The trends about body image and eating behavior among female college students

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和文抄録

近年、多くの日本人は「美しい＝痩身」と考えている。自分の身体像に満足できないという感覚を持つことは、不要で非科学的なダイエット行動（食行動異常）に陥るきっかけとなり、偏向したダイエット行動が継続すると、摂食障害に移行するという連続性がある。このような食行動異常は10代後半から20代前半にかけて始まりやすい。本研究では、女子大学生の自覚する体型と食行動異常の関係について検討するものとした。

K大学の女子学生227名にアンケートを実施し、196名の回答を解析対象とした。アンケートでは、体格指数（BMI）、摂食障害調査票（EAT-26）、9段階の女性のシルエット画を利用した自己の体型を調査した。

EAT-26の解析によると、解析対象者の4％が食行動異常に陥っている可能性が高いことが判明した。BMIの別に評価した場合、痩せの0％、普通4.4%、肥満の16.6%が何らかの食行動異常を来している可能性があることが示唆された。しかしながら、体重の重い者が極端な痩せを望んでいるわけではなく、現在の体重よりは減らしたいと考えている程度であった。一方、体重の少なかった者は、現状でも痩せであるにもかかわらず、もう少し痩せたいと考えていた。EAT-26への回答を因子分析した結果、解析対象者は、肥満になることを恐れて食べる量を減らすことによる、いわゆるダイエットを行う傾向にあると考えられた。

本研究の結果から、食行動異常に陥ることは、現状の体型がどうであるかとは関連はなく、どのような体型の持ち主であろうとも更なる痩せ体型を望むことということが食行動異常を引き起こす引き金となる可能性があることが示唆された。

Abstract

Many Japanese people consider that "beauty equals a slim body". Dissatisfaction with their body shape triggers the beginning of unnecessary and unscientific diet behaviors, and continuation of biased diet behaviors can lead to eating disorders. Such abnormal eating behaviors are more likely to occur at ages between late teens and early twenties (female college students). The aim of the present study is to investigate the association between their types of body shape and the abnormal eating behaviors.

I performed a questionnaire, in order to assess Body Mass Index (BMI), one's body shape employing 9 silhouettes and Eating Attitude Test-26 (EAT26). The questionnaire was distributed to 227 students at K University. 196 students answered all questions of the questionnaire, and thus, they were included in the analysis set.

4 % were judged by EAT26 as having a strong tendency for abnormal eating behaviors. When it was analyzed in terms of the BMI-based type of body shape, a strong tendency for abnormal eating behaviors was seen in 0 % of thin individuals, 4.4% of ordinary individuals, and 16.6% of obese individuals. Individuals with large body weight did not desire "excessively thin" body but "desired to reduce body weight from the current level", while individual with small body weight "desired to become slightly thinner" even though they were aware of their current body shape as belonging to the category "thin." In the analysis of EAT26, the results supported the possibility that the present subjects had a resistance to becoming obese, which in turn led to biased selection of foods, i.e., food intake restriction for so-called dieting.

The results of the present study revealed that the potential of developing eating disorders is not directly related to the actual obesity level. More specifically, the subjects having any type of body shape had the "desire to become thin," and thus, they had the possibility of developing eating disorders.

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Objective

Dieting is recognized as "intentional eating behaviors such as restricted food intake and practicing exercise for the purpose of losing weight, getting slim, or avoiding obesity"[1]. Actually, many people consider that "beauty equals a slim body." It is noteworthy in modern Japanese society that an ideal body image for which women are striving is a slim body [2]. A survey involving college students has shown that women's ideal body image is much thinner body than what men consider ideal, although there was no difference in awareness of their actual body shape between men and women, indicating a strong adhesion to slim body in female students [3].

It is also reported that being unsatisfied with their actual body shape leads not only to a strong desire to become slim but also to eating suppression [4]. Thus, dissatisfaction with their body shape triggers the beginning of unnecessary and unscientific diet behaviors, and continuation of biased diet behaviors can lead to eating disorders [5]. Such abnormal eating behaviors are more likely to occur at ages between late teens and early twenties. In particular, female college students characteristically account for a large proportion of individuals with eating disorders or problematic eating behaviors (precursors to eating disorders), as compared with women of other generations or men [6].

