# Body Image, Eating Behavior, and Weight Control Practices among Korean Adolescent Girls*

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This study was designed to investigate body image, objective and subjective measurements of body size and shape, eating behavior, and weight control practices in 650 Korean adolescent girls; 500 of the subjects were 14 years old and enrolled in middle schools, while the remaining 150 were 17 years old and enrolled in high schools. Subjects responded anonymously to a self-administered questionnaire. The results showed that average height and weight of the subjects were 157cm and 49.5kg, respectively, while subjects ideal heights and weights averaged 164cm and 48 kg, respectively. The ideal adult body heights and weights proposed by the subjects averaged 172cm and 55kg respectively. Over 50% of the subjects were dissatisfied with their body image; the degree of dissatisfaction with body image was higher in those who believed themselves to be fat. Most of the subjects wanted to lose weight and had tried to lose weight. Self-reported weight control practice methods included reducing food intake (31.9%), skipping meals (29.6%), exercise (25.8%), using slimming machines (6.9%), and using diet pills (5.1%). The heavier the subjects weight was, the greater the difference between the subjective and objective evaluations of body size. The body image scores of subjects who perceived themselves as fat were significantly lower than those of subjects who perceived themselves as normal or underweight. The difference between subjective and objective evaluations of body size, and the degree of obesity, were significantly higher in those subjects who had experience of weight control than those who had no experience of weight control. These results suggest that nutrition and health education programs for adolescent girls should be researched and implemented in order to establish a more realistic body image, positive habits in weight control, and healthful eating habits.

Key Word : body image, eating behavior, weight control

## INTRODUCTION

Adolescence is an important period in ones life when one develops standards and value systems as guides for behavior, and psychologically ones body image of oneself plays an important role in developing self-esteem. However, individuals nowadays look at themselves and provide subjective evaluations of their bodies according to rapidly-changing social norms; this is reflected in the flexible and interchangeable terms commonly used such as body image, body concept, body schema, body attitude, and body experience.[1]-[3] Any aspect of experience related to the body is influenced by ones subjective idea of oneself; thus, ones body image is influenced by ones established value system. Ones awareness of body image is achieved through ones psychological frame of feelings and attitudes.

Recently, the popular perception of what constitutes beauty in Korean women has changed. People now prefer to be slim, and as a result various weight reduction regimes have been prevalent among adolescents and young women. This social and cultural influence has spread rapidly through all age groups, especially among adolescents; this has resulted in widespread weight reduction behavior often leading to inadequate supplies of nutrients, to nutrition imbalances, and to eating disorders.[4]-[10] Many reports have pointed out that a desire to be slim, dissatisfaction with ones body image, and severe restriction of food intake, can initiate a vicious cycle of dieting and binge eating as a response to being unable to maintain a diet regime.[7]-[11]

In the life cycle, adolescence is the second period of rapid growth after early childhood; the importance of good nutrition management for physical growth at this stage of the life cycle cannot be overemphasized. During this period, eating behaviour is directly related to the needs of weight control. Eating behavior has a definite effect on ones attitude in life and on ones behavior patterns. Therefore eating behavior is important not only for maintaining ones health, but also from a social viewpoint.[10]-[13] Eating disorders can result in many physical and mental problems such as nutritional deficiency,

