do crescimento do sobrepeso/obesidade no Brasil. *Cad. Saúde Pública*. 2004; 20(3) p. 698-709.
- MINISTÉRIO DA SAÚDE. Análise da estratégia global para alimentação, atividade física e saúde: documento realizado pelo Grupo Técnico Assessor instituído pela Portaria do Ministério da Saúde nº 596 de 8 de abril de 2004. *Epidemiologia e Serviços de Saúde*. 2005; v.14, n.1, p.41-68.
- MINISTÉRIO DA SAÚDE. *Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico*. Estimativas sobre frequência e distribuição sócio-demográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2007. Brasília, DF, 2008. 135 p.
- MINISTÉRIO DO PLANEJAMENTO, ORÇAMENTO E GESTÃO. Instituto Brasileiro de Geografia e Estatística. *Pesquisa de Orçamento Familiar 2008-2009*. Antropometria e Estado Nutricional de Crianças, Adolescentes e Adultos no Brasil. Rio de Janeiro: IBGE; 2010. Extraído de [http://www.ibge.gov.br/home/estatistica/populacao/condicaodevida/pof/2008_2009_enca_a/pof_20082009_encaa.pdf], acesso em [21 nov. 2015].
- NEVES, C. P.; SILVA, E. F.; ASSUNAO, G. S.; LIMA, J. Q.; JOIA, L. C. A obesidade como fator predisponente da hipertensão nos moradores da cidade de Barreiras-BA. *Revista Movimenta*. 2009; vol. 2, n. 3, p.102-107.
- OLIVEIRA, C. N.; COSTA, R. G.; RIBEIRO, R. L. Obesidade abdominal associada a fatores de risco à saúde em adultos. *Saúde e Ambiente em Revista*. 2008; v.3, n.1, p.34-43.
- PADEZ, C. Atividade física, obesidade e saúde: uma perspectiva evolutiva. *Revista Portuguesa de saúde pública*. 2002; vol.20, n. 1, p. 11-20.
- PEROZZO, G.; OLINTO, M. T. A.; COSTA, J. S. D. ; HENN, R. L.; SARRIERA, J. ; PATTUSSI, M. P. Associação dos padrões alimentares com obesidade geral e abdominal em mulheres residentes no sul do Brasil. *Cad. Saúde Pública*. 2008; 24(10); p.2427-2439.
- PINHEIRO, A. R. O. ; FREITAS, S. F. T.; CORSO, A. C. T. Uma abordagem epidemiológica da obesidade. *Rev. Nutr*. 2004; 17(4): p.523-533.
- RAMOS, A. M. P. P.; FILHO, A. A. B. Prevalência de obesidade em adolescentes de Bragança Paulista e sua relação com a Obesidade no País. *Arq Bras Endocrinol Metab*. 2003; vol. 47, n. 6, p. 663-668.
- SILVA, M. A. M.; RIVERA, I. R.; FERRAZ, M. R. M. T.; PINHEIRO, A. J. T.; ALVES, S. W. S.; MOURA A. A.; CARVALHO, A. C.C. Prevalência de fatores de risco cardiovascular em crianças e adolescentes da rede de ensino da cidade de Maceió. *Arquivos Brasileiros de Cardiologia*. 2005; v.84, n.5, p.387-392.
- SOUSA, L. J.; NETO, C. J.; CHALITA, F. E. B.; REIS, A. F. F.; BASTOS, D. A.; FILHO, J. T. D. S.; SOUSA, T. F.; CÔRTEZ, V. A. Prevalência de obesidade e fatores de risco cardiovascular em Campos, Rio de Janeiro. *Arq Bras Endocrinol Metab*. 2003; vol. 47, n. 6, p. 669-676.
- TARDIDO, A. P.; FALCÃO, M. C. O impacto da modernização na transição nutricional e obesidade. *Rev Bras Nutr Clin*. 2006; 21(2): p. 117-124.
- VELOSO, H. J. F.; SILVA, A. A. Prevalência de fatores associados à obesidade abdominal e ao excesso de peso em

- adultos maranhenses. *Rev. Bras Endocrinol.* 2010; 13(3), p. 400-412.
- WORLD HEALTH ORGANIZATION. *Diet, nutrition and prevention of chronic diseases*: report of a joint WHO/FAO expert consultation. Geneva 2003. Extraído de [http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf], acesso em [17 jun. 2015].
- WORLD HEALTH ORGANIZATION. *Obesity: Preventing and Managing the Global Epidemic*. Report of a World Health Organization Consultation. Geneva 2000. Extraído de [http://whqlibdoc.who.int/trs/WHO_TRS_894.pdf], acesso em [23 jan. 2015].
- WORLD HEALTH ORGANIZATION. *Physical Status: The Use and Interpretation of Anthropometry*. Report of a WHO Expert Committee. Geneva, 1995. Extraído de [http://apps.who.int/iris/bitstream/10665/37003/1/WHO_TRS_854.pdf], acesso em [21 jun. 2015].
