**Paper : Adolescent Health**

# Misconceptions about Self-evaluated Physique and Interest in Shape and Weight Control/Loss Behaviors in Adolescent Males Desiring Weight Loss

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[Received January 10, 2007 ; Accepted June 7, 2007]

**The aim of this study was to determine whether the desire for slenderness in young men was associated with perceptions and misconceptions of the self-evaluated physique, criteria for the ideal physique or interest in shape and weight control/loss behaviors (SWCBs). The study subjects were 599 male students of a vocational school (18-23y old), who were targeted in a self-administered questionnaire survey. They were divided into two groups, those desiring weight loss (group A) and those not (group B). The results obtained for those desiring weight loss revealed that 45.9% of the students desired weight loss, although 73.8% of students in group A had BMI 18.5 to 24.9, *i.e.* were in the normal weight range. In group A, 29.5% of students, and in group B, 25.9% of students had misconceptions about their proper body weight. In both groups A and B, 34~49% of subjects chose "weight" and "height" as criteria for their ideal physiques. Subjects were commonly interested in "endurance exercise", "muscle exercise", "how to eat" and "calories" as SWCBs and the rate of subjects who were interested in these items in group A was higher than in group B. The number of students who were interested in unhealthy and/or risky SWCBs and who had dieted 2 times or more were higher in group A than in group B. The rate of subjects who tried unhealthy and/or risky SWCBs among the subjects who had dieted 2 times or more was higher than that among the subjects who had dieted once. These results suggest that repeated dieting causes unhealthy and/or risky SWCBs. These results demonstrate that in male students, misconceptions about physique are associated with unnecessary weight loss and interest in unhealthy and/or risky SWCBs. Thus, it is important to provide adolescents with health education emphasizing appropriate recognition of the physique.**

**Keywords:** adolescent males, desire for weight loss, body image, weight loss behaviors

**[School Health Vol.3, 30-38, 2007]**

## 1. Introduction

A profound problem in young females is the excessive desire for slenderness beginning in the latter half of the 20th century in Japan. According to the National Nutrition Survey of Japan in 2004 (The National Health and Nutrition Survey, 2005), among those aged from 20 through 29, 21.4% of the females and 8.4% of the males had a BMI<18.5, which is underweight, and the rate is increasing. Most of them

were dissatisfied with their body size and shape and desired to be slender, with concomitant unnecessary weight loss (Furukawa et al., 1993; Monden, 1997; Nishizawa et al., 2003). There are many reports about self-perceived physique, slenderness and eating behavior among junior high school students (Furukawa et al., 1993; Monden, 1997; Nishizawa et al., 2003), female high school students (Miyagi,1998), and adolescent females (Miyagi,1998; Yamaguchi et al., Sakuma et al., 2001; Takasaki et al., 2003). These reports suggest that desiring weight loss in females is associated with eating behaviors and leads to unnecessary weight loss (Yamaguchi et al., 2001). It is well known that unnecessary weight loss causes many diseases in women such as eating disorders (Agatsuma et al., 2002; Grigg et al., 1996; Boschi et al., 2003), menoxenia (Rock et al., 1996), menstrual pain (Hirata et al., 2002), lassitude, anemia and future osteoporosis (Kamesaki et.al., 1998). Moreover, the excessive desire for slenderness may place them at risk of using unhealthy shape and weight-control behaviors (SWCBs) such as self-induced vomiting, use of laxatives, diet pills or fasting, and there have been many fatalities as a result of taking weight-reducing pills containing Chinese herbs (Wu et al., 2004; Nortier et al., 2000).

On the other hand, there is little information about the desire for weight loss and eating behavior in adolescent males compared with females. We previously showed that even for males, 30.9% of high school students, 43.0% of vocational school students and 38.8% of university students desired weight loss. However, 81.9 %, 74.7% and 68.2% of high school, vocational school and university students, respectively, desiring weight loss were in the normal weight range (Takahashi et.al., 2004a; Takahashi et al., 2004b) as already reported for females. Although as many as 30.9% of high school female students desired weight loss, most of the students (94.8%) had not actually experienced dieting. It is reported that in males interest in body image increases from the beginning of junior high school and that the body image is mostly formed among university students (Fujita et al., 2002). But the relationship between the formation of the body image and desire for SWCBs in adolescent males is still unclear.

