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Should Plant-Based Beverages be Called Milk?

Abstract

Cow's milk has been consumed around the world for centuries. It is an easily available source of protein and energy. Despite the nutrition advantages of consuming cow's milk, there are different reasons why some part of the population chooses to drink plant-based beverages. Though they are advertised as healthy and wholesome, little research has been done in understanding the nutritional implications of consuming these products in short and long term. Because there is so little research about the benefits of drinking plant-based beverages they should not be labeled as milk

Cover Page Footnote

The Faculty Mentor for this Honors project was Farrell Jenab, English.

Cow's milk has been consumed around the world for centuries. It is an easily available source of protein and energy. Despite the nutrition advantages of consuming cow's milk, there are different reasons why some part of the population chooses to drink plant-based beverages. Though they are advertised as healthy and wholesome, little research has been done in understanding the nutritional implications of consuming these products in short and long term. Because there is so little research about the benefits of drinking plant-based beverages they should not be labeled as milk.

The consumption of bovine milk has been decreasing in the past two decades. At the same time, the alternatives of milk have gained popularity among people with a vegetarian or a healthy diet. But various questions have arisen about the advantages to these plant-based alternatives.

The Merriam Webster dictionary defines milk as "a fluid secreted by the mammary glands of females for the nourishment of their young." This definition does not fit the products that are currently sold as milk alternatives on the market. Although they are popularly advertised as healthy and nutritious, little research has been done in understanding the nutrition implications of consuming these products. Important questions have been raised about the nutritional content compared to the bovine milk and the health benefits for humans.

As an example, the consumption of rice milk as an alternative to cow's milk without the proper care can result in malnutrition, especially in the case of infants because of the difference in their nutrient profile (Katz et al. 2005; Massa et al. 2001).

Cow's milk is an excellent source of protein and provides a wide range of nutrients and vitamins essential for good nutrition, especially for children under the age of eight-years-old (citation). Milk is considered a nutritious food because it provides all the major nutrients like fat,

carbohydrates, and proteins. Although protein malnutrition is a cause of growth failure, it is rarely seen in developing countries such the USA. Few cases have been documented here in our country. However, in the medical literature, several cases of infants were diagnosed with a form of protein-energy malnutrition or kwashiorkor disease while on rice beverage-based diets in the USA (Katz et al. 2005).

The popularity of milk replacing drinks represents a potential malnutrition risk when it is given to infants. Rice drink is an alternative for bovine milk when an infant shows allergy or is lactose intolerant. Rice drink has a low-calorie content, with virtually no protein, and low-fat levels (Massa et al. 2001). Some parents may wrongly assume that rice beverages' nutritional contents are similar to those of the breast milk or cow's milk. Other parents could have imposed their preferences for alternative "trendy" foods advertised heavily on social media or they had succumbed to peer pressure. Others might be attempted to deal with true or perceived food allergies. Occasionally, the ingestion of new or contaminated food in infants have a severe adverse digestive reaction, and parents could mistakenly blame milk as a direct source of the ailment. It does not matter the religious, cultural and socioeconomical background of families dealing with sick infants due to the lack of sufficient protein in their diets. Kwashiorkor disease has been reported in infants in different socioeconomic groups (Liu et al. 2001).

Furthermore, this rice milk does not meet the minimal recommendations for infant formulas and does not meet the essential nutrition requirements. Self-made or store-bought grain milk like soya, rice, almond or oat milk might not suitable for infant nutrition and possible never be recommended by any physician or dietician. It is important to stress the importance of the dietary balance in infants with failure to grow due the replacement of breast or cow's milk for a grain beverage. These infants are in a great risk of kwashiorkor disease and underdevelopment.

Grain drinks are not alternatives to cow's milk and might pose a serious risk for the development of protein malnutrition (Katz et al. 2005). Manufacturers of rice beverages should appropriately warn parents about the danger of using their products as infant nourishment. Kwashiorkor cases may be prevented by clear and visible warnings on the packaging and websites of these alternative foods. Also, pediatricians, dietitians, and parents should be educated about the lack of nutritional content of these trendy rice beverages.

In most cases, there is no reason to feed children plant-based beverages. In humans, breast feeding has a positive impact on the child's nutritional and health wellbeing. There are different personal and clinical reasons why a new mother could not be able to breastfeed. It is well known that breast feeding is protective in nature. Some protective benefits of breast feeding include preventing diarrhea, fevers, ear and respiratory infections. The protective effects of raw cow's milk on infections were comparable to those of breast-feeding, indicating similar properties in preventing infections (Loss et al. 2015).