nutritional imbalance, dental caries, permanent brain damage, infertility, chronic frailty, organ damage, cardiovascular disorders, and osteoporosis[14]-[15]; in addition, anti-social behaviour and psychological concerns, such as avoidance of meeting people and depression, are quoted as problems.[16]-[19] Especially, the anxiety of adolescent girls about their body shape and weight is widespread even among normal weight girls, and this is becoming a serious psychological problem that can affect physical health.[19]-[20] A recent survey of adolescents in Seoul found that 14.5% were obese, including 12.7% of girls at puberty and 20.9% of 17-year old girls.[21]-[23] Although the increased rate of obesity in adolescents is not a problem to ignore, an even more serious problem is that it is a wide-spread practice for Korean adolescent girls to arbitrarily define their ideal body weight and undertake weight control on their own. The resulting improper choice and use of weight control methods such as missing/reducing meals, health foods, and drugs, which are often not based on accurate knowledge, may result in critical damage to ones health. These influences are spreading rapidly and unpredictably through the mass media and the internet in Korea.[4]-[11]
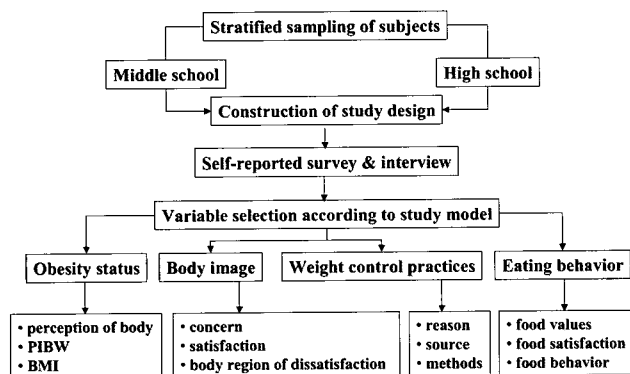


Fig 1. Study model according to study design

Schools do not assist in teaching adolescents how to manage their body images. Eating disorders are becoming a serious problem among adolescent girls and young women; this is attributed to a desire for slimness and to a value system which places emphasis on physical appearances. These factors threaten healthy food habits, and can also negatively impact physical and psychological health. Thus, the problem of eating disorders needs to be approached from many aspects.[4]-[12] The goal of this study is to help promote a healthy attitude to body image, and to encourage healthy eating behaviors, among adolescents in Korea. The aim of this study is to analyze the extent of distortion of body image through a comparison of subjective and objective evaluations of body image, and how this is related to eating habits, obesity

status and weight control practices in adolescents (Fig 1). Speurecifically, this study is designed to identify problems such as distorted body image and improper weight control methods which would impede adequate growth and development, and to assess the importance of adequate nutrition and health education among adolescent girls.

## METHODS

### 1. Subjects

A random sample of 20 middle/high schools situated in Chung-chung province, Kyoung-gi province, and Seoul was selected. Stratified samples of five hundred girls in the second grade of the middle schools (mean age = 14 years) and one hundred and fifty girls in the second grade of the high schools (mean age = 17 years) were taken. Self-administered questionnaires were given to the subjects. Upon request, subjects were given the results of the analysis which were undertaken as part of the study. A total of 642 responses were used for analysis, due to inadequate responses from 8 subjects. Due to numerous incomplete responses, the number of responses varied between variables; however, the number of responses analyzed for each variable is specified in the Tables.

### 2. Objectives

The objectives of this study were as follows:

*(1) Subjective and objective evaluation of body weight and shape*

① Subjective evaluation and objective evaluation of body image among subjects

② The relationship between the perceived body image and an objective evaluation

③ Differences between the subjects ideal body shape at present and in the future as adults.

*(2) Analysis of body image*

① The degree of interest in and satisfaction of subjects body image

② Parts of the body that subjects are most dissatisfied with

③ The extent of distortion of the body image

*(3) Weight control practices*

① Experience of weight control

② Reasons for weight control

③ Weight control methods used

④ Sources of information on weight control

*(4) Eating behavior*

① The reasons of eating

② The degree of satisfaction from eating

③ Food behaviors

*(5) Analysis of variables influencing a distorted body image:*

Relationship of distorted body image (the difference between the subjective and objective evaluations of body image) with weight control behavior and eating behavior

## 3. Study Instruments

The instruments used in the study were as follows:

*(1) Assessment of subjects physique:* an assessment of each subjects physique was carried out by comparing the subjects height and weight change since birth with the standard charts, the subjects perceived body image, and the objective evaluation of the subjects weight and height.

① Height and weight change : information on length and body weight at birth was provided by the subjects. The records kept at school from school physical examinations were traced in order to observe the pattern of change.

② Subjective evaluation of body image: subjects were asked to evaluate their own body image in terms of 5 categories: very slim, slim, moderate, overweight, obese.