To prevent female college students from initiating biased diet behaviors, which in turn leads to eating disorders, it is essential to ascertain both the mental status of female students as to "what body shape they want to achieve" and the actual status as to "how they take eating behaviors to achieve their ideal body shape."

Here, we surveyed the ideal body image for which female college students are striving and their actual eating behaviors, with the aim of preventing the negative linkage from dieting to abnormal eating behaviors.

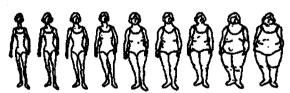## Research Design and Methods

We performed a "questionnaire survey on eating behaviors and body shape" (hereinafter called "the questionnaire"), in order to assess 1) height and body weight, 2) Eating Attitude Test-26 (EAT26) (Table 1) [7][8], and 3) one's body shape (hereinafter called "body image") employing nine silhouettes (Figure 1). The questionnaire was distributed to 227 students (aged 18-22) at K University. The respondents to all questions of the questionnaire (Figure 1) were included in the analysis ("the analysis set"). This study was approved by the Human Study Ethics Committee of the Kobe Women's University (H25-J-3). The questionnaire was made by the Japanese language.

Body mass index (BMI) of subjects in the analysis set was calculated from height and body weight. In addition, individuals with BMI less than 18.5 kg/m^2 were defined as thin, those with BMI between 18.5 and 25.0 kg/m^2 as ordinary, and those with BMI 25.0 kg/m^2 or more as obese. The percentage of subjects classified as "thin" "ordinary" or "obese" was calculated.

EAT26 is a tool developed for simple evaluation of clinical symptoms in individuals with anorexia
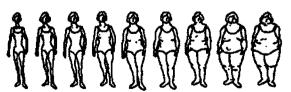
Table 1　EAT26 [7) 8)]

	Questions	1 Never	2 Rarely	3 Some-times	4 Often	5 Usually	6 Always
1	Am terrified about being overweight.						
2	Avoid eating when I am hungry.						
3	Find myself preoccupied with food.						
4	Have gone on eating binges where I feel that I may not be able to stop.						
5	Cut my food into small pieces.						
6	Aware of the calorie content of foods that I eat.						
7	Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)						
8	Feel that others would prefer if I ate more.						
9	Vomit after I have eaten.						
10	Feel extremely guilty after eating.						
11	Am occupied with a desire to be thinner.						
12	Think about burning up calories when I exercise.						
13	Other people think that I am too thin.						
14	Am preoccupied with the thought of having fat on my body.						
15	Take longer than others to eat my meals.						
16	Avoid foods with sugar in them.						
17	Eat diet foods.						
18	Feel that food controls my life.						
19	Display self-control around food.						
20	Feel that others pressure me to eat.						
21	Give too much time and thought to food.						
22	Feel uncomfortable after eating sweets.						
23	Engage in dieting behavior.						
24	Like my stomach to be empty.						
25	Have the impulse to vomit after meals.						
26	Enjoy trying new rich foods.						

Choose the silhouette number which you consider it to be closest to your current body shape.

1　2　3　4　5　6　7　8　9

Choose the silhouette number which you consider it to be closest to your ideal body image.

1　2　3　4　5　6　7　8　9

Figure 1　Nine silhouettes of female ranging from very thin to very fat

nervosa [7][8]. As shown in Table 1, EAT26 is composed of 26 questions, and its validity and reliability have been confirmed also in Japan [8][9]. EAT26 is designed on a 6-category scale, requesting the respondent to choose one of the 6 alternatives (1, Never; 2, Rarely; 3, Sometimes; 4, Often; 5, Usually; 6, Always) as an answer to each question.

The number of the alternative selected (1 through 6) was directly adopted as a raw score (point). The raw scores were changed into conversion points (raw score 1, 2 or 3 into conversion 0 point; raw score 4 into conversion 1 point; raw score 5 into conversion 2 point; and raw score 6 into conversion 3 points). The conversion points for all 26 questions were summed to yield the total conversion score. When employing EAT26, higher total conversion score is interpreted as indicating a stronger tendency for eating disorders. Individuals rated as the total conversion score exceeding 20 points are viewed as having a strong tendency for eating disorders or abnormal eating behaviors akin to eating disorders [8][9]. In this study, the percentage of individuals in whom the total conversion score exceeded 20 points in the EAT26 was calculated according to the type of body shape. Furthermore, the presence/absence of correlation between BMI and total conversion score (relationship between two variables) was analyzed with Pearson's coefficient of correlation in individual subjects in the analysis set.