The purpose of this study was to examine whether the body image and interest in SWCBs were different between those desiring weight loss and those not doing so among adolescent males. The results revealed that over 40% of male students desired weight loss and the number of subjects who were interested in unhealthy and/or risky SWCBs was higher among those who desired weight loss. Based on the results of our questionnaire survey, the efficacy of education regarding body image and healthy SWCBs is discussed.

## 2. Materials and Methods

### 2.1. Subjects

To compare the results of the different survey years, we investigated same-aged students of the same vocational school in 1999 and 2003. The participants of this study were 291 male students aged 18 to 23 in May 1999 and 328 male students of the same age range in November 2003. We excluded 13 of the students in 1999 and 7 of the students in 2003 who provided unclear or incomplete responses. Subjects were informed of the purpose of the study. Height and weight were measured, and the body mass index (BMI) was calculated as weight (kg)/height ($m^2$). The ideal BMI was also calculated from the ideal body weight.

### 2.2. Questionnaire

The questionnaire was self-administered. Information on the self-evaluated physique, ideal physique, factors influencing the physique, criteria for the ideal physique, purpose of having the ideal physique and SWCBs of interest was obtained using the questionnaire of Yamaguchi, et al.(2000) with slight modification.

***The self-evaluated physique***: Each subject chose one criterion from five categories: **(1)** underweight, **(2)** slightly underweight, **(3)** appropriate, **(4)** slightly overweight and **(5)** overweight.

***The ideal physique***: Each subject chose one criteria from five categories: **(1)** wish to gain weight, **(2)** wish to be thicker in part, **(3)** wish to maintain the current weight, **(4)** wish to be thinner in part and **(5)** desire to lose weight.

***Criteria for the ideal physique***: Each subject chose the criteria from twelve options and the options with similar meanings were classified into six categories: **(1)** body weight (present body weight and past body weight), **(2)** height (level of obesity, average body weight and height), **(3)** body fat, **(4)** model/friend

**Table 1** Physiological characteristics of subjects.

| Subjects | number | age (yr) | height (cm) | weight (kg) | BMI ($kg/m^2$) | ideal weight (kg) | ideal BMI ($kg/m^2$) |
|---|---|---|---|---|---|---|---|
| **Total** | 599 (100%) | 19.5±1.7 | 171.9±5.8 | 65.0± 9.4 | 22.0±2.8 | 62.9±6.6 | 21.3±1.7 |
| **Desiring (group A)** | 275 (45.9%) | 19.6±1.7 | 171.5±6.0 | 69.7± 9.9* | 23.5±2.9** | 62.6±6.8 | 21.3±1.6 |
| **Not desiring (group B)** | 324 (54.1%) | 19.5±1.8 | 172.0±5.6 | 62.1± 7.6 | 21.0±2.2 | 63.5±6.4 | 21.4±1.9 |

Values are means±S.D. Body mass index (BMI) was calculated as weight (kg)/height ($m^2$). Imagined ideal BMI was also calculated as imagined ideal weight (kg)/height ($m^2$). Values in parenthesis are % of total subjects. *$p$<0.001, **$p$<0.005: Mann-Whitney U test between group desiring weight loss and that not desiring weight loss.

(physique of a celebrity or fashion model, physique of a friend and physique of an athlete), **(5)** media and **(6)** others (no reason and others).

***Purpose of having the ideal physique***: The reasons for desiring an ideal physique were classified into seven categories: **(1)** to look more attractive, **(2)** to be healthier, **(3)** to change the present physique, **(4)** because of bad health condition, **(5)** to be stronger, **(6)** no reason and **(7)** others.

