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Cardiovascular Risk in Vegetarians and Omnivores: A Comparative Study

Rita de Cássia Moreira de Almeida Teixeira, Maria del Carmen Bisi Molina, Eliana Zandonade, José Geraldo Mill
Universidade Federal do Espírito Santo - UFES - Vitória, ES - Brazil

Summary

Background: Clinical and epidemiological studies have demonstrated a strong association between eating habits and chronic diseases, particularly cardiovascular events, although not all the mechanisms of action are understood.

Objective: To describe and analyze the cardiovascular risk (CVR) in vegetarians and omnivores residing in Greater Vitória, State of Espírito Santo, Brazil, in the age range from 35 to 64 years.

Methods: To evaluate CVR in the groups, a historical cohort study with 201 individuals was conducted. Sixty seven individuals who had been following a vegetarian diet for at least five years, and who were from Greater Vitória, as well as 134 omnivores participating in the MONICA Project/Vitória matched for socioeconomic class, gender, age and race were included. Biochemical and hemodynamic measurements were obtained in the Cardiovascular Investigation Clinic of UFES. For comparison of proportions, the χ^2 test was used, and the Prevalence Ratio was calculated. The CVR was calculated using the Framingham algorithm for the group as a whole, and for separate genders.

Results: The mean age of the group was 47 ± 8 years and the mean duration of vegetarianism was 19 ± 10 years; the lacto-ovo vegetarian diet was followed by 73% of the vegetarians. Blood pressure, fasting plasma glucose, total cholesterol, LDL-c, and triglycerides were lower among vegetarians (p<0.001). HDL-c levels were not different between the groups. According to the Framingham algorithm, vegetarians had a lower CVR (p<0.001).

Conclusion: Unbalanced omnivorous diet with excess animal protein and fat may be implicated, to a great extent, in the development of noncommunicable diseases and conditions, especially in the CVR. (Arq Bras Cardiol 2007;88(6):624-628)

Key words: Diet, vegetarian; risk factors; chronic disease.

Introduction

A vegetarian diet pattern (VEG) is that where nothing implicating the death of animals should serve as food. Vegetarians do not eat meat or meat products, but may consume milk, dairy products and eggs. This diet, when appropriately planned and balanced, is healthful and provides health benefits, because it acts both in the prevention and in the treatment of diseases[1]. VEG diets are classified as lacto-ovo vegetarian (LOVEG), when they include eggs, milk and dairy products; lacto vegetarian (LVEG), when milk and dairy products are included, and strict vegetarian (SVEG), which does not include any animal product.

Studies show that vegetarians (VEGs) present lower blood pressure levels (from 5 to 10 mmHg) than omnivores (OMNIs)[2] and a lower prevalence of high blood pressure[3], even when their body mass index is similar[4]. Mortality from ischemic heart disease (IHD) was 24% lower among VEGs when compared to OMNIs, and even lower among lacto-ovo vegetarians[5]. The lower cardiovascular risk among VEGs could be partly explained by the occurrence of lower cholesterol levels in these individuals[6]. According to an experimental one-year follow-up study in patients with coronary heart disease[7], vegetarian diets could also reduce coronary stenosis secondary to atherosclerosis. Plaque reduction, albeit modest, could explain the reduction of angina in patients who adopted a VEG diet in this study[7].

Vegetarian diets also comply with the guidelines for the treatment of diabetes, and studies indicate that they reduce the risk for type-2 diabetes. In the "Adventists Health Study", the risk of development of diabetes among VEGs and OMNIs, adjusted for age, was 1 and 1.97 for men, and 1 and 1.93 for women, respectively[3].

Several clinical and epidemiological evidences show that diet is directly implicated in the development of chronic diseases; however, the mechanisms of action are not fully explained, particularly in relation to the cardiovascular risk.

The objective of this study was to determine the prevalence of cardiovascular risk factors in vegetarians and to compare this risk with a control group of OMNIs participating in the MONICA-OMS Project / Vitória.

Methods

This is a comparative observational study. The cardiovascular

risk was considered and investigated as the primary endpoint and the OMNI (with meat) and VEG (without meat) diets, with and without the exposure factor respectively, comprising two groups (one exposed to meat ingestion and the other not exposed). The groups of individuals exposed and not exposed to the Western omnivorous diet were determined at baseline.

