REVISTA CHILENA DE PEDIATRÍA
www.revistachilenadepediatria.cl
www.scielo.cl

Rev Chil Pediatr. 2020;91(5):705-710
DOI: 10.32641/rchped.v91i5.2143

ORIGINAL ARTICLE

Vegetarian diets in first year university students

Dietas vegetarianas en alumnos universitarios

Javiera Aravena[a], Tamara Zubarew[b], Paula Bedregal[c], Soledad Zuzulich[d], Pascuala Urrejola[b]

[a]Becado de Pediatría, Pontificia Universidad Católica de Chile. Santiago, Chile
[b]División de Pediatría, Unidad de Adolescencia, Pontificia Universidad Católica de Chile. Santiago, Chile
[c]Departamento de Salud Pública, División de Salud Pública y Medicina Familiar, Pontificia Universidad Católica de Chile. Santiago, Chile
[d]Enfermera Matrona, Dirección de Asuntos Estudiantiles, Pontificia Universidad Católica de Chile.

Received: March 25, 2020; Approved: Jun 25, 2020

What do we know about the subject matter of this study?

Vegetarian diets have increased in popularity and at younger ages. They look healthy, but if they are not balanced, they could result in deficiencies of calcium, omega-3 fatty acids, and vitamin B12, among others.

What does this study contribute to what is already known?

Among the university students surveyed, there is a high percentage of vegetarians. One third started between the ages of 12 and 18. 75.7% obtain information about their diet through digital media. Only half of the total use vitamin B12 supplements.

Abstract

There has been an increase in the popularity of vegetarian diets, especially among adolescents and young adults. These diets seem to be healthy and balanced, but the recommendations are controversial regarding potential nutritional deficits. **Objective**: To identify the frequency and types of vegetarian diet used, their motivation, and sources of information. **Patients and Method**: Cross-sectional analytical study in freshmen students from the Pontifical Catholic University of Chile (PUC). Through an online survey, we collected demographic information and diet characterization of those who considered themselves as vegetarians. Variables were analyzed using IDM SPSS Statistics® software and in Excel® spreadsheet in a quantitative way. **Results**: 152 students answered the survey (15.2% of the sample) and, out of these, 49.4% were vegetarian. 32.4% started this eating pattern between the ages 12 and 18 and among their most frequent motivations were environmentalists (91.9%) and animalists (72.9%). 52.9% of vegetarians take vitamin B 12 supplementation but only 15.9% reported having this deficiency. 75.7% obtain information related to vegetarian diets through digital media. **Conclusion**: In the surveys answered, we found a high percentage of vegetarian students, therefore, health professionals need to be trained in this area to assure adequate nutritional education, supplementation if necessary, and follow-up.

Keywords:
Diet;
Vegetarian;
Vegan;
Adolescents

Correspondence:
Pascuala Urrejola
purrejol@med.puc.cl

How to cite this article: Rev Chil Pediatr. 2020;91(5):705-710. DOI: 10.32641/rchped.v91i5.2143

Introduction

Vegetarianism is a broad term that encompasses a variety of eating practices. A vegetarian is defined as someone who does not include animal foods or parts of them in her/his diet, while vegans do not consume any animal products or their derivatives (Table 1)[1-3]. In recent years, the concept of *flexitarianism* has emerged, which is the practice of being "flexible" about how one is a vegetarian. A flexitarian practices a vegetarian diet but consumes animal products once or twice a week[4,5].

There are multiple reasons for adopting a vegetarian diet including ethical, spiritual, or religious reasons as well as concern for animal welfare or environmental reasons[5-9]. The latter is due to the increasingly frequent disclosure in the media of studies assessing the impact of intensive animal food production on the environment and water resources[10]. A vegetarian diet can also be part of a lifestyle or identity[1,2]. The decision to adopt a vegetarian diet for health reasons may be influenced by the perception of health benefits that appear frequently in the media, as well as by the growing number of epidemiological studies that show an association between this type of diet and the prevention and treatment of some chronic non-communicable diseases and some types of cancer[9,11-13].