***SWCBs of interest***: Each subjects chose the SWCBs from 41 options and the options with similar meanings were combined into eight categories: **(1)** endurance exercises (jogging, walking, aerobics, swimming, cycling and jumping rope), **(2)** muscle exercise and flexibility exercise (weight training, abdominal exercise, dumbbell exercise, stretching), **(3)** how to eat (meal frequency, balance of nutrients, eating speed, eating time, and snacking), **(4)** calories (calorie intake and amount of food per meal), **(5)** surgical operations and medicine (surgical operation, acupuncture for slimming, laxative use and use of weight-reducing pills), **(6)** fasting and dieting (self-induced vomiting, a microbiotic , apple, water, konjac (*amorphophallus rivieri vac. Konjac*), beer-yeast, amino acid and insulin diet, and supplement use), **(7)** water depletion (sauna use, prolonged bathing and wrapping in plastic film), **(8)** others (any other exercise, any other aspects of meals, kneading the body with salt, pushing special points on the ear, use of a special soap for slimming and others, and **(9)** not interested (not interested and none).

Multiple answers were available for factors of own physique, criteria for ideal physique and SWCBs. Furthermore, as the SWCBs such as **(5)**, **(6)**, **(7)** and **(8)** often caused trouble for their health condition, these behaviors were defined as "unhealthy and/or risky SWCBs" and were subjected to evaluation separately.

***Frequency of dieting experiences***: The frequency of dieting experience was classified into three categories: **(1)** once, **(2)** 2~4times and **(3)** more than 5 times.

### 2.3. Grouping

At first, as we intented to compare the results of the different survey years, we investigated students of the same age at the same vocational school in 1999 and 2003. But, there was no significant difference in physical characteristics of subjects and in the answer for questionnaire between 1999 and 2003. So, the combined analysis of 1999 and 2003 were performed. The subjects were divided into two groups, one that desired weight loss (**Group A**) (students who answered "want to be thinner in part" or "want to lose weight") and others who did not (**Group B**) (other students).

### 2.4. Statistical analysis

The Mann-Whitney U test was used to examine the differences of body weight and BMI between groups A and B. The chi-square test was used to examine the difference of percentages between groups A and B. We used SPSS for Windows 11.0J.

## 3. Results

### 3.1. Percentages of subjects desiring weight loss and physical characteristics of subjects

**Table 1** shows the physical characteristics of subjects. We found that a total of 45.9% of students desired weight loss. The body mass index (BMI) in the group A was higher than in the group B ($p$< 0.005), but the imagined ideal BMIs were the same both in group A and B.

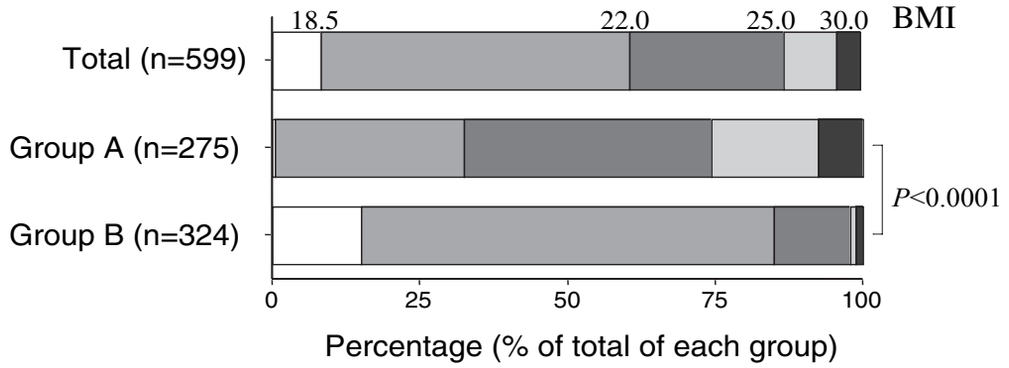


**Figure 1** Distribution of BMI of subjects desiring weight loss.

The body mass index (BMI) was calculated as weight (kg)/(m$^2$) and was classified into five groups by the criteria for obesity of the Japan Society for the Study of Obesity (Matsuzawa et al., 2000). BMI<18.5; underweight, BMI 18.5-24. 9; normal, BMI 25.0-29.9; slightly overweight and BMI≧30.0; overweight. A BMI of 22.0 is the ideal BMI associated with the lowest morbidity reported by Tokunaga et al.(1991). Data show the percentage of total of subjects of each group. $\chi^2$ test between subjects desiring weight loss and those not desiring it.