Individuals who, during the interview, reported not to consume meat (whether red or white) for at least five years, were classified as VEG. Individuals participating in the MONICA-OMS Project/Vitória who reported not to refrain from eating meat in the questionnaire on eating habits were classified as OMNIs. The MONICA Project/Vitória was developed with the purpose of determining the major risk factors for cardiovascular diseases in the population of the city of Vitória by means of a survey and analysis of socioeconomic, biochemical, and anthropometric data, as well as data on eating and health habits in a probabilistic sample of inhabitants of the city.

The intention to conduct the research was publicized in natural and/or vegetarian restaurants and in Adventist churches in the cities of Vitória and VilaVelha/ State of Espírito Santo as a means to invite VEGs of both genders to participate in the study. Of the 92 eligible individuals, 67 (73%) underwent all the tests required for determination of the cardiovascular risk and answered the questionnaires for acquisition of socioeconomic data, as well as of data on self-reported health and life habits. The questionnaires and protocols for laboratory test performance were identical to those used in the MONICA-OMS Project/ Vitória[8]. The OMNI group was selected from the database of the 1,663 participants of the MONICA-OMS Project/Vitória. For each VEG, at least two OMNIs of the same gender, age, socioeconomic class and race were selected, with the purpose of obtaining a matched sample in relation to these criteria and increasing the power of the statistical tests to be performed. If more than two OMNIs were eligible for each VEG, the choice was made by drawing lots. Although data collection had been made at different moments (1999-2000 for OMNIs and 2003-2004 for VEGs), the method used was the same at the two moments. The study was approved by the Research Ethics Committee of the Center of Health Sciences of UFES and there was no conflict of interest, as was declared by the authors.

The socioeconomic, health, eating habits, and physical activity questionnaire administered during a home visit was elaborated and used during the MONICA Project/Vitória, and the clinical tests were performed at the Cardiovascular Research Clinic of the Postgraduate Program in Physiological Sciences in the two groups studied. During the home visit, personal data were collected, as well as parameters to define the socioeconomic class, level of education, tobacco use (a possible confounding factor, as is the use of alcoholic beverages), and physical activity. In this study, individuals who performed physical exercises at least three times a week for at least thirty minutes per section were considered to perform regular physical activity.

Blood was drawn after a 12-hour fasting, via a deep venous puncture. Blood specimens were analyzed in one single laboratory (SESI Central Laboratory - Vitória) for determination of the lipid profile and fasting plasma glucose. To evaluate the consumption of sodium and potassium, a 12-hour overnight urine quantification of these electrolytes was performed, a protocol that had been validated in a previous study[8].

Blood pressure was measured twice during the clinical visit, in compliance with the guidelines of the Brazilian Society of Hypertension[9]. The measurements were taken by a single trained observer using a mercury sphygmomanometer. Korotkoff sounds phases I and V were used as indicators of systolic (SBP) and diastolic blood pressure (DBP), respectively. Blood pressure of each individual was calculated by the arithmetic mean of the two measurements. The individuals were classified as regards their pressure levels according to the criteria of the V Joint National Committee[10]. Thus, they were classified as hypertensive when their SBP was ≥140mmHg and/or DBP≥90mmHg or also when they reported to use any antihypertensive medication, albeit irregularly.

The risk of development of acute coronary artery disease (CAD), more specifically myocardial infarction, also called "cardiovascular risk" (CVR), was calculated based on the points table developed by the Framingham Study[11]. According to this chart, the risk was calculated for each gender taking seven parameters into consideration, four of which are continuous variables (age, systolic blood pressure, and total cholesterol and HDL-c plasma concentration), and three are dichotomous variables, defined by the presence of cigarette smoking, diabetes mellitus, and left ventricular hypertrophy. All individuals who declared themselves to be "smokers" (whether of paper-rolled or straw-rolled cigarettes) at the moment of the interview, or who reported to have quit smoking for less than six months prior to the interview were considered smokers. Those who declared themselves as occasional smokers were also considered smokers. Individuals were classified as "diabetics" when they presented fasting plasma glucose ≥126 mg/dl or reported use of oral hypoglycemic agents and/or insulin. The presence of left ventricular hypertrophy was detected with resting electrocardiogram (ECG) using the Sokolow-Lyon index ≥ 3.5 mV ($S_{V1 \text{ or } V2} + R_{V5 \text{ or } V6}$) as the cut-off criterion. For each individual, the total score was calculated using the following equation:

$$\Sigma \text{ points} = (\text{Age} + \text{TC} + \text{HDL} + \text{SBP} + \text{SKL} + \text{Smoking} + \text{Diabetes}) \text{ points.}$$

According to the score obtained, the probability of developing coronary artery disease in five to ten years was calculated using the table developed in the Framingham study[12]. CVR stratification in this study was performed according to the Brazilian Society of Cardiology (BSC)[13]: Low risk - event risk < 10% in five to ten years; Average risk - event risk ≥10% but <20%, and High risk - event risk ≥ 20%.