However, this dietary pattern can result in low bioavailability of certain micronutrients such as iron, zinc, and selenium, or deficiencies of vitamin B12, vitamin D, and omega-3 (n-3) polyunsaturated fatty acids. This is associated with risk of nutritional deficit, which requires adequate monitoring and nutritional education[5,8,10,12].

In recent years, there has been an increase in the popularity of vegetarian diets, especially among the adolescent and young adult population[1,2,9,14]. Recent studies have found that between 3.3 and 5% of adults and children in the United States claim to be vegetarian and 3.7% claim to be vegan[3,4]. In Europe, the prevalence of vegetarians is as high as 5%[15]. In Chile, there are no epidemiological data on the prevalence or frequency of a vegetarian diet[1,14].

Table 1. Vegetarian diet categories

Diet	Product of animal origin consumed
Lacto-ovo-vegetarian	Only eat dairy and eggs
Lacto-vegetarian	Only eat dairy
Ovo-vegetarian	Only eat eggs
Vegan	It does not consume products of animal origin or their derivatives
Pescetarian	Only consume seafood
Flexitarian	Eat animal products but only once or twice a week

Studies have found that, despite the possible health consequences of a vegetarian diet, less than 10% of vegetarians consult a health professional for nutritional counseling. Most of them, especially adolescents and young people, base their knowledge on sources of information such as social networks or similar and few on professional articles of good quality[1,13].

Given the above, the objective of this research is to identify the frequency and types of vegetarians in first-year university students in Santiago, Chile, in addition to their motivation and sources of information used to follow this type of diet. The results of this study will be useful for future research and to implement preventive measures to avoid short- and long-term health complications.

Patients and Method

We carried out a cross-sectional descriptive study on first-year university students (over 18 years old) of the Pontifical Catholic University of Chile (PUC). The total sample was 4,900 students. The sample was estimated based on the information available in the *Encuesta Nacional de Medio Ambiente* 2018 (National Survey on the Environment)[16]. According to the Survey, the proportion of the population that does not consume milk or eggs is about 3%. Considering a 95% confidence level, with an accuracy of 2%, we estimated a sample size of at least 275 students. Since the method of information collection was through a survey sent by email, and that the average response rate with this method is between 10%-30% (data obtained from the Institutional Analysis and Planning Department of the PUC), it was decided to invite 1,000 students to participate. The sample was obtained randomly from the information in the emails of the PUC first-year students.

The survey sent to the students included demographic information (sex, age, current university degree program), food consumption, and an exclusive area for those who considered themselves vegetarians, where they were asked about the age at which they started the diet, the reasons why they chose it, visits to health professionals history, any health condition (nutritional deficit or disease) since they started the diet, nutritional supplements they are taking, and the sources of information used.

A descriptive analysis was carried out with the data, establishing frequencies, means, ranges, and standard deviation for continuous variables and univariate analyses to identify differences between groups. Non-parametric tests were used to identify differences in the homogeneity of the distribution (Chi^2) and differences in the means (Kruskal Wallis).

All analyses were performed using the IDM SPSS Statistics® software (Chicago, IL, USA), version 20.0, and an Excel® spreadsheet.

The study was approved by the Research Ethics Committee of the Faculty of Medicine of the Pontifical Catholic University of Chile (180318002).

Results

152 students answered the survey, 86% aged between 18 and 20 years, and 72% were women. There were no significant differences between the degree programs in terms of the predominance of any one food pattern.

49.4% of those surveyed considered themselves vegetarians. Out of them, 21.1% lacto-ovo-vegetarian, 14.5% pescetarian, 4.6% vegan, 3.9% flexitarian, 3.3% lacto-vegetarian, and 2% ovo-vegetarian. 7.2% were considering opting for this diet.

Of the vegetarians, 84% were women aged between 18 and 20 years, 43.2% started this diet after the age of 18, 32.4% between 12-18 years, and only 2.7% before the age of 12.

The most frequent motivations for opting for a vegetarian diet were environmental and animalist (Table 2).