**Table 2** Self-evaluation of physique of subjects desiring weight loss.

| Subjects | underweight | slightly underweight | appropriate | slightly overweight | overweight |
|---|---|---|---|---|---|
| **Total (n=599)** | 91(15.2%) | 97(16.2%) | 202(33.7%) | 135(22.5%) | 74(12.4%) |
| **Desiring weight loss * (Group A, n=275)** | 1( 0.4%) | 8( 2.9%) | 82(29.8%) | 118(42.9%) | 66(24.0%) |
| **Not desiring weight loss (Group B, n=324)** | 90(27.8%) | 89(27.5%) | 120(37.0%) | 17( 5.2%) | 8( 2.5%) |

Self-evaluated physique was classified into five categories: (1) underweight, (2) slightly underweight, (3) appropriate, (4) slightly overweight and (5) overweight. Values in parentheses are the percentage of total subjects of each group. *$p$<0.0001: $\chi^2$-test comparing the group desiring weight loss and that not desiring weight loss in subjects.

### 3.2. Distribution of BMI values of subjects

The BMI was classified into five groups by the criteria for obesity of the Japan Society for the Study of Obesity (Matsuzawa et al., 2000), that is BMI<18.5, underweight; BMI=18.5-24.9, normal; BMI= 25.0-29.9, slightly overweight and BMI≧ 30.0, overweight. As shown in **Figure 1**, 78.6% of all subjects, and even 73.8% in group A, had a BMI of 18.5-24.9, *i.e.* in the normal range. In contrast, 8.5% of all subjects had a BMI<18.5, which is underweight, whereas 13.0% of subjects had a BMI ≧25, which is overweight. In the comparison of the BMI values of groups A and B, the rate of BMI ≧25 was higher in group A than in group B among subjects ($p$<0.0001).

### 3.3. Self-evaluated physiques of subjects

To determine the relation of the self-estimated physique to the desired weight, we compared the self-estimated physiques in the two groups. In group A, 42.9% and 24.0% of students self-estimated their physiques as "slightly overweight" or "overweight", respectively. The rate of such self-evaluation in group A was higher than in group B ($p$<0.0001) (**Table 2**).

Next, we compared the misconceptions about weight of the two groups. We defined those subjects who had correct conceptions as those whose BMIs and self-estimations were as follows. BMI<18.5 and "underweight", 18.5<BMI<24.9 and "slightly underweight" or "appropriate", 25.0<BMI<29.9 and "slightly overweight" and BMI≧30.0 and "overweight." Others were defined as having misconceptions. As shown in **Figure 2**, in group A,

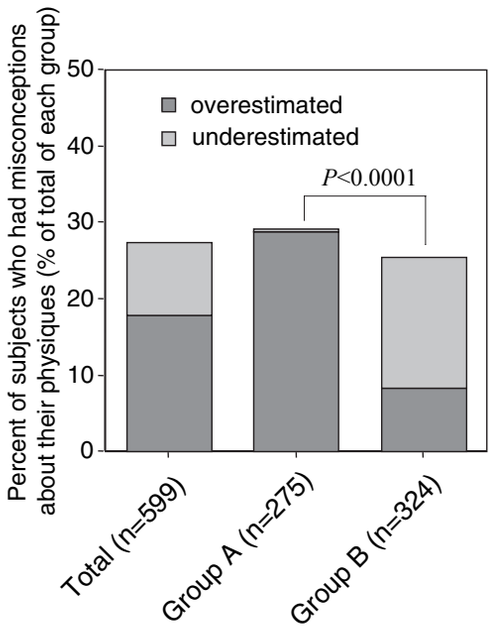


**Figure 2** The misconception of physique of subjects.

Data show the percentage of total of subjects who had misconceptions about their physiques. ▭: subjects who overestimated their weight, ▭: subjects who underestimated their physiques. $\chi^2$ test between those desiring weight loss and those not.