Data regarding continuous quantitative variables are expressed as mean ± standard deviation, and those regarding qualitative variables are expressed as percentages. A bivariate analysis was performed to compare the means, using the Student's t test. Comparison of proportions was performed using the chi-square test (χ^2). The prevalence ratio (PR) was used as a measurement of association. To evaluate the statistical significance of the associations, the null hypothesis was PR = 1. All tests were two-tailed tests and the level of statistical significance was predetermined at 5%. The statistical analysis was performed using the SPSS software program for Windows

(version 10.0.1). Since the sample size was determined by screening the VEGs (total of 67), the test power associated with the study sample size was calculated *a posteriori*. Two controls were defined for each case to increase the test power. The test power associated with the sample size was calculated for the main variables of the study (WHR, overweight, glycemia, hypertension and cholesterol). The minimum power value found was 89%. The EPIINFO software program was used for this calculation.

Results

A total of 67 VEGs and 134 OMNIs of both genders were studied. The mean age of the groups was 47±8 years, and most of the participants were white or of mixed race. A more detailed group description had been published previously[14]. The mean duration of compliance to the vegetarian diet in the group VEG was 19±10 years, and most of the individuals (73%) in this group were lacto-ovo vegetarians. In the sample, 14% were strict vegetarians, 10% were pesco-vegetarians, and only 3% were lacto-vegetarians.

Although no difference had been found between the two groups as regards the frequency of regular practice of physical activities, time spent with physical activities was longer in the OMNI group (62±24min) when compared with the VEG group (49±27min), p=0.037; time spent watching television and/or using a computer was longer in the OMNI group[14].

Mean SBP and DBP were significantly lower (p<0.01) in VEGs (108±16 and 71±10mmHg) than in OMNIs (129±19 and 86±13mmHg). Only one individual in the VEG group reported use of antihypertensive medication, whereas in the OMNI group 22 did so; 50% of them had their blood pressure controlled.

The VEG group had lower BMI and WHR than the OMNI group, although the total caloric intake had been similar in the two groups, as shown in Table 1. However, there was a difference in the balance of the diets, because VEGs ate fewer calories from protein and lipids and more from carbohydrates. All biochemical measurements related to the lipid profile were lower in the VEG group, except for HDL-cholesterol. Fasting plasma glucose was also significantly different (p=0.000) between the groups, and it is worth pointing out that no individuals from the VEG group had levels higher than 125 mg/dl, whereas 14 individuals in the OMNI group had levels higher than that.

VEGs also had lower levels of urea, uric acid, and a better Na/K ratio, because of lower ingestion of sodium, since no difference was observed in relation to the urinary excretion of K.

The prevalence of cardiovascular risk factors in the two groups is shown in Table 2. The total CVR points were significantly lower among VEGs, as shown in Figure 1. Since there was no difference regarding gender and age between the groups, the difference in points is due to the lower total cholesterol and

Table 1 - Anthropometric indicators, calorie consumption, and biochemical measurements according to the type of diet

Measurements and indicators	Vegetarian		Omnivorous		p*
	Mean	SD	Mean	SD	
BMI, kg/m²	22.6	3.1	26.7	5.1	0.000
WHR	0.82	0.08	0.88	0.09	0.000
Calorie consumption, kcal	1,748	504	1,762	543	0.865
Carbohydrates, % of TEV	68	7.8	52	8.4	0.000
Proteins, % of TEV	13	3.4	17	3.8	0.000
Lipids, % of TEV	20	7.1	30	6.9	0.000
Proteins, g/day	58	22	73	27	0.000
Total cholesterol, mg/dl	173	36	225	45	0.000
HDL–cholesterol, mg/dl	45.2	10	45.7	12	0.748
LDL–cholesterol, mg/dl	106	35	151	43	0.000
VLDL-cholesterol, mg/dl	21	12	28	19	0.006
Triglycerides, mg/dl	113	79	156	127	0.004
Glucose, mg/dl	82	10	108	37	0.000
Urea, mg/dl	22.1	6.6	27.3	8.2	0.000
Uric acid, mg/dl	3.8	0.9	4.8	1.4	0.000
Urinary sodium -12 h, mmol	76	41	100	59	0.001
Urinary potassium -12 h, mmol	21	12	23	12	0.492
Na/K	3.8	1.5	4.8	2.6	0.002

BMI - body mass index; WHR - waist-hip ratio; TEV - total energy value; SD - standard deviation. (*) Student's t test.

