

# Relationship Between BMI, Exercise, and Milk Consumption

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## Introduction

- Obesity is a multifactorial disease. Imbalances in energy intake and expenditure may be one of the major causes of obesity. Energy intake from beverages may especially go unaccounted for by many individuals.
- The USDA recommends that adults consume 24 oz of dairy per day. 24 oz of milk provides approximately 900mg of calcium.<sup>5</sup>
- Researchers have noted that dairy calcium intake may help prevent excess weight gain and that milk consumption is inversely related to body fat (BF) and BMI in girls and college students.<sup>4</sup>
- The relationship between milk consumption and body fat has been heavily researched in children, but is lacking in adult populations.

## Purpose

- The purpose of this study was to examine the relationships between dairy consumption, body composition, and physical activity in males and females.

## Methods

- 169 males and 344 females from a small college community were surveyed about their beverage consumption and exercise habits.
- The BevQ-15 was used to assess beverage consumption habits. Participants were asked to provide their height and weight as well as their average frequency, intensity, and duration of exercise.<sup>3</sup>
- A bioelectrical impedance test for BF percentage was performed on a sub-group of volunteers from the survey sample.
- 98 sub-sample subjects were measured for height and weight. Bioelectrical impedance testing was performed with a BodyStat QuadScan 4000. All subjects were euhydrated at time of testing (urine specific gravity  $\leq$  1.020).
- Pearson product moment correlation coefficients were used to examine the relationships between milk consumption, BMI, BF, and minutes of exercise per week.

## Results

Table 1. Descriptions of the two samples used in the study

|               | N  | Age (yrs)                                | Milk* (oz)                                | BMI (kg/m <sup>2</sup> )           | Exercise per week (mins) |
|---------------|--|--|---|------------------------------------|--------------------------|
| Survey Sample | Total= 513<br>Females= 344<br>Males= 169 | 34 $\pm$ 15.6 years<br>45% between 18-22 | 10.6 $\pm$ 12.6 oz<br>79.1% drank LF milk | 24.94 $\pm$ 4.58 kg/m <sup>2</sup> | 239.37 $\pm$ 190.05      |
| Sub-Sample    | Total= 98<br>Females= 58<br>Males= 40    | 28 $\pm$ 12.3 years<br>65% between 18-22 | 14.1 $\pm$ 16.5 oz<br>74.5% drank LF milk | 23.82 $\pm$ 3.19 kg/m <sup>2</sup> | 413.969 $\pm$ 315.01     |

\*Milk consumption values include low fat, reduced fat, and whole milk.

## Results: Survey Data (N= 513)

Table 2. The relationships between milk consumption, BMI, and minutes of exercise per week in survey data

|                          | Milk (oz) | BMI (kg/m <sup>2</sup> ) | Exercise (mins) |
|--------------------------|-----------|--------------------------|-----------------|
| Milk (oz)                | 1.0       |                          |                 |
| BMI (kg/m <sup>2</sup> ) | -.104*    | 1.0                      |                 |
| Exercise (mins/week)     | .179*     | -.209*                   | 1.0             |

\*Indicates significant results ( $p < .05$ ).

### When the survey data was broken down by sex;

- A significant inverse relationship was found between milk consumption and BMI for females ( $r = -.150$ ,  $p = .005$ ), but not for males ( $r = -.142$ ,  $p = .065$ ).
- A weak, significant relationship was found between milk consumption and exercise per week for both males ( $r = .219$ ,  $p = .004$ ) and females ( $r = .152$ ,  $p = .005$ ).
- A significant inverse relationship was found between BMI and exercise per week in females ( $r = -.265$ ,  $p < .05$ ) and the general survey ( $r = -.209$ ,  $p < .05$ ), but was not found in males ( $r = -.097$ ,  $p = .207$ ).

## Results: Sub-sample Data (N= 98)

Table 3. The relationships between milk consumption, BF, and minutes of exercise per week in the sub-sample

|                          | Milk (oz) | % BF  | Exercise (mins/week) | BMI (kg/m <sup>2</sup> ) |
|--------------------------|-----------|-------|----------------------|--------------------------|
| Milk (oz)                | 1.0       |       |                      |                          |
| % BF                     | -.313*    | 1.0   |                      |                          |
| Exercise (mins/week)     | .290*     | -.096 | 1.0                  |                          |
| BMI (kg/m <sup>2</sup> ) | -.124     | .258* | .018                 | 1.0                      |

\*Indicates significant results ( $p < .05$ ).

### When sub-sample data was broken down by sex;

- A weak, non-significant inverse relationship was found between milk consumption and BMI for females ( $r = -.245$ ,  $p = .064$ ) and males ( $r = -.135$ ,  $p = .405$ ).
- A moderate, significant inverse relationship was found between milk consumption and %BF in males ( $r = -.382$ ,  $p = .015$ ), but not in females ( $r = -.212$ ,  $p = .110$ ).
- A moderate, significant relationship was found between milk consumption and minutes of exercise per week in females ( $r = .321$ ,  $p = .014$ ), but not in males ( $r = .291$ ,  $p = .069$ ).
- Non-significant relationships were found between minutes of exercise per week and BMI in both males ( $r = .207$ ,  $p = .200$ ) and females ( $r = -.086$ ,  $p = .519$ ).
- A non-significant relationship was found between minutes of exercise per week and % BF in both males ( $r = -.032$ ,  $p = .846$ ) and females ( $r = -.179$ ,  $p = .180$ ).

## Discussion

- Consistent with previous research, we found a significant, inverse relationship between milk consumption and BMI which was slightly stronger in women.<sup>1,2</sup>
- In a smaller sub-sample of data, milk consumption was not significantly related to BMI in men or women, but was moderately related to percent BF in men.
- Our lab has previously found that women tend to more accurately report their height and weight, where men tend to overestimate their height, making self-reported BMI inaccurate.
- Dairy consumption may influence body composition via a number of potential mechanisms:
  - Researchers have suggested that calcium influences energy metabolism by decreasing fat absorption and increasing fat oxidation.<sup>1</sup>
  - Protein content in milk may suppress appetite<sup>1</sup>
  - Low fat dairy intake may be associated with better overall diet quality which may influence body composition.<sup>4</sup>
- Milk consumption was also positively related to minutes of exercise per week in both the overall survey and the sub-sample and for both men and women. It is likely that individuals who participate in one healthy behavior (i.e.- milk consumption) likely participate in other healthy behaviors (i.e.- exercise).
- It is important to note that on average, participants exceeded the weekly recommended guidelines for exercise, but did not consume the recommended amount of dairy per day.

## Literature Cited

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