Figure 1 illustrates the female silhouettes for visual evaluation of their body image [10]. The respondent was requested to choose the silhouette number she considered it to be the closest to her current body shape (Figure 1, upper) and the silhouette number she considered it to represent her ideal body image (Figure 1, lower). The silhouette chosen as the closest to the respondent's current body shape (Figure 1, upper) was regarded as her actual subjective body image, and the silhouette chosen as the ideal body image (Figure 1, lower) was regarded as her ideal body image. Individual silhouette numbers (1 through 9) selected by the subjects (described in upper and lower rows of Figure 1) were scored as the actual body image and the ideal body image, respectively. The balance yielded by subtracting the ideal body image score from the actual body image score was defined as the body image difference score. The body image difference score represents their desire intensity for slim body. The higher the body image difference score, the stronger the desire intensity for slim body [10].

In this study, Pearson's correlation coefficient was calculated between each pair of BMI, actual body image score, ideal body image score, and body image difference score to investigate the presence/absence of correlation.

Furthermore, to examine the significance of eating behaviors found in the analysis set, we carried out analysis of the raw scores obtained with EAT26, including determination of the initial eigenvalue, scree plotting, and varimax rotation. First, the initial eigenvalue of the correlation coefficient matrix was determined by means of factor analysis. This was followed by scree plotting to determine the number of factors. When the number of factors was determined, the

number of factors immediately before abrupt decrease in scree plot value was determined. Then, the number of factors determined by scree plotting was adopted as the number of extracted factors and varimax rotation was performed. Varimax rotation allows a strong correlation between each question of EAT26 and the extracted factor to be confirmed as the factor load becomes larger. The 26 questions of EAT26 were classified according to the factor number to which the largest factor load (among the factor loads assigned to each question of EAT26) was assigned, and each of these classes was treated as a group. Then, factor contribution (i.e., the total contribution of each common factor to the dispersion of all variables, representing the magnitude of the explanatory power of individual factors in factor analysis) was determined. Factors with higher contribution can be viewed as being factors representing the frequent behaviors of the subjects in the analysis set. We attempted to characterize the eating behaviors of subjects based on the meaning of each EAT26 question in each body shape group combined with the factor contribution data.

Results

Responses to the questionnaire were recollected from all of the 227 subjects to whom it had been distributed. Of these subjects, 196 answered all questions of the questionnaire, and thus, they were included in the analysis set.

The percentages of individuals rated as thin, ordinary, and obese were 16.3% (32/196), 80.6% (158/196) and 3.1% (6/196), respectively.

Of the subjects in the analysis set, 4 % (8/196) were judged by EAT26 as having a strong tendency for abnormal eating behaviors. When it was analyzed in terms of the BMI-based type of body shape, a strong tendency for abnormal eating behaviors (total conversion score ≥ 20) was seen in 0 % (0/32) of thin individuals, 4.4% (7/158) of ordinary individuals, and 16.6% (1/6) of obese individuals. This result allowed us to confirm that the analysis set included individuals with eating disorders or a high risk of developing eating disorders in the future.

Next, Pearson's correlation coefficient was calculated between BMI and total conversion score in the subjects in the analysis set (n = 196). Correlation coefficient was r = 0.159 and the significance level was p = 0.026, thus indicating that there are minimal correlations between BMI and total conversion score in the analysis set. This confirmed the finding that the tendency for abnormal eating behaviors seen among the subjects is not always influenced by the obesity level.

The above two analytical findings suggest that even if the tendency for abnormal eating disorders is more associated with higher BMI, all female college students are actually likely to have a potential for abnormal eating disorders, despite the type of body shape.

Pearson's correlation coefficient was also calculated between each pair of BMI, actual body image score, ideal body image score, and body image difference score (Table 2).