③ Objective evaluation of body image: the percentage of ideal body weight (PIBW) and body mass index (BMI) were calculated. The standard weights used in the study were the 50 percentile values of weight for height, suggested by the Korean Pedriatic Association (1998)24).

The values obtained from the PIBW calculations were classified into the following five catetories: -20.0% as very slim, -10.1 to -19.9% as slim, -10.0% to +10.0% as moderate, +10.1% to 19.9% as overweight, and +20% as obese. BMI is reported to positively reflect body fat (r = 0.7 0.8)3-7). Subjects with BMI values of under 18.5 were considered as underweight, of 18.5 to 22.9 as normal weight, of 23.0 to 24.9 as overweight, and of over 25.0 as obese.

*(2) Body Image*

① The degree of concern and satisfaction with ones physique: five levels of concern and five levels of satisfaction were used.

② Body image: an individuals attitudes and feelings were determined by modification of the multidimensional eating disorder inventory suggested by Garner and Olmstead for anorexia nervosa.[19-20] Nine questions from Garner and Olmstead were selected and modified to suit the characteristics of, and the cultural differences in, the present subjects. Each question had a maximum value of 7 points, giving a possible maximum of 63 points; the ratio of internal agreement was 0.8026 according to the calculation of Cronbachs alpha.

*(3) Weight control practices*

① Degree of concern regarding weight and weight control : the questionnaire was used to find out if subjects were concerned about weight control and what experience they had in using weight control methods

② Weight control behavior: questions were asked about the methods of weight control such as controlling food intake, use of special diets, exercise, use of slimming drugs, use of slimming machines, and use of commercial obesity management centers.

*(4) Eating behavior:* eating behavior was measured by the subjects reasons for eating and by their actual food behaviors. The prevalence of eating problems was also studied.

① Reasons of eating: the elements of a questionnaire used in a previous study[10] for evaluating the value of eating food were used; values were placed on the desire for meeting physiological needs, security, health promotion, and pleasure. In this study the following categories were applied to classify subjects value systems: physiological value of satisfying hunger, eating for security, eating nourishing meals to promote health, and eating for pleasure.

② Food behavior: the questionnaire used by Kim et al[25] was modified. A total of 20 questions were posed, consisting of 4 questions evaluating regularity of eating, 12 questions on food balance, and 4 questions on eating in the context of general living.

## 4. Data analysis

Data were analyzed by using the SPSS package for windows. Frequency and percentages of all variables were treated as mean ± standard deviations, and the statistical differences between middle school students and high school students were tested by using the t-test; Pearsons correlation coefficients were used to calculate the relationship between variables.

## RESULTS & DISCUSSION

### 1. Growth pattern of weight and height of subjects since birth

Subjects were asked to report their weight and height at birth. The physical examination records of subjects were traced in their schools, starting from primary school, in order to study the subjects growth pattern. Mean birth weight of the subjects was 3.2kg (Fig 2). Mean weight and height of the middle school girls were 49.9kg and 155.2cm, respectively, compared to 50.66kg and

157.8cm suggested by the Korean Pediatric Association for 14 year old girls. Also, mean weight and height of the high school girls were 53.55kg and 159.7cm, respectively; these results are low compared to the Korean Pediatric Association values for 17year old girls. However, the growth patterns of subjects after birth were similar to the growth rates estimated by the Korean Pediatric Association.[26]
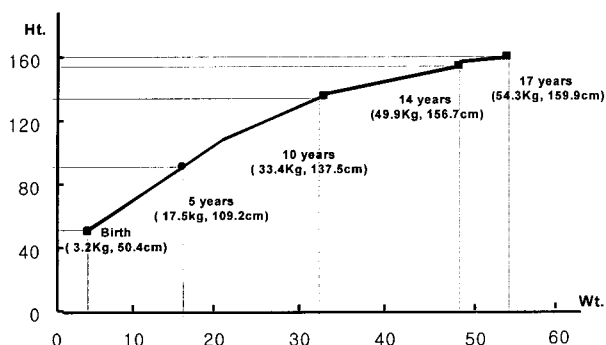


