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ORIGINAL ARTICLE

Exclusive breastfeeding by vegetarian mothers and their possible implications for children

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Abstract

It is known that the period of life between pregnancy and the childs two years of age is critical for the promotion of growth and development, which makes adequate nutrition essential for the complete potential development of each human being. In this sense, the present study aims to discuss the peculiarities of exclusive breastfeeding up to 6 months of life of the infant by vegetarian mothers and its possible implications for the child. This is a narrative review based on the evaluation of protocols by the Brazilian Vegetarian Society, Brazilian Society of Pediatrics and Society of Pediatrics of São Paulo, as well as articles comprised between 1982 and 2020, available in online databases. Human milk contains lipids, vitamins, minerals, proteins, carbohydrates, immunoglobulin A, interferon, enzymes, and growth modulators. This composition is generally similar when comparing vegetarian and non-vegetarian breast milk, however it differs quantitatively. In view of this, in the case of exclusive breastfeeding by vegetarian mothers, medical evaluation is necessary to determine whether there is a need for nutritional supplementation, especially vitamin B12, iron and omega-3. In cases where breastfeeding is not possible, an alternative is infant formulas based on soy or rice. Recent studies show that the growth and development of children fed through soy or rice-based formulas may be similar to that of infants who received exclusive breastfeeding or formula based on cows milk.

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INTRODUCTION

There has been a greater interest in the vegetarian dietary pattern over the years by adults, but also by children and adolescents[1]. Vegetarianism is defined as a diet that excludes all types of meat. Veganism, in turn, adopts strict vegetarianism as food option. This aspect seeks to exclude, as far as possible and practicable, all forms of animal exploitation and cruelty, whether in food, clothing or any other form[2].

The adoption of a certain type of vegetarian diet is often related to the different reasons that lead people to practice this dietary pattern (health, animal welfare, environment, religion, spiritual or ethical reasons)[3]. In Brazil, 14% of the population declares itself to be vegetarian, according to a survey by IBOPE Inteligência conducted in April 2018[4].

According to the Academy of Nutrition and Dietetics (formerly the ADA) and the Regional Council on Nutrition of the 3rd Region (CRN-3), a vegetarian diet can be followed through all life cycles, including pregnancy, lactation and childhood[5]. It is important to emphasize that the period of life between pregnancy and the child's two years of age (1000 days) is critical for promoting the individual's growth and development due to the high rate of cell multiplication. Thus, adequate nutrition in early childhood is essential for the full development of the potential of each human being[6]. In this sense, the present study aims to discuss the peculiarities of exclusive breastfeeding up to 6 months of the infant's life by vegetarian mothers, as well as its possible implications.

METHODOLOGY

This is a narrative review based on the evaluation of protocols and guidelines from the Brazilian Vegetarian Society, Sociedade Brasileira De Pediatria and Sociedade de Pediatria de São Paulo, as well as papers from the period between 1982 and 2020, available in the Cochrane databases, Google Scholar, Scientific Electronic Library Online (Scielo) and PubMed, in English, Spanish and Portuguese. The keywords used in the research were: "vegetarian and non-vegetarian breast milk" AND "vegetarian formula" and "soy formula". Publications were pre-selected according to their titles and, later, studies of clinical trials, reviews, case reports and protocols were evaluated. As inclusion criteria, we considered the presence of methodology in the description of the studies and the discussion on exclusive breastfeeding of infants up to 6 months of age by vegetarian and non-vegetarian women. Then, papers from conference proceedings and duplications in different databases were excluded.

DEVELOPMENT

Nutritional values of human milk

According to the World Health Organization, exclusive breastfeeding up to six months of age has proven benefits for the health of infants, mainly by reducing infectious conditions[7,8]. The nutritional diet of pregnant women directly influences the composition of breast milk, and vitamins A, B, C and D are the nutrients most dependent on the mother's nutrition[8].

Human milk contains lipids, vitamins, minerals, proteins, carbohydrates, immunoglobulin A, interferon, enzymes and growth modulators. This composition is generally similar when comparing the breast milk of vegetarians and non-vegetarians, but differs quantitatively (Table 1), mainly in the amount of fat[9]. Furthermore, a recent study by Pawlak et al. demonstrated that the concentrations of vitamin B12 in the breast milk of non-vegetarians were higher than those of vegetarian women[10].

Table 1. Differences in human milk composition of vegetarians and non-vegetarians.

Composition	Human milk from vegetarians	Human milk from non-vegetarians
Vitamin B12[10]	18.2 %	15.4%
Fatty acids[11]	3.2%	23.96%
Lipids[11]	1.78%	2.13%

Sources:
[10] Pawlak, R. Is vitamin B12 deficiency a risk factor for cardiovascular disease in vegetarians?
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Nutritional deficit in infants of vegetarian mothers and its implications

Nutritional iron deficiency is the most prevalent in the world and its prevalence is even more common in vegetarian children[12]. This happens due to the variation in the bioavailability of this element in its different forms. Heme iron, present in meat and offal, is highly bioavailable and has excellent absorption. On the other hand, non-heme iron, found in vegetables, cereals and fruits, is much less bioavailable, which provides less absorption[3,12,13].

