



## Chocolate Milk as Part of a Healthy Diet



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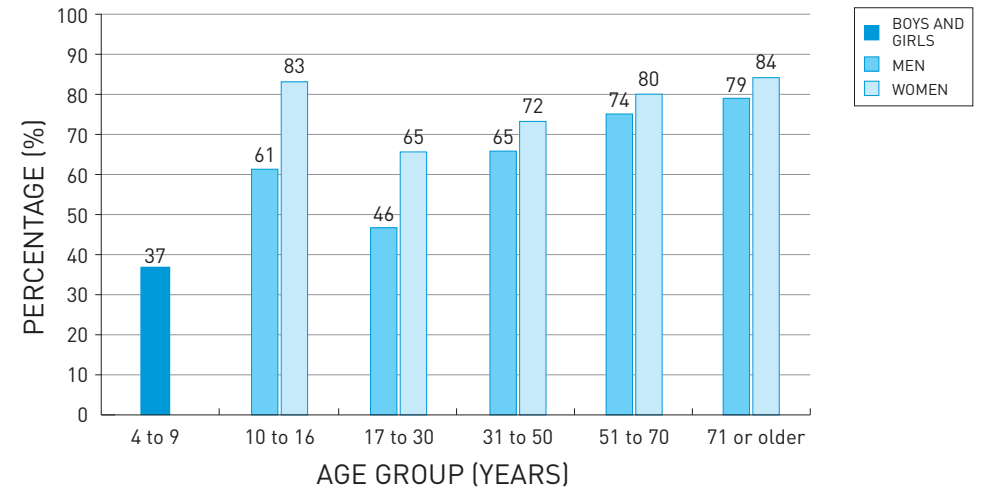
## Introduction

This document is based on scientific literature and features current information that answers questions raised about the role of chocolate milk in the diet of Canadians. Several studies show that chocolate milk and flavoured milk (e.g., vanilla, strawberry) have a place in a healthy diet. They provide a good alternative for people who do not like the taste of white milk or who find it challenging to consume the recommended daily servings from the *Milk and Alternatives* food group. These beverages can therefore represent a solution to the underconsumption of milk products in Canada.



## Milk products underconsumed

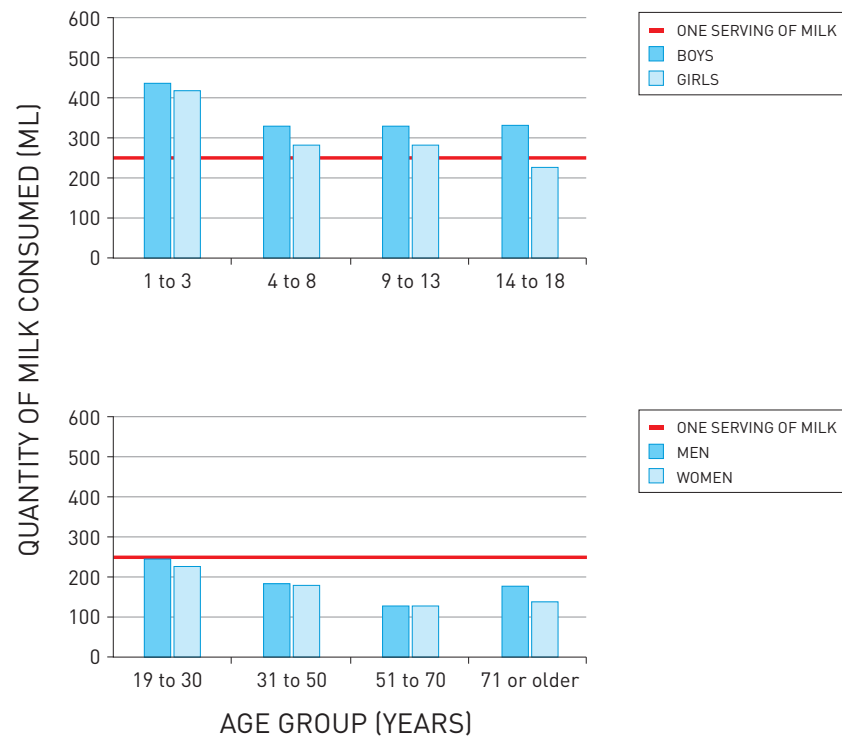
Data from the most recent national study on Canadians' eating habits show that a large proportion of Canadians consume fewer than the minimum number of recommended servings from the *Milk Products*\* group (Graph 1).<sup>1</sup> For example, more than one third of children aged 4 to 9 years and more than two thirds of adults aged 30 years and older consume fewer than two servings of *Milk Products*\* a day.