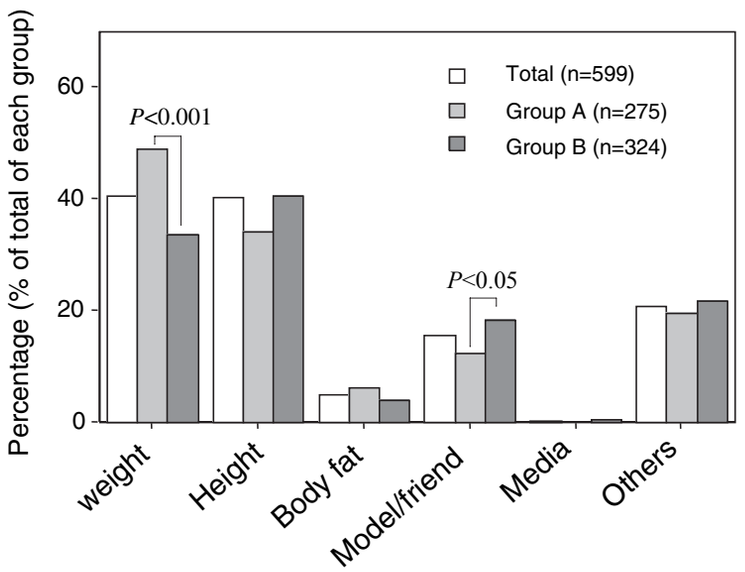


**Figure 3** Criteria for ideal physique.

Data show the percentages of total of subjects of each group who chose the criteria for their ideal physiques. Multiple answers were available. $\chi^2$ test between those desiring weight loss and those not.

**Table 3** Shape and weight control/loss behaviors.

| Weight loss | Endurance exercise | Muscle exercise | How to eat | Calories | Surgical operation | Fasting and dieting | Water depletion | Others | Not interested |
|---|---|---|---|---|---|---|---|---|---|
| Total (n=599) | 327(54.6%) | 301(50.3%) | 63(22.7%) | 126(21.0%) | 15( 2.5%) | 44( 7.3%) | 59( 9.8%) | 11( 1.8%) | 143(23.9%) |
| Desiring weight loss ( group A, n=275) | 186(67.6%)* | 164(58.2%)* | 98(35.6%)# | 76(27.6%)* | 4( 1.5%) | 32(11.6%)** | 37(13.5%)$ | 7( 2.5%) | 19( 6.9%)* |
| Not desiring weight loss (group B, n=324) | 141(43.9%) | 137(42.7%) | 24(17.0%) | 28( 8.6%) | 11( 3.4%) | 12( 3.7%) | 22( 6.8%) | 4( 1.2%) | 124(38.3%) |

The SWCBs in which subjects were interested in and/or wanted to try were classified into the nine categories shown in **Table 3**. Values in parentheses are the percentage of total subjects of each group. *$p$< 0.0001, **$p$<0.0005, #$p$<0.005, $$p$<0.01: $\chi^2$-test between the group desiring weight loss and that not desiring weight loss.

29.5% of students, and in group B, 25.6% of subjects had misconceptions about their weight. There was no significant difference in the rate of misconception between groups A and B. But, there were two types of misconceptions about weight, "overestimated weight" and "underestimated weight." Almost all the students (98.8%) who had misconceptions about weight in group A overestimated their weight. In group B, 66.7% of subjects were apt to underestimate their weight. The rates of misconception as overweight in group A were higher than in group B ($p$<0.0001).