Vitamin B12, in turn, is present in beef, pork, poultry, fish, eggs, offal, and to a lesser extent in milk and dairy products, and is absent in vegetables, except fortified ones[12]. Therefore, non-consumers of animal protein also have an increased risk of vitamin deficiency[14]. In infants and children, this deficiency can generate megaloblastic anemia and/or cause irreversible damage, compromising neurological progress and weight status, one of the most severe complications presented by children of mothers who use vegetarianism without any care or control[3,15,16].

In view of this, vegetarian individuals must have well-planned and elaborate diets in order to avoid any deficiency[12,13]. If the signs, in addition to a good interview, are indicative of a shortage of cobalamin (B12), a laboratory investigation should be initiated and, if the deficit is proven, treatment with administration of vitamin B12 should be initiated[17].

Guidelines on food and supplementation

Breastfeeding should be encouraged to all lactating women, including vegetarians, and should be exclusive until 6 months of age and complemented until 2 years or more[12]. A vegetarian breastfeeding mother must ensure an adequate supply of nutrients through food or nutritional supplements. The European Society for Pediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) warns that a vegan diet in the first years of life is only safe with medical supervision and adequate nutritional guidance. To detect potential nutritional imbalances in lactating women and infants, it is necessary to monitor serum levels of vitamins and minerals[17].

Due to the restriction in the source of vitamin B12, its consumption by vegetarians should be encouraged[12], either through the consumption of foods: eggs and dairy products, an alternative for lacto-egg vegetarians[3], by the addition of vitamin B12 in enriched foods or even through supplementation[3,12], the last two options being the indication for strictly vegetarians[13].

Regarding iron intake, it is known that non-heme iron has its absorption hindered by certain substances, such as zinc supplements, proteins derived from eggs and milk, phytates and polyphenols. Thus, such foods should be avoided by practitioners of vegetarianism[13]. On the other hand, there are substances that promote absorption and, therefore, have their indication guaranteed in this diet, such as, for example, vitamin C and other organic acids, vitamin A, beta-carotene and fruit oligosaccharide[3,13]. The Brazilian Society of Pediatrics recommends iron replacement in infants[12] up to 24 months of age, regardless of the mother's eating habits, or even the child's own[2]. Thus, iron supplementation becomes a must for the pediatric age group[2], with special attention to infants who do not consume animal protein[17].

Breast milk contains sufficient levels of zinc for the infant's needs up to 7 months of age. However, the bioavailability of zinc in products of plant origin is compromised due to the presence of phytates. Therefore, zinc requirements in vegetarians are approximately twice as high as the recommendations, which can lead to a deficiency of this mineral in the maternal milk of vegetarians. For infants whose diet is insufficient in this mineral, supplementation of 4mg of zinc per day should be recommended until 6 months[17].

Due to the fact that serum levels of omega-3 are lower in strict vegetarian pregnant women, these mothers are recommended to consume sources of this nutrient, such as flaxseed and chia oils, flaxseeds and chia seeds, and walnuts. Another option is supplementation through DHA (decosahexaenoic acid) capsules from algae in doses ranging from 200 to 600mg[5].

Iodine deficiency is not common in vegetarians who consume iodized salt. If the salt used is not iodized and/or there is substantial consumption of mustard, broccoli, kale, turnip and/or those who live in iodine-poor areas, fortified foods are indicated[12].

Vegetarian infant formulas

In cases where breastfeeding is contraindicated in vegetarian mothers, or when there are factors related to the infant's health – such as allergy to cow's milk protein, for example, an alternative is infant formulas based on soy or rice[5].

The Brazilian Society of Pediatrics does not recommend the use of soy-based infant formulas for babies younger than 6 months; however, the American Academy of Pediatrics suggests the use of these formulas as an alternative to breast milk from birth in full-term infants of strict vegetarian mothers[5].

Among the advantages presented by soy-based formulas, the fact that they do not contain antibiotics and synthetic hormones stands out. Today, we know that they have adequate nutritional capacity and are able to support the growth of full-term infants from birth, in a similar way to breast milk and cow's milk-based infant formulas. Its consumption should be encouraged up to 6 years of age or more[5,8,18,19].

Although the safety and effectiveness of soy-based infant formula are questionable, studies have shown that patients who used soy showed similar patterns of growth, bone health, metabolic, reproductive, endocrine, immune, and neurological functions to patients fed soy-based formula, cow's milk or who were exclusively breastfed[19-21]. Regarding the effects of phytoestrogens (isoflavones) found in soy-based infant formula, no evidence of an adverse effect was reported. One hypothesis for this is the fact that isoflavones are present in their conjugated form, which is not biologically active[22].

CONCLUSION

In conclusion, it appears that, in case of exclusive breastfeeding by vegetarian mothers, medical and nutritional assessments are essential to establish if there is a need for supplementation, especially vitamin B12, iron and omega-3, in order to avoid possible implications for the infant's development. If breastfeeding is not possible, an alternative is infant formulas based on soy or rice.

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