Studies have shown that milk produced by cows boosts the under developed immune system of infants but there is a limited clinical information and more studies need to be done comparing the nutritional and immune boosting properties of these two milks. Dr. Kasper Hettinga et al. explored this subject in his study "the host defense proteome of human and bovine milk". Dr. Hettinga and colleagues compared the differences in host defense proteins between human and bovine milk. To study the milk proteome, milk is separated into three protein factors: caseins, serum, and milk fat globule membrane (MFGM). "To begin, the whole milk is separated into cream and skim milk. The cream contains the milk fat, which is present in globules. These globules consist of a triglyceride core surrounded by the MFGM, derived from the apical membrane of the milk epithelial cells. The protein component of the MFGM can be isolated from

the cream. The skim milk can be centrifuged to obtain a casein pellet and a supernatant containing the serum proteins. The pellet is used for proteomic analyses” (Hettinga et al. 2011).

The study identified 44 human milk and 51 bovine proteins were identified as host defense-related system. “Of these proteins, 33 were found in both species but in different quantities. High concentrations of proteins involved in the mucosal immune system, immunoglobulin A, CD14, lactoferrin, and lysozyme, were present in human milk. Newborns are known to be deficient for at least two of these proteins, immunoglobulin and CD14. On the other hand, antimicrobial proteins (5 cathelicidins and lactoperoxidase) we abundant in bovine milk. The high concentration of lactoperoxidase is probably linked to the high amount of thiocyanate in the plant-based diet of cows. This is a milestone in understanding the function of milk in the development of the immune system of these two mammals” (Hettinga et al, 2011).

Another study done by Dr.Loss et al. study demonstrated that the consumption of raw cow’s milk reduced the risk of respiratory infections and fever in the first year of life by 30% (2015). The study followed 983 infants from rural areas in Austria, Finland, France, Germany and Switzerland, for the first year of life. Parents reported information on feeding practices, farm related exposures, and the track of infections on weekly diaries for 53 weeks. The milk consumed by infants were pasteurized milk, farm milk, boiled farm milk, and raw milk. The quantity of milk given to the children was also entered in the weekly diary.

The main finding of this study was an inverse association between the consumption of unprocessed cow’s milk and rhinitis (common cold), respiratory tract infections, and otitis (ear infection). Consumption of raw cow’s milk demonstrated to be the strongest on preventing these infections in infants. Infants are more susceptible to infections because their immune system is undeveloped. For this reason, this age group might benefit the most for the stimulation of

antibody formation quality of the unprocessed cow's milk (Loss et al. 2015). Boiled farm milk reduced the benefit of preventing infections on infants. Despite the heat treatment, boiled raw milk maintained some protective properties of raw milk but still more protective than pasteurized/store bought milk. One explanation is the viable probiotic organisms that are present in raw milk but are removed by centrifugation in the industrialized process (Loss et. al 2015). In a way, cow's milk might provide immunity to humans similar to breast milk. On the study previously named, children consuming raw cow's milk were less affected by common infections and fevers as compared with children fed with processed milk. Though in most European countries, consumption of raw milk is actively discouraged, it is still practiced by many farming families. Different industrial processes done to cow's milk can affect negatively these findings. Centrifugation, fat separation, homogenization, and heat treatment can alter the beneficial nutritional value of cow's milk (Loss et. al 2015). Studies, literacy or data about plant-based beverages proving to be similar to bovine milk in this area were found.

In industrialized countries, like ours, the idea of consuming raw cow's milk is daunting. The risk of serious infections that can be transmitted by raw milk like tuberculosis, brucellosis, listeriosis and ischemia coli might stop consumers from exploring the idea of buying cow's raw milk and feed them to their family (Loss et al. 2015). If the general conception of health hazards of raw milk could possibly be overcome, the positive public's health impact of minimally processed milk ingestion might be enormous. Preventing respiratory infections, fevers, digestive tract infections and asthma related hospitalizations is better than treatment them. Dairy farmers, milk companies, microbiologists, and health protection agencies should work together to produce a minimally processed safe cow's milk to offer to the public. Currently, milk is a basic, popular and nutritious food welcomed in millions of homes around the world. If we add a major

qualification to it, like the health value, we might be changing a whole new generation of people in how to boost their immune system since the beginning of life.

Finally, consumers of cow's milk are aware what they are ingesting when pouring a glass of milk. There is not confusion about what is the main component in a store-bought gallon of milk. It is a different story when it comes to based-plant beverages. The National Milk Producers Federation (NMPF) have urged the Food and Drugs Administration (FDA) for the last 20 years to stop soy, almond, rice and oat beverages from using the term milk (Vox, 2018). "Fake milk", is an adjective dairy milk producers bitterly use to describe plan-based beverages. Dairy producers argue that plant-based milks companies are playing "fast and loose using standardized dairy terms" and that is unfair to them because plant-based products do not have the same nutritional profile, taste, but most important take advantage of the "milk" brand. (Vox, 2018).