## 3.4. Criteria for ideal physique

The above results showed that adolescent male students desired weight loss in spite of their normal weight range. Therefore we examined how they judged the ideal physique in the two groups (**Figure 3**). In both groups, many subjects defined their ideal physique on the basis of their own weight or height. The rates of subjects who chose "weight" in group A were higher than in group B ($p$<0.001). The rate of those who chose "model and/or friend" in group B was higher than in group A ($p$<0.05).

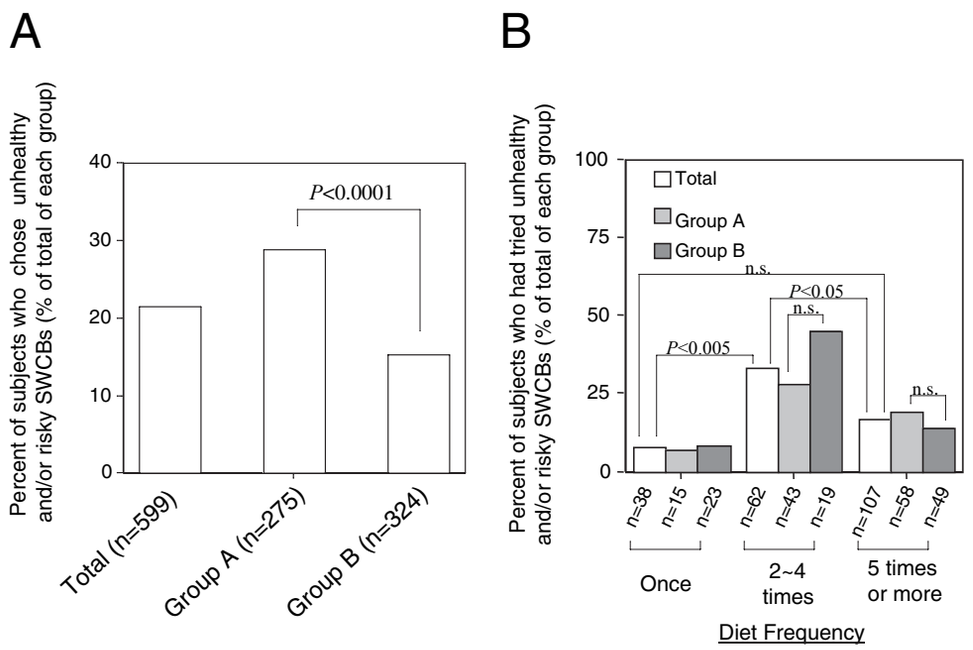


**Figure 4** Interest in unhealthy or risky shape and weight control/loss behaviors and frequency of dieting experience of subjects.

**A**; Interest in unhealthy or risky SWCBs. Data show the percentages of total of subjects of each group who chose unhealthy or risky SWCBs. Multiple answers were available. $\chi^2$ test between those desiring weight loss and those not.
**B**; Frequency of dieting experience of subjects and unhealthy and/or risky SWCBs. Data show the percentages of subjects of each group who had tried unhealthy and/or risky SWCBs compared to subjects who had dieted. Multiple answers were available. $\chi^2$ test between those desiring weight loss and those not.

**Table 4** Frequency of dieting experience of subjects.

| Groups | Diet experience | | | |
|---|---|---|---|---|
| | None | Once | 2～4times | more than 5 times |
| **Total (n=321)** | 114 (35.5%) | 38 (11.8%) | 62 (19.3%) | 107 (33.3%) |
| **Desiring weight loss (Group A, n=138)** | 22 (15.9%)* | 15 (10.9%) | 43 (31.2%)* | 58 (42.0%)** |
| **Not desiring weight loss (Group B, n=183)** | 92 (50.3%) | 23 (12.6%) | 19 (10.4%) | 49 (26.8%) |

The frequency of dieting experience was classified into four categories: (1) none, (2) once, (3) 2~4 times, and (4) 5 times or more. Values in parentheses are the percentage of total subjects of each group. *$p$< 0.0001, **$p$<0.01: $\chi^2$-test between the group desiring weight loss and that not desiring weight loss.