There was a strong positive correlation between BMI and actual body image score in the analysis

Table 2　Pearson's correlation coefficient between BMI and each body image score

	Actual body image score	Ideal body image score	Body image difference score
BMI	0.734*	0.360*	0.587*
Actual body image score		0.527*	0.770*
Ideal body image score			− 0.121

Number of subjects: 196　*Correlation coefficient: $p < 0.01$ (two-tailed)

set (n = 196). This means that individuals with a higher BMI tended to have a higher actual body image score, while individuals with a lower BMI tended to have a lower actual body image score. It remains obscure whether or not the body shape shown in the silhouettes and the actual body shape of individual subjects faithfully reflected the silhouette designer; however, it was possible to judge that the subjects in the analysis set considered their own body shape (i.e., "tends to be obese" "ordinary" or "tends to be thin") in proportional to their BMI on the whole. There was a positive correlation between BMI and body image difference score and a strong positive correlation between actual body image score and body image difference score. These findings mean that among the subjects in the analysis set, the body image difference score tends to be higher as the body weight gets larger, while the body image difference score tends to be lower as the body weight gets smaller. In other words, the findings suggest that the ideal body shape for individuals with larger body weight is larger than what individuals with smaller body weight want. In addition, there was a weak positive correlation between BMI and ideal body image score and a positive correlation between actual body image score and ideal body mage score.

These findings revealed that the ideal body image score is higher in individuals with larger body weight and lower in individuals with smaller body weight among the subjects in the analysis set. In other words, the findings suggest that individuals with large body weight do not desire to attain a thinner body that that in individuals with small body weight. Taken together, these findings indicate that individuals with large body weight did not desire "excessively thin" body but "desired to reduce body weight from the current level," while individual with small body weight "desired to become slightly thinner" even though they were aware of their current body shape as belonging to the category "thin." Thus, the subjects in the analysis set were found to have the desire of reducing body weight from the current level regardless of any type of body shape. On the other hand, there was no correlation between ideal body image score and body image score difference. When this finding is combined with the above-mentioned finding (desire to reduce body weight), it is suggested that some of the subjects probably had the desire to become further thinner, i.e., to attain excessive slimness, even though they had no need to reduce body weight.

Table 3 shows the initial eigenvalue of the

correlation coefficient matrix yielded from factor analysis of the responses to 26 questions of EAT26.

As shown in Table 3, the total of initial eigenvalues for factor 1 was 6.185 and cumulative percentage of the information held by all of the 26 factors was 100%. Thus, factor 1 had a size of information occupying 23.787% (dispersion percentage) of all sorts of information. Factors with the initial eigenvalue less than 1 are judged to lack sufficient information. In this study, the number of factors having 1 or higher initial eigenvalue (the number of principal factors)

among the 26 factors analyzed was 8.

Then, on the basis of these data on initial eigenvalue, scree plotting of the factors was carried out.

In this analysis, sharp drop of the plots was seen between Factor 7 and 8 (data not shown). This can be interpreted as indicating that Factors 8 through 26 "lacked sufficient information." Finally, 7 principal factors (Factors 1 through 7) were extracted.

Subsequently, varimax rotation was carried out, with the number of factors set at 7 (Table 4).

Because the number of factors was set at 7,

Table 3　Initial eigenvalue of correlation coefficient matrix yielded
from factor analysis of responses to all questions of EAT26

Factor	Initial eigenvalue		
	Total	Dispersion (%)	Cumulative (%)
1	6.185	23.787	23.787
2	2.242	8.623	32.410
3	1.660	6.385	38.795
4	1.414	5.437	44.231
5	1.332	5.122	49.353
6	1.292	4.970	54.324
7	1.270	4.886	59.210
8	1.042	4.006	63.216
9	0.996	3.832	67.048
10	0.878	3.377	70.426
11	0.818	3.146	73.572
12	0.743	2.859	76.431
13	0.710	2.729	79.160
14	0.633	2.433	81.594
15	0.589	2.267	83.860
16	0.559	2.149	86.009
17	0.512	1.969	87.978
18	0.475	1.826	89.804
19	0.450	1.733	91.537
20	0.408	1.569	93.105
21	0.394	1.516	94.622
22	0.352	1.352	95.974
23	0.307	1.182	97.156
24	0.278	1.071	98.227
25	0.248	0.953	99.180
26	0.213	0.820	100