**Graph 1.** Percentage of the Canadian population that consumes fewer than the minimum number of recommended servings from the *Milk Products*\* group<sup>1</sup>

<sup>1</sup>The term "Milk Products" is used in accordance with the terms used in the *Canadian Community Health Survey*,<sup>1</sup> published in 2004. At that time, the *Milk and Alternatives* group was named "Milk Products."

The average daily consumption of milk tends to decrease with age in both adults and children (Graph 2).<sup>2,3</sup> Milk consumption in adults is estimated at half a serving (125 mL) a day (Graph 2).<sup>2</sup> Unfortunately, the consumption of yogurt and cheese is not enough to compensate for the population's low consumption of milk. When the consumption of milk products is not optimal, the intake of calcium, potassium, magnesium, zinc, vitamins A and D, riboflavin and folate is limited.<sup>4</sup>



**Graph 2.** Daily consumption of milk (in mL) in Canadian children (top), adolescents (top) and adults (bottom)<sup>2,3</sup>

## Nutrient value of chocolate milk

Just like white milk, chocolate milk is a nutrient-rich food.<sup>5</sup> It contains the same amounts of vitamins and minerals as white milk. In fact, it contains 16 essential nutrients, including high-quality protein. Furthermore, chocolate milk contains calcium that is well absorbed by the body.<sup>6</sup> Two 250-mL servings of chocolate milk provide more than 50% of the recommended daily intake of calcium for adults 19-50 years of age. For children and adults who are not able to drink enough milk, chocolate milk is a good way to support an adequate intake of calcium and vitamin D.<sup>7</sup>



It is interesting to note that chocolate milk does not contain more carbohydrates than an identical amount of 100% pure apple juice. Limiting its consumption because of sugar content may contribute to a lower consumption of foods from the *Milk and Alternatives* group,<sup>8</sup> thereby reducing the intake of certain essential nutrients, such as calcium, vitamin D, potassium and magnesium.<sup>9</sup>

A study was carried out in 58 schools to evaluate the impact of the availability of chocolate milk on students' milk consumption.<sup>10</sup> When chocolate milk was withdrawn from the menu, total milk consumption decreased by an average of 35%. The schools that chose to withdraw chocolate milk from the menu for a second consecutive year continued to observe a decrease in milk consumption. In fact, students consumed 37% less milk than they did when chocolate milk was offered. Studies conducted to date show that children and adolescents who drink chocolate or flavoured milk consume more milk than those who consume only white milk.<sup>7,8,9,10</sup>

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Furthermore, flavoured milk consumption by children and adolescents is negatively associated with consumption of soft drinks and fruit-flavoured drinks.<sup>7</sup> Another interesting fact: added sugar intake among children and adolescents who drink flavoured milk is not higher than that among those who do not drink these types of milk.<sup>7</sup> Flavoured milk consumption also has a positive influence on nutrient intake.<sup>7,9</sup> For example, children and adolescents who consume flavoured milk or white milk have significantly higher intakes of calcium, phosphorus, magnesium, potassium and vitamin A compared with those who do not.<sup>9</sup> Since they consume more milk overall, children and adolescents who drink flavoured milk have higher intakes of calcium compared with those who drink white milk exclusively.<sup>7</sup>