Table 2 - Percentage distribution of cardiovascular risk factors according to the type of diet					
	Vegetarians		**Omnivores**		**p**
Indicators	**n**	**%**	**n**	**%**	**value***
Cholesterol (mg/dl)					
<200	53	79.0	39	29	0.000
200-239	14	21.0	95	71	
≥240	2	3.0	43	32.1	
HDL-c (mg/dl)					
≥40	46	69.0	87	65.0	0.712
<40	21	31.0	47	35.0	
Glucose (mg/dl)					
<110	66	98.5	100	74.6	0.000
110-125	1	1.5	34	25.4	
Hypertension					
Yes	5	7.4	64	47.7	0.000
No	62	92.6	80	52.3	

Hypertension: SBP >140mmHg and/or DBP> 90mmHg and/or use of antihypertensive medication. (*)Chi-square test.
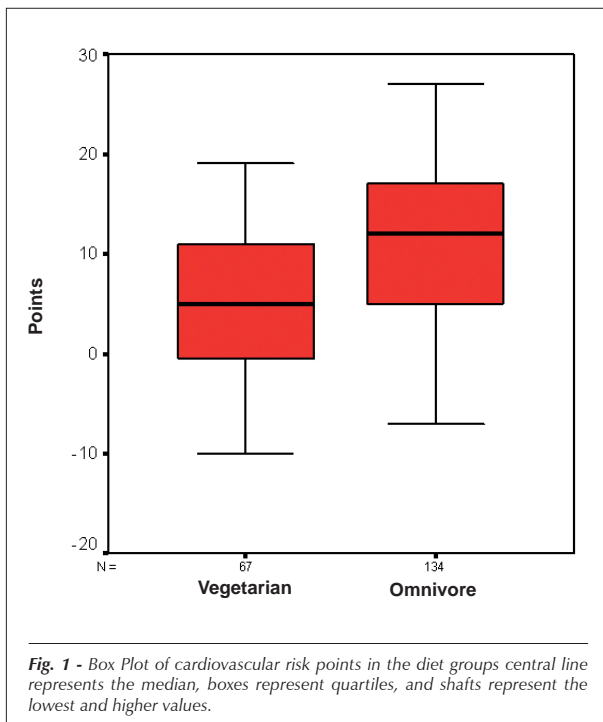

Fig. 1 - *Box Plot of cardiovascular risk points in the diet groups central line represents the median, boxes represent quartiles, and shafts represent the lowest and higher values.*

blood pressure values among VEGs, as well as to the lower prevalence of cigarette smoking and diabetes. Only one OMNI had points attributed to left ventricular hypertrophy.

The probability of developing coronary artery disease in ten years was calculated for the two diet groups studied, and the risk value was plotted as a function of age. In the group as whole (Figure 2), the probability of developing CAD in 10 years

for VEGs and OMNIs was adjusted for the following equations: Probability of CAD = $0.1 \times 10^{-5} \times Age^{3.77}$ and = $0.6 \times 10^{-6} \times Age^{4.1959}$, respectively (age in years). We can observe that the probability curve starts to present an upward inflection after 37 or 38 years in both groups, although more markedly for OMNIs, culminating with a higher than twofold probability for ages higher than 40 years.

We can observe that when VEGs reach the age of 64 years they still have a lower than 10% mean probability of developing CAD in 10 years, and are thus classified as low risk[13], whereas OMNIs of the same age have a higher than 20% mean probability, and are therefore classified as high risk. The mean and standard deviation of the probability of CAD in ten years was 4.0±3.4 (%) for VEGs, and 8.7±7.3 (%) for OMNIs.