Fig 2. Growth transition of subjects

## 2. Evaluation of body shape (physique)

### (1) Subjective evaluation

The rates of perceived overweight and obesity were found to be higher among high school girls than among middle school girls. Regarding the middle school girls perception of body weight, 20.6% and 11.4% considered themselves overweight and obese/very obese, respectively. Regarding high school girls, 23.2% perceived themselves to be overweight, and 21.8% to be obese or very obese(Fig 3a,b).
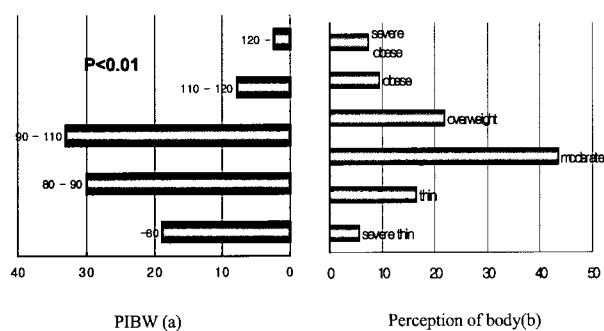


Fig 3. Comparison between the perception of body size (b) and PIBW(a)

### (2) Objective evaluation of subjects physique

As shown in Table 1, significant differences were found between subjective evaluations and objective evaluations of body shape. The evaluation with PIBW (percent of Ideal body weight) resulted in estimates of 9.2% of middle school girls and 17.2% of high school girls being overweight. Evaluation with BMI revealed that

7.9% of middle school girls and 11.0% of high school girls were overweight. Thus, the objective evaluation showed that the rate of overweight was significantly higher in high school girls than in middle school girls ($p<0.05$ for both PIBW and BMI).

Table 1 . Subjective and objective obesity status of the subjects

| Variables | | Middle | High | p-value |
|---|---|---|---|---|
| Objective Status 1 : PIBW | ~90 | 223(60.4) | 52(47.3) | df=3 $x_2$=5.1 p=0.017 |
| | 90~110 | 112(30.4) | 39(35.5) | |
| | 110~120 | 22( 6.0) | 10( 9.1) | |
| | 120~ | 12( 3.2) | 9( 8.1) | |
| | Average | 103.1+10.6 | 105+9.8 | |
| Objective Status 2 : BMI | 25.0~ | 7( 1.9) | 4( 3.4) | df=3 $x_2$=3.8 p=0.004 |
| | 23.0~24.9 | 22( 6.0) | 9( 7.6) | |
| | 18.5~22.9 | 100(27.1) | 42(35.3) | |
| | ~18.5 | 240(65.0) | 64(53.7) | |
| | Average | 20.1+2.6 | 20.0+2.4 | |
| Subjective Status : Perception of Body Size | very slim | 9( 1.8) | 2( 1.4) | df=5 $x_2$=16.2 p=0.006 |
| | slim | 87(17.6) | 21(15.2) | |
| | moderate | 240(48.6) | 53(38.4) | |
| | overweight | 102(20.6) | 32(23.2) | |
| | obese | 24( 4.9) | 19(13.8) | |
| | very ovese | 32( 6.5) | 11( 8.0) | |
| Total | | 494(100.0) | 138(100.0) | |

### (3) Comparison of subjective evaluation and objective evaluation

Subjects perceptions of their body sizes were compared with the objective evaluation as shown in Table 2. The subjects (both middle school and high school girls) who perceived their weight as moderate were mostly underweight, and those who thought they were overweight had an average PIBW value of 96.6 ± 8.8% and an average BMI value of 22.3 ± 2.2, both of which are considered to be in the normal range. Even the subjects who considered themselves to be obese had normal weights when evaluated using the objective method. The subjects who considered themselves to be severely obese had a mean BMI value of 24.6 ± 3.5 and PIBW value of 104.9 ± 17.2%, both of which belong to the normal range.

This tendency of overestimating ones degree of fatness was also observed in female subjects in other studies.[7-10] Many normal weight women consider themselves to be overweight and many overweight women consider themselves to be obese. Kim[13] reported in her study with high school students that no subjects perceived themselves to be slim, and 21.4% of the normal weight subjects perceived themselves to be fat. This tendency of overestimation of ones weight was apparent in the present study; even the subjects who were slim believed themselves to

have normal weight or to be overweight.