### 3.5. Interest in SWCBs

We examined the SWCBs that subjects were interested in and/or wanted to try in the two groups. Subjects in group A were more interested in and/or wanted to try SWCBs such as "endurance exercises" ($p$<0.0001), "muscle exercises" ($p$<0.0001), "how to eat" ($p$<0.005), and "calories" ($p$<0.0001) than in group B as shown in **Table 3**. Next, we compared the rates of subjects who were interested in and/or wanted to try the unhealthy and/or risky SWCBs listed in Materials and Methods. As shown in **Figure 4-A**, more subjects in group A (29.1%) were interested in such behaviors than those in group B (15.1%) ($p$<0.0001).

### 3.6. Frequency of dieting experience of the subjects and interest in SWCBs

We asked the subjects about actual dieting

experience in 2003. As shown in **Table 4**, 35.5% of the subjects had not experienced dieting. The rate of those who had not dieted was higher in group B than in group A ($p<0.0001$). The number of subjects who had dieted two times or more was higher in group A than in group B (2 to 4 times: $p<0.0001$, 5 times or more: $p<0.01$). We also determined the rates of the subjects who had ever tried unhealthy and or risky SWCBs. In group A, 27.9% of subjects and in group B, 45.0% of subjects who had dieted 2~4 times had tried unhealthy and or risky SWCBs and there were no significant differences between group A and B (**Figure 4-B**). When the relation between the diet frequency and unhealthy and/or risky SWBCs was examined, the rate of subjects who had tried them among total subjects who had dieted 2~4 times was higher than in the subjects who had only dieted once ($p<0.005$). The rate of subjects who had tried them among total subjects who had dieted 5 times or more was lower than in the subjects who had dieted 2~4 times ($p<0.05$).

## 4. Discussion

This study, using a self-evaluation questionnaire, examined whether body image and interest in SWCBs were different between those desiring weight loss and those not doing so among adolescent males. The results obtained in 1999 and 2003 were not significantly different, and thus were combined as already described.

The percentages of students desiring weight loss were 45.9% of subjects (**Table 1**) and about half of the students (43.2%) of them desired weight loss to look more attractive or to change the present physique(data not shown). But 73.8% of them had a BMI between 18.5 and 24.9 **(Figure 1**), which is the normal weight range in the criteria for obesity of the Japan Society for the Study of Obesity (Matsuzawa et al., 2000). Although this rate was lower than for same-aged females (Yamaguchi et al., 2000; Takahashi et al., 2000), it is clear that a lot of adolescent males desired unnecessary weight loss as females did. Though there are few reports about the influence of excessive dieting in males, it is also harmful for them (Shih et al., 2004). The appropriate recognition of one's own physique is very important for the prevention of lifestyle-related diseases and maintenance of optimal health. However, as many as 27.4% of the subjects had misconceptions about their weight. Interestingly, almost all students who had a misconception about their weight in group A overestimated it (**Figure 2**), while in group B subjects were apt to underestimate it. These results suggest that such misconceptions about physique are one of the reasons for unnecessarily desiring weight loss or lack of interest in dieting despite being overweight. Kjærbye-Thygesen (2004) investigated why slim women consider themselves too heavy. Their results indicated that body dissatisfaction was established in childhood and adolescence. In males, it is reported that interest in body image increases from the beginning of junior high school and that the body image is mostly formed during university life (Fujita, 2002). The media promote the image that slenderness is a symbol of attractiveness, beauty, and success in life for women (Field et al., 2006). Though few chose "the media" as the criterion for the ideal physique in this study, 15.7% of the subjects chose "model and/or friend." As almost all information about the shape of a model or athlete comes through the media, it is thought that the media also influence male adolescents by promoting a thin male body ideal. It is interesting that the rate of those who chose "model and/or friend" in group B was higher than in group A (**Figure 3**). These results show that subjects not desiring weight loss think the figure of a fashion model, obtained through the media, to be ideal. This may cause them to desire weight loss.