Considering that the mean age for women was 47±8 years - therefore perimenopausal women - the probability of developing CAD in ten years was calculated separately (Figure 3). The exponential curves that best adjusted to the points were: Probability of CAD in VEGs = $0.4 \times 10^{-8} \times Age^{5.185}$ and Probability of CAD in OMNIs = $0.5 \times 10^{-8} \times Age^{5.3421}$, with age expressed in years. We can observe that VEG women have a lower than 5% mean probability of developing CAD in 10 years at the age of 64, and are therefore situated within the low risk range, whereas OMNI women of the same age are already situated within the high risk range.

The smoking variable had a statistically significant association with the OMNI and VEG groups (p=0.0023), as did the alcohol consumption variable (p=0.0104). Analyses excluding smokers were performed and we found very similar results for all variables (statistically significant results); therefore we chose to present only the analysis including smokers.

Table 3 reveals that 93% of the VEGs were classified as low risk and 7% as medium risk, while 63% of the OMNIs were
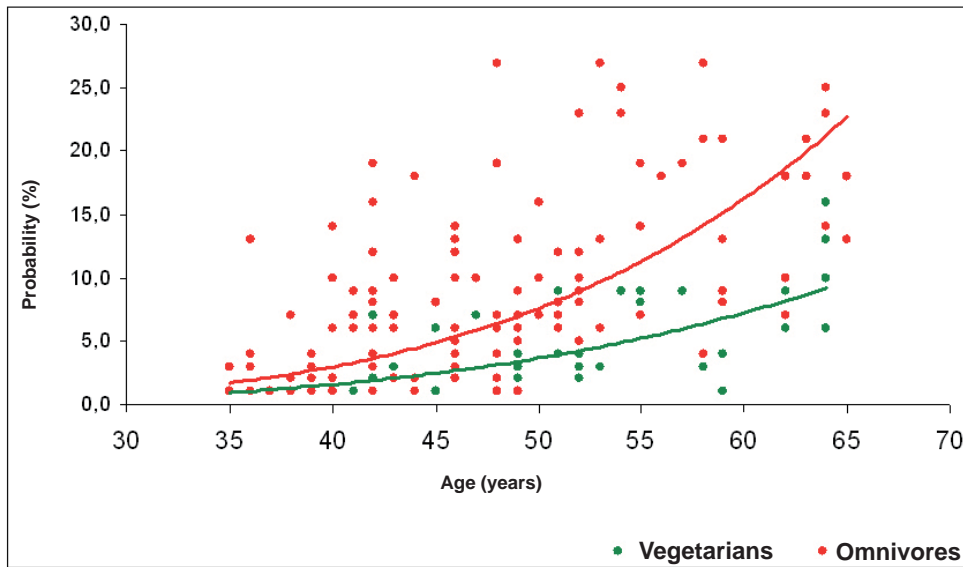
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Fig. 2 - *Probability of developing CAD in ten years as a function of age in vegetarians and omnivores.*
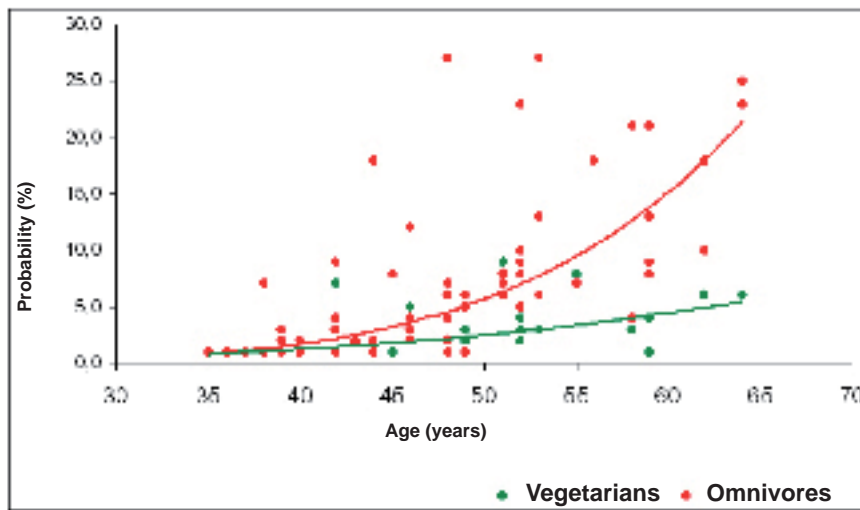

Fig. 3 - *Probability of developing CAD in ten years in vegetarian and omnivorous women.*

classified as low risk, 27% as medium risk and 10% as high risk (p=0.000).