Table 2. Obesity index according to perception of body size

| Perception of body size | Obesity Index | |
|---|---|---|
| | BMI | PIBW |
| Very slim | 16.4±1.1 | 71.0±5.5 |
| Slim | 16.6±1.1 | 71.8±5.0 |
| Moderate | 18.9±1.8 | 80.9±6.6 |
| Little overweight | 21.0±2.0 | 90.5±8.9 |
| Overweight | 22.3±2.2 | 96.6±8.8 |
| Obese | 22.6±2.8 | 95.5±11.8 |
| Serious obese | 24.6±3.5 | 104.9±17.2 |
| p - value | 0.000 | 0.000 |

Differing subjective and objective evaluations of ones body size appears to be prevalent among women. Other studies conducted on female university students4, 7,10) found out that 32.7% of the subjects were underweight and 20.2% were overweight. However, 20.5% of the underweight group perceived themselves to be overweight or obese, and 55.5% of all subjects perceived themselves to be overweight or obese. The common perception of ideal body size is affected by the social and cutural environment, and differs among different races, generations, and gender. Parents generally prefer their babies to be rather plump than thin. As the children grow up, they establish their own value system and become more interested in their body size, and begin to prefer to be slim. This phenomenon among adolescent girls is related to the degree of interest in their body size and a gradual increase in the desire to be slim.[21] Recently, obesity-related research has concentrated on the area of body size.[23),27)] Many research studies have reported that perceived body size, rather than real body size measured objectively, affects the degree of satisfaction with body size in adolescent girls. Thus, the wrong perceptions of body size among middle school and high school children should be urgently corrected, because the dissatisfaction arising from a wrong perception of ones body size will lead to a lowering of self esteem.

## 3. Analysis of body image

### (1) Degree of interest in and satisfaction with body image

Results were analyzed according to two groups, middle school children and high school children. As presented in Table 3, 88.8% of the middle school girls and 94.2% of the high school girls were interested in their body image. In particular, 41.5% of middle school girls and 57.2% of high school girls were very interested in their body image; thus, high school girls showed a significantly higher interest in their body image compared to middle school girls (p<0.05).

Only 2.5% of middle school girls and 0.7% of high school girls were very satisfied with their body shape, while 38.1% of middle school girls and 36.0% of high school girls were dissatisfied. Also, a significantly higher proportion of high school girls (23.0%) were very dissatisfied with their body image compared to middle school girls (16.1%) (p<0.05).

Table 3. The degree of concern and satisfaction on the body

| Variables | | Mddle | High | |
|---|---|---|---|---|
| Degree of Concern | Much | 204(41.5) | 79(57.2) | df=4 $x_2$=12.6 p=0.013 |
| | A little | 232(47.3) | 51(37.0) | |
| | No | 31( 6.3) | 6( 4.3) | |
| | Never | 5( 1.0) | 1( 0.7) | |
| | dont' know | 19( 3.9) | 1( 0.7) | |
| | total | 491(100.0) | 138(100.0) | |
| Degree of Satisfaction | Much | 12( 2.5) | 1( 0.7) | df=4 $x_2$=13.9 p=0.008 |
| | Yes | 81(16.8) | 12( 8.6) | |
| | So - so | 184(38.1) | 44(31.7) | |
| | No | 128(38.1) | 50(36.0) | |
| | Never. | 78(16.1) | 32(23.0) | |
| | total | 483(100.0) | 139(100.0) | |

Table 4 shows the areas, or specific attributes, of their bodies with which subjects were dissatisfied. More than 50% of the subjects were dissatisfied with their height and weight, and length and thickness of the legs. When the high school girls were compared with the middle school girls, the former were more dissatisfied with their weight, waist line, bust, length of the legs, shape of buttocks, and hip circumference.