Subjects in this study were more interested in endurance exercise and muscle exercise than in how to eat or calories as SWCBs (**Table 3**). These results were different from our previous report (Yamaguchi et al., 2000) showing that over 50% of adolescent female students were interested in how to eat or calories as SWCBs. These difference may be associated with the fact that boys dissatisfied with their body shape desired larger upper arms, chest and shoulders (Moore, 1993) and that the rate of male students with interest in dietary habits was half of that of female students (Takahashi et al., 2005).

Recently, people are inundated with information about SWCBs, including so-called health foods, diet pills or dieting by eating only one food, and such information confuses them. In addition, unhealthy or risky SWCBs are often described in the media. The rates of subjects interested in unhealthy or risky SWCBs in group A were higher than in group B ($p<0.0001$) (**Figure 4-A**). **Table 4** shows that

33.3% of total subjects had experienced dieting 5 times or more and the percentage in group A (42.0%) was higher than in group B (26.8%). As shown in **Figure 4-B**, there were no significant difference between group A and B in the rate of subjects who actually tried unhealthy or risky SWCBs. But when the diet frequency was related to unhealthy or risky SWCBs, the rate of subjects who tried unhealthy or risky SWCBs among the subjects who had dieted 2~4 times was higher than in the subjects who had dieted only once. These results suggested that repeated dieting led to unhealthy or risky SWCBs. It is not clear why the rate of subjects who tried unhealthy or risky SWCBs among the subjects who had dieted 5 times or more was lower than in the subjects who had dieted 2~4 times. Our previous report showed that most high school male students (94.8%) had not experienced dieting (Takahashi et al., 2004a; Takahashi et al., 2004b). In Japan, high school students are generally under the authority of their parents, and they begin to live alone or to manage their own lives, including meals, after graduation from high school. The subjects in this study were vocational school students who had graduated from high school. Being free from their parents' management, they easily accepted information about SWCBs. As reported for females (Agatsuma et al., 2002; Grigg et al., 1996; Boschi et al., 2003; Rock et al., 1996; Takahashi et al., 2005), increasing interest in risky or unhealthy SWCBs may result in unbalanced nutrition and many diseases in males.

This is the first report that desiring weight loss and the frequency of dieting experience in adolescent males are associated with risky or unhealthy SWCBs. We also showed that desiring weight loss in adolescent males was associated with their misconception of the self-evaluated physique. These results suggest that health education based on correct recognition of the physique and healthy SWCBs is very important even for adolescent males after graduation from high school.

We attempted to develop a nutrition-related program for male students. For example, after the "general home economics" class, each student submitted a report entitled "Assessment of My Dietary Life" and then discussed their dietary life with other students. Another attempt was a special seminar in which students assessed their physiques and lifestyles, including diet, defecation, sleeping and exercise. After the assessment, students had a lecture related to the inadequacies in their lifestyles such as skipping breakfast, risky dieting experiences, eating junk food every day etc. Though these attempts have just begun, about 50% of the students indicated that they found this type of self assessment to be a very useful tool to help them improve their lifestyle. In the near future, we plan to report in detail on the efficacy of these attempts.

**Acknowledgments**

We thank the vocational school students who participated in this study. This study was supported in part by a Grant-in-Aid from the Hokkaido Food Science Technology Promotion Foundation.

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- "Cholesterol metabolism in the human body" J of Lipid Nutrition, 14, 27-38 (2005)
- An effective smoking cessation program using the measurement of the carbon monoxide concentration in the breath for vocational school students. Bull. Sch. Hlth.Sci.Sapporo Med. Univ. 9, 17-22 (2006)

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- The Japanese Biochemical Society
- Japanese Conference on the Biochemistry of Lipids
- The Japanese Society of Lipid Nutrition
- The Japanese Society of Nutrition and Food Science
- The Vitamin Society of Japan
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