Factor extraction method: Principal factor analysis

Table 4　Factor matrix after varimax rotation

	Questions	Factor Loading						
		1	2	3	4	5	6	7
1	Am terrified about being overweight.	0.569	0.095	0.188	−0.366	0.052	−0.005	0.248
2	Avoid eating when I am hungry.	0.603	0.082	0.036	0.111	0.008	0.078	−0.044
3	Find myself preoccupied with food.	0.098	0.684	−0.044	−0.174	0.031	0.070	0.060
4	Have gone on eating binges where I feel that I may not be able to stop.	−0.057	0.528	0.298	−0.244	0.184	0.105	0.040
5	Cut my food into small pieces.	0.276	0.070	0.045	−0.043	0.157	0.105	0.477
6	Aware of the calorie content of foods that I eat.	0.170	0.092	0.210	−0.099	0.511	0.023	0.174
7	Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	0.552	0.165	0.113	0.064	0.105	0.026	0.059
8	Feel that others would prefer if I ate more.	0.113	0.158	−0.019	0.671	−0.003	−0.077	0.074
9	Vomit after I have eaten.	0.069	−0.024	−0.126	−0.014	0.166	0.545	−0.081
10	Feel extremely guilty after eating.	0.310	0.198	0.758	−0.146	0.066	0.106	−0.020
11	Am occupied with a desire to be thinner.	0.546	0.155	0.258	−0.410	0.154	0.165	0.043
12	Think about burning up calories when I exercise.	0.434	0.036	0.263	−0.186	0.544	−0.014	−0.033
13	Other people think that I am too thin.	−0.194	−0.092	0.039	0.698	0.057	0.031	0.043
14	Am preoccupied with the thought of having fat on my body.	0.442	0.263	0.280	−0.293	0.165	0.118	0.170
15	Take longer than others to eat my meals.	−0.152	0.048	0.085	0.105	0.039	−0.093	0.608
16	Avoid foods with sugar in them.	0.548	0.060	0.114	0.041	0.193	0.070	−0.025
17	Eat diet foods.	0.433	0.191	0.290	−0.129	0.065	0.081	−0.017
18	Feel that food controls my life.	0.362	0.596	0.183	0.099	−0.054	−0.053	0.087
19	Display self-control around food.	0.155	0.169	0.007	0.189	0.541	0.054	0.088
20	Feel that others pressure me to eat.	0.160	0.300	0.107	0.133	0.085	−0.064	0.038
21	Give too much time and thought to food.	0.262	0.551	0.213	0.177	0.043	−0.009	0.341
22	Feel uncomfortable after eating sweets.	0.137	0.240	0.508	0.070	0.142	−0.049	0.092
23	Engage in dieting behavior.	0.587	0.067	0.199	−0.254	0.287	−0.005	0.014
24	Like my stomach to be empty.	0.143	0.034	0.438	0.025	0.082	0.002	0.081
25	Have the impulse to vomit after meals.	0.141	0.084	0.257	−0.061	−0.152	0.726	0.087
26	Enjoy trying new rich foods.	0.017	0.332	0.099	0.078	0.202	0.030	−0.148

7 values (factor loading) were assigned to each question of EAT26. The factor load in this study means the value representing the correlation between each question of EAT26 and Factors 1 through 7. Larger factor loads indicate the presence of higher correlation.

The questions of EAT26 were classified according to the factor to which the largest factor load (among the factor loads related to each of Factors 1 through 7 assigned to individual questions) was assigned (Table 5). When the questions of EAT26 were classified in this way,

Groups 1 through 7 were formed, with Group 1 representing the questions showing largest factor loads related to Factor 1 (and Groups 2 through 6 representing the questions showing largest factors loads related to Factors 2 through 6, respectively).