Discussion

Although some food products rich in animal protein and fat, like red meat and sausages, are widely consumed and valued in the Brazilian culture, some people choose not to consume animal food. The number of people who do not consume animal food is excessively small in the Western population, particularly in developing countries such as Brazil, where animal food consumption has continuously increased with income, according to a study performed by the Brazilian Institute of Geography and Statistics (IBGE) in the years of 2002 and 2003[15].

Despite the difficulty in finding people adept to meatless food in Greater Vitória, we could count on the collaboration

Table 3 - Risk stratification of Coronary Artery Disease (CAD) in ten years according to the				
Probability of CAD in 10 years(%)	**Vegetarian diet**		**Omnivorous diet**	
	n	**%**	**n**	**%**
<10% (low risk)	62	93	84	63
>10 and < 20% (average risk)	5	7	36	27
> 20% (high risk)	0	0	14	10

Chi-square test; n - number of individuals.

of 67 persons who informed not having consumed meat in the past five years, which is a remarkable fact for individuals who choose this type of food within our culture. We stipulated this minimum period of five years, considering that the longer the time of vegetarianism, the higher the probability of any effect of this type of diet on health. However, the mean time among the participants in our study was 19±10 years, thus enabling this study to be conducted. According to the initial hypothesis, OMNIs were eating animal protein and fat in excess; this shows that the unbalanced westernized diet adopted by the majority of the population is associated with the occurrence of noncommunicable chronic diseases.

Thus, differences were found with better results for the VEG group in relation to the OMNI group in all cardiovascular risk factors studied, except for HDL-c. Similar results have been found in many trials conducted in European countries and the USA; however, studies are still scarce in South America. Navarro conducted two studies[16,17]. In both, a lower prevalence of cardiovascular risk factors was found in VEGs than in semi-vegetarians and OMNIs.

Would vegetarian diets be a panacea for modern lifestyle diseases? According to Segasothy & Phillips[18] there is considerable epidemiologic evidence suggesting that the vegetarian lifestyle is less associated with diseases such as obesity, diabetes, hyperlipidemia, hypertension, CAD, and some malignancies, which are common in industrialized countries. According to Lessa[19], the clinical expression of noncommunicable chronic diseases occurs after a long period of exposure to the risk factors and of asymptomatic coexistence of the individual with the non-diagnosed disease, even when the risk factors are noticeable. Curiously, the great majority of the risk factors for CVDs is the same for diabetes and chronic kidney disease; it is also shared by a variety of malignancies.

Burkitt was the first to demonstrate this fact in observational studies. After 20 years of epidemiologic studies in Africa, he published several scientific articles in the 1970's[20-23] describing that CVDs, cancer of the colon and rectum, appendicitis, diverticulitis of the colon, and gall stones were uncommon or almost unknown in rural African populations. In parallel, these diseases already had a high incidence in the United States and other industrialized countries[21]. By observing that rural Africans evacuated more than 450g of soft stools once a day, whereas populations from industrialized areas evacuated, on average, 100g of hard, concentrated, difficult to pass stools, Burkitt focused his research on the differences

between the diets of these two populations. He observed that, while rural Africans used whole grains and a small proportion of animal food, inhabitants of industrialized countries used refined grains, especially rice and wheat, animal protein and fat, and little fiber. Intestinal transit time was 15 to 17 hours in Africans and 72 to 80 hours in inhabitants of industrialized areas. Fiber deficiency slows the gastrointestinal transit, thus leading to bile stasis in the colon. The lack of fibers and use of refined grains and sugar result in an increased prevalence of anaerobic bacterial flora in the colon. By acting in the bile salts, this flora chemically degrades them into cholates which are carcinogenic. The author hypothesized that, due to stasis, these carcinogens would remain in contact with the colonic and rectal mucosa for a prolonged time,thus causing the risk of development of cancer in these regions. Additionally, dietary fiber deficiency promotes increased fat absorption because of the slower transit and because fibers adsorb fat, which prevents it from being absorbed into the circulation and eliminates it with the stools[22].

In fact, after the Industrial Revolution, the food industry intensified the process of hulling and refining grains to extend storage life, and foods such as rice and wheat, that were basic for populations, lost 93% of their fibers, 30% of proteins, 71% of mineral salts, and 81% of vitamins. Salt started to be industrially refined, and had its concentration increased by removing other 79 mineral salts, going from 70% to 100% of sodium chloride[24]. The increase in consumption of animal products may likely have occurred to compensate nutritional deficiencies of refined grains.