33.8% presented a nutritional deficit or some disease from the beginning of the diet (Table 3). 66% received some type of supplementation (Table 4). 42% had checkup visits with a health professional (physician or nutritionist): 30% went once, 30% once a month, and 40% annually.

Regarding the sources of information, 75.7% reported obtaining information from digital media (Table 5).

Discussion

In the Western world, the popularity of vegetarian diets is increasing, especially among youth and adolescents[3,4,15]. Unlike the frequency reported in the literature (3-5%), in the population studied was 51.3%, however, this could be explained by selection bias. As in other studies, most were women (84%)[7]. 4.6% were vegans, which, although higher than that reported in recent publications, in recent years have seen a progressive increase in their prevalence[7,17].

Scientific societies have established that a vegetarian diet, including a vegan one, is suitable for all stages of life if it is well planned and supplemented[1,5,17]. 32.4% of respondents became vegetarian between the ages of 12-18. It should be noted that of the total sample, only 42% had consulted a health professional.

Table 2. Motivations in vegetarian students. N total = 74

Motive	n	%
Environmental	67	91.9
Animals/Animal Abuse	53	72.9
Health benefits	35	47.9
Dislike for the taste of meat	18	24.3
Weight control	6	8.1
Economic reasons	2	2.7
Religious beliefs	1	1.4
Instilled by family	0	0

n = number of students in each motivation category. % = percentage of students of the total in each motivation category.

Table 3. Health conditions in students from the beginning of the vegetarian diet. N total = 74

Health condition	n	%
None	48	66.2
Vitamin B 12 deficiency	13	15.9
Vitamin D deficiency	12	16.9
Iron deficiency	8	11.2
Eating disorder	2	2.8
Celiac disease or Inflammatory Bowel disease	1	1.4

n = Number of students who declare each health condition. % = Percentage of total students who declare each health condition.

Table 4. Nutritional supplements used by vegetarians. N total = 74

Nutritional supplements	n	%
None	25	34
Vitamin B 12	39	52.9
Multivitamin	17	22.9
Vitamin D	15	20
Iron	9	12.9
Omega 3	4	5.7
Zinc	2	2.9
Other	2	2.9

n = Number of students who report consuming each category of nutritional supplement. % = Percentage of total students who declare consuming each category of nutritional supplement.

Table 5. Main sources of information used by vegetarian. N total = 74

Source of information	n	%
Digital Media (forums, blogs, web pages, Facebook, Instagram)	55	75.7
Family and/or friends	34	47.3
Health professionals	33	45.9
Scientific books or journals	28	37.8
Media (television, radio, newspapers)	20	27
None	6	8.1

n = Number of vegetarians indicated by source of information. % = Percentage of total vegetarians indicated by said source of information.

Despite there are several epidemiological studies that show the benefits of practicing a vegetarian diet[9,11-13], a dietary pattern without adequate counseling can result in vitamin and micronutrient deficiencies which imply health risks[3,10,14,17,18].

Thus, the deficit of vitamin B12 is frequent in vegetarians, since it is present almost exclusively in animal products and only in some varieties of algae and mushrooms[4,15,17,19]. Initially, even with adequate plasma levels of vitamin B12, there is an increase of homocysteine levels, which is an independent and irreversible factor for cardiovascular disease. Vitamin B12 deficiency appears as megaloblastic anemia and neurological disorders[4,11,15,20]. Given this, it is recommended that all vegetarians, including lacto-ovo-vegetarians, should receive vitamin B12 supplementation[21]. 15.9% of the population studied reported this deficit, but 52.9% of the total vegetarian population was receiving vitamin B12 supplementation.

On the other hand, in vegetarian diets, the intake of omega-6 polyunsaturated fatty acids (n-6) predominates and the intake of omega-3 (n-3) is deficient, affecting the synthesis of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Several studies have shown that the intake and plasma concentration of EPA and DHA in lacto-ovo-vegetarians and vegans is lower than in omnivores. This can be a health concern since both play an important role in neurological, cardiovascular, cognitive, and other functions. It is possible to maximize the conversion of alpha-linolenic acid (ALA) to EPA and DHA by combining an increase in ALA intake and a decrease in linoleic acid (LA) intake, achieving an optimal n-3/n-6 balance. By consuming chia, flaxseed, nuts, canola oil, and soybean oil or with a supplement you can increase your ALA intake[17,20,22]. In this study, 5.7% reported intake of supplementation with omega-3s, but the composition was not known.