Then, factor contribution (total contribution of each common factor in the dispersion of all variables, representing the magnitude of the explanatory power of factors in factor analysis) was determined (Table 6). In this study, factors with larger factor contribution can be viewed as

representing eating behaviors frequently taken by the subjects. Factor 1 had the largest factor contribution, and contribution decreased in the order of Factors 2 through 7. This indicated that the group in which EAT26 questions showed the largest factor load for Factor 1, i.e., Group 1, reflected questions related to most frequently observed eating behaviors among the subjects in the present analysis set. It was also confirmed that the relationship to frequent eating behaviors of the subjects became minimal in the order of Groups 2 through 7.

Group 1, showing the largest factor

contribution, was judged to reflect restricted food intake or so-called "diet food" intake because of the fear of becoming obese. Group 2 was judged to reflect the feeling pressure about foods. Group 3 was judged to reflect the disgust or guilty feeling about food intake. In other words, this

Table 6   Contribution by each factor

Factor	Factor Contribution
Factor 1	3.106
Factor 2	1.972
Factor 3	1.751
Factor 4	1.704
Factor 5	1.238
Factor 6	0.951
Factor 7	0.925

Table 5   Classification of questions according to the responses (raw scores)
to EAT26 questionnaire among the subjects in the analysis set

Groups		Questions	Factor Loading						
			1	2	3	4	5	6	7
Group 1	2	Avoid eating when I am hungry.	0.603	0.082	0.036	0.111	0.008	0.078	−0.044
	23	Engage in dieting behavior.	0.587	0.067	0.199	−0.254	0.287	−0.005	0.014
	1	Am terrified about being overweight.	0.569	0.095	0.188	−0.366	0.052	−0.005	0.248
	7	Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	0.552	0.165	0.113	0.064	0.105	0.026	0.059
	16	Avoid foods with sugar in them.	0.548	0.060	0.114	0.041	0.193	0.070	−0.025
	11	Am occupied with a desire to be thinner.	0.546	0.155	0.258	−0.410	0.154	0.165	0.043
	14	Am preoccupied with the thought of having fat on my body.	0.442	0.263	0.280	−0.293	0.165	0.118	0.170
	17	Eat diet foods.	0.433	0.191	0.290	−0.129	0.065	0.081	−0.017
Group 2	3	Find myself preoccupied with food.	0.098	0.684	−0.044	−0.174	0.031	0.070	0.060
	18	Feel that food controls my life.	0.362	0.596	0.183	0.099	−0.054	−0.053	0.087
	21	Give too much time and thought to food.	0.262	0.551	0.213	0.177	0.043	−0.009	0.341
	4	Have gone on eating binges where I feel that I may not be able to stop.	−0.057	0.528	0.298	−0.244	0.184	0.105	0.040
	26	Enjoy trying new rich foods.	0.017	0.332	0.099	0.078	0.202	0.030	−0.148
	20	Feel that others pressure me to eat.	0.160	0.300	0.107	0.133	0.085	−0.064	0.038
Group 3	10	Feel extremely guilty after eating.	0.310	0.198	0.758	−0.146	0.066	0.106	−0.020
	22	Feel uncomfortable after eating sweets.	0.137	0.240	0.508	0.070	0.142	−0.049	0.092
	24	Like my stomach to be empty.	0.143	0.034	0.438	0.025	0.082	0.002	0.081
Group 4	13	Other people think that I am too thin.	−0.194	−0.092	0.039	0.698	0.057	0.031	0.043
	8	Feel that others would prefer if I ate more.	0.113	0.158	−0.019	0.671	−0.003	−0.077	0.074
Group 5	12	Think about burning up calories when I exercise.	0.434	0.036	0.263	−0.186	0.544	−0.014	−0.033
	19	Display self-control around food.	0.155	0.169	0.007	0.189	0.541	0.054	0.088
	6	Aware of the calorie content of foods that I eat.	0.170	0.092	0.210	−0.099	0.511	0.023	0.174
Group 6	25	Have the impulse to vomit after meals.	0.141	0.084	0.257	−0.061	−0.152	0.726	0.087
	9	Vomit after I have eaten.	0.069	−0.024	−0.126	−0.014	0.166	0.545	−0.081
Group 7	15	Take longer than others to eat my meals.	−0.152	0.048	0.085	0.105	0.039	−0.093	0.608
	5	Cut my food into small pieces.	0.276	0.070	0.045	−0.043	0.157	0.105	0.477

group means that "food skipping is preferred." Group 4 was judged to mean that they are concerned about others' eyes (i.e., "how others rate me".) Group 5 was judged to mean that dieting is achieved by self-controlling the calories consumed or ingested. Group 6 was judged to involve "vomiting"-related words such as "impulse to vomit" or "vomit." Group 7 was judged to focus on the awareness about the dietary style (e.g., the time taken for eating and how to eat).