NUTRIENTS	Amount or % DV*	NUTRIENTS	Amount or % DV*
Fat	2.6 g	Vitamin B <sub>6</sub>	6%
Carbohydrate	28 g**	Vitamin B <sub>12</sub>	45%
Protein	9 g	Pantothenic acid	10%
Potassium	13%	Folate	6%
Vitamin A	15%	Calcium	30%
Vitamin D	50%	Magnesium	15%
Thiamin	8%	Phosphorus	25%
Riboflavin	25%	Zinc	10%
Niacin	10%	Selenium	10%

**Table 1.** Nutrient value of 1% chocolate milk (250 mL or 1 cup)

\* These are average values taken from the *Canadian Nutrient File*. Actual nutrient content may vary from one product to another.<sup>5</sup>

\*\* Including approximately 13 g from lactose.

% DV: Percent daily value.

## Weight and body composition

To date, studies seem to show that chocolate milk consumption does not have any adverse effects on weight.<sup>9,11</sup> For example, a group of researchers evaluated the effects of chocolate or flavoured milk consumption on energy intake and body mass index in 8181 children and adolescents aged 2 to 18 years.<sup>9</sup> The results of this study suggest that chocolate milk consumption did not have any adverse effects on the total energy intake, weight and body mass index of young people.

Furthermore, a clinical study of 98 children aged 8 to 10 years who regularly consume soft drinks was conducted.<sup>11</sup> The results showed an improvement in the body composition of children after their daily soft drink consumption was replaced with approximately two servings of flavoured milk.<sup>11</sup> The results of these studies are in keeping with the results of other studies, which indicate that children and adolescents who consume nutrient-rich foods to which sugar is added, such as flavoured yogurt or milk, improve the quality of their diets without any adverse effects on their weight.<sup>12</sup>

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## Bone growth and development

The positive relationship between good bone and dental health and a number of nutrients in milk has been clearly demonstrated in scientific literature.<sup>13</sup> In addition to calcium, milk contains several nutrients (e.g., vitamin D, protein, potassium, phosphorus, magnesium) that play a role in attaining and maintaining maximum bone mineral density.<sup>14,15</sup> An inverse relationship between milk consumption and the risk of bone fractures has been observed in several studies.<sup>16,17</sup>



The proteins found in milk are of high quality, as they provide all of the essential amino acids. Since bones are composed of 50% protein, an adequate intake of this nutrient is necessary to attain and maintain good bone health.<sup>18</sup> Calcium not only provides benefits for bones but is also necessary for muscle contractions, blood pressure regulation and blood clotting. To allow the body to fulfil these functions without taking the calcium it needs from bone stores, meeting the recommended dietary intake for calcium is essential.

In Canada, it is mandatory for white milk, chocolate milk and flavoured milk to be fortified with vitamin D. Vitamin D3, also called 25-hydroxycholecalciferol, is the form generally used in milk products because it allows the body to use calcium and phosphorus most effectively.<sup>19</sup> Vitamin D contributes significantly to the integrity of bones and teeth. An adequate intake of vitamin D has also been associated with a decreased risk of osteoporosis and rickets, two diseases that affect the skeletal system.<sup>20,21</sup>

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## Sugar and hyperactivity

Since it contains added sugar, chocolate milk is sometimes wrongly accused of making children hyperactive. Many clinical studies have been conducted to evaluate the effect of various sugar quantities on the behaviour of children. In a 1995 meta-analysis, the results of scientific papers featuring double blind clinical interventions were evaluated to determine the effect on behaviour of various sugar quantities in children's diets.<sup>22</sup>

The behaviour of children after sugar consumption was evaluated based on observations and questionnaires completed by parents or educators. Several behavioural and cognitive variables were measured in each study. After the results of these studies were compiled, it was impossible to establish a causal link between sugar and cognitive performance, hyperactivity or attention level of children, even in children suffering from an attention deficit disorder or hyperactivity.<sup>22,23</sup> It is rather the special or festive context (e.g., a forbidden food, a friend's birthday, Halloween, Easter) during which the child receives a sweet food, and not the sugar itself, that is thought to cause hyperactivity.<sup>22</sup>



**It is impossible to establish a causal link between sugar and cognitive performance, hyperactivity or attention level of children.**

## Caffeine

A 250-mL serving (1 cup) of chocolate milk contains 5 mg of caffeine, an amount comparable to that found in a cup of decaffeinated coffee.<sup>5,24</sup> In contrast, a 250-mL serving (1 cup) of cola contains an average of 26 mg of caffeine (an average of 37 mg per 355-mL can) (Table 2).