Table 4. The dissatisfaction region of the body

| Variables | Middle | High | Total |
|---|---|---|---|
| Height* | 332(66.0) | 94(67.6) | 426(66.4) |
| Weight* | 240(57.7) | 99(67.6) | 389(60.6) |
| Waist* | 184(36.6) | 64(46.0) | 248(38.6) |
| Bast** | 142(28.2) | 65(46.8) | 207(32.2) |
| Length of leg* | 249(49.5) | 80(57.6) | 329(51.2) |
| Thickness of leg* | 347(69.0) | 98(70.5) | 445(69.3) |
| Shape of hip* | 134(26.6) | 51(36.7) | 185(28.8) |
| Circumference of hip* | 166(33.0) | 69(49.6) | 235(36.6) |
| Shape of face | 226(44.9) | 71(51.10 | 297(46.3) |
| Size of face | 179(35.6) | 68(48.9) | 247(38.5) |
| Total | 503 | 139 | 642 |

* p<0.05   ** p<0.01

With the onset of puberty, adolescents experience a rapid growth; in boys, the development of muscles makes them attain their traditional ideals of muscular features, while in girls increases in subcutaneous fat, and a more rounded body shape, tends to bring them in the opposite

direction to their modern ideal body shape. These changes, as confirmed in the present study, tend to make girls dissatisfied with their body shape and to feel that they are becoming fat1-3,.[16)-18)] According to previous research,[9)-10)] 67% of adolescent girls were dissatisfied with their body shape; Moses et al[9)] reported in their study of 326 high school girls in New York that underweight and normal weight girls were engaged in weight reduction activities. Regardless of individual body weights, high school girls were reported to be extremely worried about becoming fat, and 36% of girls were worried about any accumulation of body fat. A wrong perception of body size is particularly prevalent in underweight adolescent girls, as they set their ideal weight arbitrarily. The study of Storz and Greene[28)] revealed that 62% of normal weight adolescent girls wanted to reduce weight and were dissatisfied with their weight. It is understandable that the interest in the opposite sex and in dating with the onset of puberty in girls makes them become more sensitive to their physical attractiveness, and this can lead to stress.

## 4. Weight control practices

The results of the subjects weight control behavior are presented in Fig 4. Overall, 41% of the subjects had some experience of weight control, and 43% wanted to control their weight; this shows that most subjects were interested in weight control and wanted to undertake weight control. Among the weight control methods utilized, 61.5% of the subjects practiced skipping meals and eating less food, 25.8% exercised, 5.1% took slimming drugs, and 6.9% used commercial obesity control center.
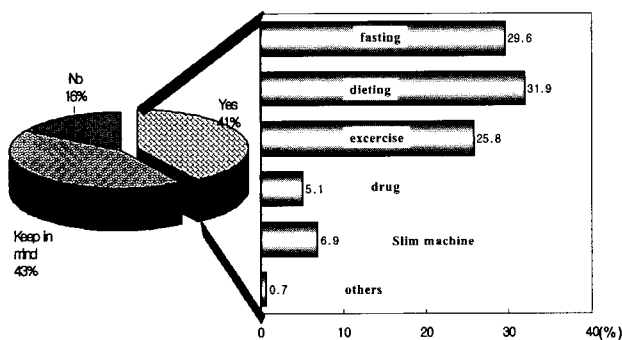


Fig 4. Weight control practices of subjects

Reasons for weight control, sources of information on weight control, and methods used for weight control, were further analyzed. Table 5 shows that a higher proportion of high school girls control their weight for cosmetic reasons, compared to middle school girls.

Sources of information on weight control were mainly through mass media (48% of middle school girls and 43.8% of high school girls), followed by magazines and

family/friends.

The methods utilized for weight control were skipping meals and reduced food intake; the use of these methods was significantly higher in high school girls, compared to middle school girls. More middle school girls were involved in increased physical exercise to reduce their weight, compared to high school girls. 21.1% of middle school girls and 13.8% of high school girls used slimming drugs.