Table 6 lists the factor contribution for Factors 1 through 7 in the order of the magnitude of contribution. The largest difference in contribution was noted between Factor 1 (3.101) and Factor 2 (1.972). We may thus judge that the questions belonging to Group 1 (the questions showing the largest factor load related to Factor 1), as shown in Table 5, are questions pertaining to the most frequently observed eating behaviors in the analysis set, although the other groups of EAT26 questions are also related to eating behaviors observed in the analysis set. This supported the possibility that the present subjects had a resistance to becoming obese, which in turn led to biased selection of foods, i.e., food intake restriction for so-called dieting. The 26 questions of EAT26 included those related to dieting other than restricted food intake, such as "Think about burning up calories when I exercise" (Group 5) or "Take longer than others to eat my meals" (Group 7), however factor contribution of these questions was small. Thus, the results of this study indicate the characteristic finding that food-intake restriction of various dieting behaviors was preferred among the subjects in the analysis set.

Conclusions

The present survey was performed with the aim of preventing the negative linkage from "so-called dieting" to "abnormal eating behaviors." Therefore, it was necessary to investigate the correlation among BMI, silhouettes and responses to EAT26 questions. For this purpose, only subjects who responded to all questions of the questionnaire were included in the analysis set.

The results suggest that some of the female students were rated, according to the EAT26, as having a strong tendency for abnormal eating behaviors, regardless of their obesity level. A previous study demonstrated that female college students with an actually higher obesity level have more strong desire to become thin [11]. However, the results of the present study revealed that the potential of developing eating disorders is not directly related to the actual obesity level. More specifically, the subjects having any type of body shape had the "desire to become thin," and thus, they had the potential of developing eating disorders.

Some of the female college students analyzed in the present study were unsatisfied with the current body shape and desired to become further thin even when they had no more need to become thinner. A previous study has also shown that the awareness of adolescent women about body shape is characterized by the desire to get more slim body [12]. These findings suggest that even if female college students have attained their ideal body shape, they would not be satisfied with such their body image and would set a new ideal body

shape, thus continuing to desire further slim body and to practice dieting. The desire to become thin was also reported to be a major cause of problematic eating behaviors and occurrence of ingestion disorders [13]. It is desirable that obese individuals have the desire to become thin and to practice healthy diet. However, it should be prevented that already thin individuals attempt to practice biased unscientific diet such as food-intake restriction because of a strong desire to become thin.

Slim women are the current social trends for beauty in Japanese society, which has created a factor responsible for the desire to become further thinner or the strong desire to become thin [13]. In the present age, the style of slim fashion models is accepted as an ideal female image, contributing to the image that becoming thin is a goodness. In addition, it has been suggested that the mass media and journals encourage people to practice diet, thereby causing a biased view about ideal body shape [4]. Under such circumstances, in 2005, the report from the studies within the framework of Ministry of Health, Labour and Welfare scientific research project issues a warning that eating disorders are often triggered by psychological factors, such as desire to become thin and stress, or dieting. Taking these previous results into consideration with our present results, it seems quite possible that many female college students would have eating disorders if their current eating behaviors and psychological status are continued. There is a report that 41% of female college students with eating disorders or subclinical eating disorders

continued to have same level of eating disorders and 14% of them moved to more disordered level in the 10 years after college [14].

The results of this study may not apply equally to all generations of both women and men. However, this study confirmed the previously reported findings that female college students account for a large proportion of individuals with eating disorders or problematic eating behaviors, as compared with women of other generations or men [6][15], suggesting that eating disorders could be prevented among many women of older generations in the future by making efforts to prevent eating disorders among young women.

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