BEVERAGES	Caffeine content	BEVERAGES	Caffeine content
Coffee (250 mL)	100 mg	Energy drink* (1 can, variable content)	46 to 375 mg
Tea (250 mL)	50 mg	Chocolate milk (250 mL)	5 mg
Cola (250 mL)	26 mg	Decaffeinated coffee (250 mL)	3 mg

**Table 2.** Caffeine content of certain beverages, according to data from the *Canadian Nutrient File*<sup>5</sup>

The amount of caffeine in chocolate milk is low when compared with the daily tolerable upper level for various age groups (Table 3). For example, according to weight averages, Health Canada considers the tolerable upper level for caffeine to be 45 mg for children aged 4 to 6 years, 62.5 mg for those 7 to 9 years, and 85 mg for those aged 10 to 12.<sup>25</sup>

AGE GROUP	Maximum recommended caffeine intake
Children under 12 years of age	2.5 mg/kg of body weight per day
Youth 12 to 18 years of age	2.5 mg/kg of body weight per day
Women of childbearing age	300 mg per day
Other healthy adults	400 mg per day

**Table 3.** Maximum caffeine intake recommended by Health Canada, according to age<sup>25</sup>

## Dental health

Even though chocolate milk contains sugar, it has a low cariogenic potential.<sup>26</sup>

- The almost neutral pH of chocolate milk helps neutralize mouth acidity, which is partially responsible for cavities and dental erosion;<sup>27,28</sup>
- The minerals it contains (e.g., calcium, phosphorus) protect enamel against cavities;<sup>28,29</sup>
- The protein and fat it contains coat enamel with a thin film that protects teeth against demineralization;<sup>27,29</sup>
- The enzymes in milk reduce the development of plaque caused by bacteria;<sup>27</sup>
- Nearly half of the carbohydrates contained in chocolate milk come from lactose, the least cariogenic carbohydrate;<sup>30</sup>
- The polyphenols in cocoa, which is present in chocolate milk, may also have protective effects against dental cavities by reducing mouth acidity.<sup>26</sup>

The presence of multiple components that protect against dental cavities explains the low cariogenic potential of chocolate milk compared with that of other foods with the same amount of sugar.<sup>31</sup>



The presence of multiple components that protect against dental cavities explains the low cariogenic potential of chocolate milk.

## Post-workout recovery

After prolonged moderate to intense physical activity, it is recommended that people consume foods and beverages containing water, electrolytes, carbohydrates and proteins to allow the body to recover.<sup>32</sup> Sports nutrition research shows that chocolate milk is an effective recovery drink after physical exercise as it contains all of these elements.<sup>33,34</sup> When consumed between two workout sessions at close intervals, chocolate milk is associated with improved performance during the second workout.<sup>35</sup>



The nutritional composition of chocolate milk is ideal for promoting recovery after prolonged moderate to intense physical activity:

- Carbohydrates are required to replenish the body's glycogen stores;<sup>36</sup>
- Proteins provide a full range of amino acids, which help repair muscle and synthesize muscle protein;<sup>37,38</sup>
- Chocolate milk contains about 85% water, which makes it ideal for rehydration;
- Its sodium and potassium content helps to restore the body's electrolyte balance and promotes better fluid retention;<sup>39</sup>
- It is a source of several vitamins and minerals (e.g., calcium, vitamin D, phosphorus, magnesium) that are essential for health and that are generally not found in sports drinks.<sup>34</sup>

Sports nutrition research shows that chocolate milk is an effective recovery drink after physical exercise.

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