Regarding calcium, dairy products are considered the main source of the diet. Vegetable foods are also high in this mineral but have a lower bioavailability due to the high consumption of fiber, oxalic acid, and phytic acid[8,19]. The impact of this on bone mineralization is under study[20]. On the other hand, the low bioavailability of iron, zinc, and selenium in this type of diet means that the intake of phytates, tannin, and polyols that interfere with their absorption must be reduced, while the intake of citric acid must increase[12,19].

Recently, there has been a warning between a vegetarian diet and possible risk of stroke, however, the possible nutrients involved have not yet been identified[23].

Concerning the sources of information, as in the rest of the world, most of those surveyed (75.7%) are informed through digital media and only 45.9% by health professionals. However (Nevertheless), in a survey carried out in 2019 by Bettinelli et al. to health professionals, it showed that they do not have adequate knowledge about vegetarian diets, their consequences on health, and regarding counseling in the different stages of life[24], which makes it essential to train health professionals on the subject.

The main motivations were environmental (91.9%) and animalistic (72.9%), as in the literature[5-9]. However, dietary guidelines and government reports recognize that plant-based diets affect the environment and health[6-17]. It should be noted that 8.1% follow this type of diet as a strategy to control their weight and 2.8% of vegetarians present an Eating Disorder (disorder). These data are of interest and show the value of always researching their presence in patients who decide to start or maintain this type of diet.

In relation to the limitations of the study, the sample includes only one university in the Santiago Metropolitan Region, thus its results cannot be extrapolated to the Chilean university population. In addition, there was a low percentage of responses to the online survey, but similar to that reported in the literature, allowing for the selection of those students with the greatest interest in the topic.

Despite these limitations, this initial exploratory study contributes to the knowledge of the use of vegetarian diets in university students. There is a need for future multicenter studies of students from different regions to obtain results that can be generalized to the entire population of our country.

Conclusions

There is a high percentage of vegetarians and especially vegans among the college students who answered the survey, meaning that health professionals need to be trained in this area to ensure adequate counseling and follow-up. Studies have shown a protective association between a vegetarian diet and risk factors for chronic non-communicable diseases; however (nonetheless), the international literature has described an increased risk of stroke associated with vegetarian diets[25]. We hope to contribute to the knowledge of the current reality of young people about vegetarian diets, serving as a starting point and basis for future research on the subject.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World

Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

Financial Disclosure

Authors state that no economic support has been associated with the present study.