Tsble 5. The status of weight control practices

| Variables | | Middle | High | p - value |
|---|---|---|---|---|
| Reason | Health | 99(20.7) | 16(11.9) | df=5 $x^2$=8.74 p=0.12 |
| | cosmetic | 301(65.0) | 105(77.7) | |
| | surrounding | 24( 5.0) | 6( 4.4) | |
| | others | 44( 9.2) | 8( 5.9) | |
| | total | 478(100.0) | 135(100.0) | |
| Source | mass-media | 230(48.0) | 60(43.8) | df=5 $x^2$=2.2 p=0.821 |
| | paper | 8( 1.7) | 3( 2.2) | |
| | book | 109(22.8) | 33(24.1) | |
| | speech | 3( 0.6) | 0( 0.0) | |
| | surrounding | 100(20.9) | 30(21.9) | |
| | others | 29( 6.1) | 11( 8.0) | |
| | total | 479(100.0) | 137(100.0) | |
| Method | fasting | 31( 6.3) | 17(12.3) | df=5 $x^2$=14.2 p=0.014 |
| | dieting | 201(41.1) | 66(47.8) | |
| | exercise | 148(30.3) | 33(23.9) | |
| | drug | 103(21.1) | 19(13.8) | |
| | slim machine | 3( 0.5) | 0( 0.0) | |
| | others | 3( 0.6) | 3( 2.2) | |
| | total | 489(100.0) | 138(100.0) | |

In a study with university students in Seoul,[29)] the most frequently used methods of weight control were, in descending order, skipping dinner, exercise, a reduced calorie diet, fasting, and eating only one food. These results are similar to those obtained in our study. Thus, the most frequently used method, of reducing food intake, becomes a problem of an unconditional reduction of food intake and skipping of meals.

## 5. Eating behavior

*(1) Reasons for eating and the degree of satisfaction with the daily diet.*

As shown in Table 6, the main reasons for eating among the middle school girls were as follows: 40.1% of subjects eat to satisfy hunger, 24.4% eat for pleasure, 17.9% eat for health, and 8.7% eat to control their weight. Among high school girls, the main reasons for eating were as follows: 32.4% eat to satisfy hunger, 44.6% eat for pleasure, and 6.5% eat for health. There are significant differences between middle school girls and high school girls; more value is placed on eating

to satisfy hunger and eating for health among middle school girls, while more value is placed on eating for pleasure by high school girls.

67.9% of the middle school girls and 62.3% of the high school girls were satisfied or very satisfied with their daily diet. 5.8% of the middle school girls and 10.9% of the high school girls were very dissatisfied with their daily diet. The degree of satisfaction was lower in high school girls compared with middle school girls.

**Table 6.** The reasons for eating and the degree of satisfaction on meal

| Variables | | Middle | High | p-value |
|---|---|---|---|---|
| Degree of Satisfaction | Very satisfy | 104(20.8) | 8( 5.8) | df=4 $X_2$=16.90 p=0.002 |
| | Satisfy | 236(47.1) | 78(56.5) | |
| | Dissatisfy | 132(26.3) | 37(26.8) | |
| | Very dissatisfy | 29( 5.8) | 15(10.9) | |
| | Total | 501(100.0) | 138(100.) | |
| Reasons for Eating | Hunger | 199(40.1) | 45(32.4) | df=5 $X_2$=21.4 p=0.001 |
| | For health | 89(17.9) | 9( 6.5) | |
| | Delicacies | 121(24.4) | 62(44.6) | |
| | Light meal | 27( 5.4) | 8( 5.8) | |
| | Dieting | 43( 8.7) | 12( 8.6) | |
| | Others | 17( 3.4) | 3( 2.2) | |
| | Total | 497(100.0) | 139(100.) | |

*(2) Food behavior*

Table 7 lists the results of the analysis of 20 questi-

onnaire items. More middle school girls (55.7%) than high school girls (41.7%) took three meals each day with family and friends (p<0.01). More middle school girls (46.3%) than high school girls (30.9%) reported that they had sufficient time to take three meals.

More high school girls (37.7%) had only one balanced meal compared to middle school girls (24.7%) (p<0.05), which suggests that the lack of balanced meals is a greater problem in high school girls. Similarly, 27.8% of middle school girls and 32.4% of high school girls reported that they missed breakfast all the time; missing breakfast among subjects is obviously a serious problem.