Urbanization is the major force that affects the worldwide demand for animal products and, according to the WHO[25], the agriculture and livestock farming industries have put enormous pressure for the high nutritional value of animal protein to be recognized. These industries have grown at an unprecedented pace, like a great wave that controls population growth, urbanization and income increase. In developing countries, per-capita meat and dairy product consumption increased by 150% and 60%, respectively, between 1964-1966 and 1997-1999. Worldwide meat production is expected to increase from 218 million (1997-1999) to 376 million tonnes in 2030, and the per-capita consumption may increase by more than 44%[16]. If, on one hand, urbanization has provided the population with better living conditions, on the other hand, it has fostered the growth of noncommunicable chronic diseases. These diseases have accounted for 60% of deaths and disability worldwide and, in a progressive scale, they may reach 73% of all deaths by 2020[26].

The combination of whole rice and legumes (beans, lentils, peas, soy, chickpeas) provides the amount of essential amino acids required by the body, with the advantage of not carrying saturated fat, and in addition to providing an optimal proportion of fibers in the diet. According to Federmann[27], whole grains contain four to five times more fibers than a similar amount of vegetables, and approximately 15 to 20 times more fibers than fruits; they also provide the feeling of satiety and are low glycemic index foods.

In this study, the importance of an appropriate BMI in the prevention of glucose intolerance is observed. However, it is interesting to point out that among OMNIs with glucose

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intolerance, 53% had a BMI ≥30 and 35% had a BMI ≤25. Therefore, lower blood glucose levels in the VEG group seems to result not only from a more appropriate BMI in this group, but also from the lower animal fat ingestion because this is the major differential between the two groups studied.

One of the limitations of this study is the fact that the groups compared are not identical, that is: vegetarians were volunteers and omnivores were selected from a database of a random sample. Additionally, a longitudinal study would have been more appropriate; however the difficulties to conduct this type of study are enormous. Another limitation was that not all eligible vegetarians attended the appointment for performance of the laboratory tests required for determination of the cardiovascular risk. When some of the variables studied were compared between individuals who attended the appointment and those who did not, we observed that the mean age and the percentage of females and males were similar. Duration of vegetarianism was longer (23 years) and most of them were also lacto-ovo vegetarians (73%).

Since 62% of the vegetarians were Seventh-Day Adventists (SDA), an analysis was performed according to the religion (SDA and non-SDA), but no statistical difference was found between these two groups, thus allowing the exclusion of religion as the variable determining the differences found in the calculation of risk between VEGs and OMNIs, which corroborated data from the literature obtained by compilation of large studies that showed a lower incidence of death from ischemic heart disease in vegetarians[5].

Another possible confounding factor in this study could be the fact that there was a greater number of smokers and of individuals who consumed alcoholic beverages in the omnivore group. It is worth pointing out that no questionnaire was administered in relation to alcohol consumption. Data on alcohol consumption among the OMNIs were obtained indirectly (they are reported in the results of the diet record). VEG group individuals were asked whether they consumed alcohol and how often. Studies demonstrate that excess alcohol may contribute to the occurrence of hypertension, hypertriglyceridemia, type-2 diabetes, cancer, liver diseases, pancreatitis, and psychosocial problems[28]. However, according to the WHO[25], there is convincing evidence that regular low to moderate alcohol consumption reduces the risk of coronary artery disease, which would be favorable to the OMNIs.

When an analysis was performed to verify the association between diet and cardiovascular risk without the effect of tobacco use, a similar result was found. Therefore, we can conclude that the major differential between the two groups studied was meat consumption, because most of the vegetarians (73%) in this research also consumed eggs, milk and dairy products. Although all animal products carry a greater amount of protein and saturated fats, the lack of meat in the diet may provide protection to the vegetarian group.

Our initial hypothesis was that OMNIs were consuming an excess animal protein and fat and, therefore, having an unbalanced diet, which is adopted by most of the Western population. This diet, in turn, would be associated with the occurrence of chronic diseases. This type of diet consumed over many years seems to contribute to the atherosclerotic process and the development of ischemic diseases in general.

Conclusion

Despite the great difficulty of intervening with changes in diet habits, it is of the utmost importance to point out the advantages of a diet rich in vegetable products and poor in animal food products in the prevention and control of cardiovascular risk factors. In the case of women, a vegetarian diet may be quite favorable, especially after menopause, given that the cardiovascular risk equals that of men in this phase.

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