References

1. Brignardello GJ, Heredia PL, Ocharán SMP, Durán AS. Food knowledge of chilean vegetarians and vegans. Rev Chil Nutr. 2013;40(2):129-34.
2. Parker HW, Vadiveloo MK. Diet quality of vegetarian diets compared with nonvegetarian diets: A systematic review. Nutr Rev. 2019;77(3):144-60.
3. Schürmann S, Kersting M, Alexy U. Vegetarian diets in children: a systematic review. Eur J Nutr. 2017;56(5):1797-817.
4. Derbyshire EJ. Flexitarian Diets and Health: A Review of the Evidence-Based Literature. Front Nutr. 2017;3:1-8.
5. Martínez Biarge M. Niños vegetarianos , ¿ niños sanos? In: 3.0 LE, editor. AEPap Congreso de Actualización Pediatría 2019. Madrid; 2019. p. 65-77.
6. United Nations System Standing Committee on Nutrition. Dietas sostenibles para una población y un planeta sanos United Nations System Standing Committee on Nutrition ES Documento de debate. 2017; https://www.unscn.org/uploads/web/news/document/Climate-Nutrition-Paper-SP-nov-2017-WEB.pdf
7. Pfeiler TM, Egloff B. Examining the "Veggie" personality: Results from a representative German sample. Appetite. 2018;120:246-55.
8. Sebastiani G, Barbero AH, Borrás-Novel C, et al. The effects of vegetarian and vegan diet during pregnancy on the health of mothers and offspring. Nutrients. 2019;11(3):1-29.
9. Bravo JP, Ibarra CJ, Paredes MM. Compromiso neurológico y hematológico por déficit de vitamina B12 en lactante hijo de madre vegetariana. Caso Clínico. Rev Chil Pediatr. 2014;85(3):337-43.
10. Pilis W, Stec K, Zych M, Pilis A. Health benefits and risk associated with adopting a vegetarian diet. Rocz Państwowego Zakładu Hig. 2014;65(1):9-14.
11. Melina V, Craig W, Levin S. Position of the Academy of Nutrition and Dietetics: Vegetarian Diets. J Acad Nutr Diet. 2016;116(12):1970-80.
12. Dinu M, Abbate R, Gensini GF, Casini A, Sofi F. Vegetarian, vegan diets and multiple health outcomes: A systematic review with meta-analysis of observational studies. Crit Rev Food Sci Nutr. 2017;57(17):3640-9.
13. Gorczyca D. Nutritional Status of Vegetarian Children. Veg Plant-Based Diets Heal Dis Prev. 2017;529-47; http://dx.doi.org/10.1016/B978-0-12-803968-7.00030-7
14. Le Roy OC, Díaz San Martín X. Dieta vegetariana en la edad pediátrica. Gastroenterol Latinoam. 2010;21(1):9-14.
15. Elorinne AL, Alfthan G, Erlund I, et al. Food and nutrient intake and nutritional status of Finnish vegans and non-vegetarians. PLoS One. 2016;11(2):1-14.
16. Miniesterio de Medio Ambiente. Informe Final "Encuesta Nacional de Medio Ambiente 2018 " Licitación N ° 608897-110-LE17 Dirección de Estudios Sociales (DESUC) del Instituto de Sociología, Universidad Católica. 2018;1-122; https://mma.gob.cl/wp-content/uploads/2018/03/Informe-Final-Encuesta-Nacional-de-Medio-Ambiente-2018.pdf
17. Lemale J, Mas E, Jung C, Bellaiche M, Tounian P. Vegan diet in children and adolescents. Recommendations from the French-speaking Pediatric Hepatology, Gastroenterology and Nutrition Group (GFHGNP). Arch Pediatr. 2019;26(7):442-50.
18. Serralde-Zúñiga AE, Pasquetti-Ceccatelli A, Meléndez-Mier G. Micronutrimentos en vegetarianos. Rev Endocrinol y Nutr. 2005;13(1):33-8.
19. Mullee A, Vermeire LVB. Vegetarianism and meat consumption: A comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. Appetite. 2017;114:299-305.
20. García-Maldonado E, Gallego-Narbón A, Vaquero MP. Are vegetarian diets nutritionally adequate? A revision of the scientific evidence. Nutr Hosp. 2019;36(4):950-61.
21. Pawlak R, Lester SE, Babatunde T. The prevalence of cobalamin deficiency among vegetarians assessed by serum vitamin B12: A review of literature. Eur J Clin Nutr. 2014;68(5):541-8.
22. Burdge GC, Tan S-Y, Henry CJ. Long-chain n -3 PUFA in vegetarian women: a metabolic perspective.J Nutr Sci. 2017;6:1-8.
23. Lawrence MA, McNaughton SA. Vegetarian diets and health. BMJ. 2019;366:1-2.
24. Bettinelli ME, Bezze E, Morasca L, et al. Knowledge of health professionals regarding vegetarian diets from pregnancy to adolescence: An observational study. Nutrients. 2019;11(5):3-11.
25. Tong TYN, Appleby PN, Bradbury KE, et al. Risks of ischaemic heart disease and stroke in meat eaters, fish eaters, and vegetarians over 18 years of follow-up: Results from the prospective EPIC-Oxford study. BMJ. 2019;366(1).