"An almond does not lactate, I will confess," declared FDA commissioner Scott Gottlieb at the Politico discussion (Politico, 2018). The FDA has proposed enforcing its own labeling rules for milk which could prevent producer of plant-based beverages from continuing using the term. The definition of milk according to the FDA website is "the lacteal secretion, practically free from colostrum, obtained by the complete milking of one or more healthy cows" (FDA, 2019).

At stake is what the FDA calls "standards of identity". This term is the legally binding definitions of products to ensure consumers know what are getting. On a statement made by FDA commissioner Dr. Gottlieb on modernizing standards of identity and the use of dairy names for plant-base substitutes announced that the "consumers should be able to know at a quick glance what type of product they are purchasing for themselves and their families. Implementing clear and transparent food labels and claims is an issue I've made a high priority... The wide

variety of plant-based foods that are being positioned in the market as substitutes for standardized dairy products has been the subject of much discussion... the rising demand of plant-based products...has created a number of growing number of new food in supermarket aisles. However, these products are not foods that have been standardized under names like “milk”...The FDA has concerns that the labeling of some plant-based products may lead consumers to believe those products have the same key nutritional attributes as dairy products, even though these products can vary widely in their nutritional content”(FDA, 2018).

But the agency has not sent out any notices to companies that use the term “milk” to describe beverages made of plants or nuts. Instead the FDA extended the comment period by 60 more days on the request for information on labeling plant-based products with names that include the names of dairy foods such as “milk”, “yogurt” and “cheese”. The original comment period was scheduled to end on November 27, 2018 and then was scheduled to run until January 25 2019. The reason according to the FDA was to request more comments “from interested persons to provide input without significantly delaying potential further action on these important issues” (FDA, 2019). The FDA is trying to modernize standards of identity of new certain foods or food definitions that are outdated. The FDA cannot just change the way it enforces a standard without warning, Gottlieb said. The FDA will have to first develop guidance notifying companies of the change and ask public comment (Choi, 2018).

The NMPF stated “Consumers deserve accurate and honest information about food choices.” A survey conducted by the research firm IPSOS, commissioned by the Dairy Management Inc., found that 61% believed that the FDA should restrict non-dairy beverages companies from using the term “milk” (IPSOS, 2019). In another survey performed by IPSOS 73% of consumers believed that almond-based milk has as much protein per serving than milk.

In reality milk has eight times more protein. 53% said they believed that plant-based producers labeled their products “milk” because their nutritional value is similar, which is incorrect. (Food navigator, 2019). Even a research founded by plant-drink processors showed consumers confusion. According to a study from the International Food Information Council Foundation, 25% of consumers of coconut, soy, and almond beverages either thought that those drinks contain milk or were not sure whether they did (food Insight, 2019).

The FDA has concerns about the labeling of some plant-based beverages, which can vary widely in their nutritional content, is leading consumers to believe they are equally in nutritional value as bovine milk (FDA, 2019). The abundance of plant-based dairy alternatives is certainly a concern for the dairy industry. Senator Tammy Baldwin introduced the DAIRY PRIDE Act on January of 2017 (Science meets good, 2019). The purpose of the DAIRY PRIDE Act is to prevent misbranded foods from entering commerce, in other words, products that use a dairy product name, but no meet the criterion of dairy products as established by the FDA (Science meets food, 2019).

Jim Mulhern, the president of the NMPF stated to the FDA that in countries like Canada, the UK, and the European Union actively prevent improper labeling of imitation products. “These countries prove that by actively enforcing standards of identity, dairy-free alternatives and real milk can co-exist without conflict” (Science meets food, 2019). It is clear that given the current FDA definition of dairy and dairy products, plant-based dairy alternatives do not meet the Standard of Identity for these products. Therefore, some form of regulatory change regarding the labeling of these products is inevitable.

In conclusion, the market for plant-based alternatives to dairy products continues to grow, as lactose intolerance, dairy allergy, veganism, environmental and health concerns lead

Americans to look for alternatives to dairy. It is important to understand the nutrient profiles of plant-based beverages, how are made, and the additions made to them like thickening agents, stabilizers, artificial flavorings, and sweeteners. This process results in a beverage with a nutrient profile very different from the original recipe. Regarding the nutritional concerns, if milk substitutes are being used to replace cow's milk in the diet, it is important to be aware that they are not nutritional equivalent. "Dairy products are an important source of nutrients that American tend to fall short on," says Alice H. Lichtenstein, senior scientist at Tufts' Human Research Center.

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