The frequency of intake of different food groups was studied. Only 15.8% of middle school girls and 12.9% of high school girls ate vegetables at every meal. 18.1% of middle school girls and 8.0% of high school girls ate protein foods, such as fish, meat, eggs, and beans, at every meal. Consumption of instant food was significantly higher among high school girls (p<0.01); 66.0% of middle school girls, compared to 81.3% of high school girls, consumed instant food more than once a day.

For every meal, 61.7% of middle school girls ate more than 3 side dishes, which is significantly higher (p<0.05) than the rate of 49.6% in high school girls. 12.2% of middle school girls and 15.1% of high school girls took snacks all the time. 12.8% of middle school girls and 15.1% of high school girls took meals where oil was used for cooking. The proportions of subjects using dairy

**Table 7.** Analysis on food behavior of subjects

| | Variables | Middle | | | High | | | |
|---|---|---|---|---|---|---|---|---|
| | | 3-meals | 2-meals | less than 1-meals | 3-meals | 2-meals | less than 1-meals | p-value |
| 1 | Pleasure meal | 278(55.7) | 196(39.3) | 25( 5.0) | 57(41.0) | 171(51.1) | 11( 7.9) | 0.008 |
| 2 | Enough time | 231(46.3) | 223(44.7) | 45( 9.0) | 43(30.9) | 70(50.4) | 26(18.7) | 0.000 |
| 3 | Vegetable intake | 79(15.8) | 185(37.1) | 235(47.1) | 18(12.9) | 47(33.8) | 74(53.2) | 0.415 |
| 4 | Animal food & soy intake | 90(18.1) | 276(55.4) | 132(26.5) | 11( 8.0) | 75(54.7) | 51(37.2) | 0.004 |
| 5 | Balanced diet | 124(24.9) | 250(50.3) | 123(24.7) | 28(20.3) | 58(42.0) | 52(37.7) | 0.011 |
| 6 | Diversity food | 309(61.7) | 147(29.3) | 45(9.0) | 69(49.6) | 48(24.5) | 22(15.8) | 0.014 |
| 7 | Domestic products | 170(34.0) | 247(49.4) | 83(16.6) | 67(48.2) | 55(39.6) | 179( 2.2) | 0.009 |
| 8 | Spiceful food | 251(50.5) | 160(32.2) | 85(17.3) | 76(54.7) | 35(25.2) | 28(20.1) | 0.273 |
| 9 | Instant food | 21( 4.2) | 149(29.8) | 330(66.0) | 3( 2.2) | 23(16.5) | 113(81.3) | 0.003 |
| 10 | Seasonal food | 102(20.4) | 267(53.5) | 130(26.1) | 26(18.7) | 80(57.6) | 33(23.7) | 0.698 |
| | | always | sometimes | never | . always | sometimes | never | p-value |
| 11 | Skipping breast | 138(27.8) | 266(53.5) | 93(18.7) | 45(32.4) | 64(46.0) | 30(21.6) | 0.296 |
| 12 | Snake | 61(12.2) | 383(76.6) | 56(11.2) | 22(15.8) | 105(75.5) | 12( 8.6) | 0.408 |
| 13 | Oilly food | 64(12.8) | 369(73.7) | 68(13.6) | 21(15.1) | 100(71.9) | 18(12.9) | 0.771 |
| 14 | Milk & dairy food | 195(39.0) | 229(45.8) | 76(15.2) | 62(44.6) | 52(37.4) | 25(18.0) | 0.210 |
| 15 | Food expenses for meal | 247(49.5) | 226(45.3) | 26( 5.2) | 44(31.9) | 72(52.2) | 22(15.9) | 0.000 |
| 16 | Time expenses for meal | 250(50.2) | 238(47.8) | 10( 2.0) | 62(44.6) | 68(48.9) | 9( 6.5) | 0.018 |
| 17 | Balanced life | 59(11.8) | 304(60.7) | 138(27.5) | 12( 8.7) | 65(47.1) | 61(44.2) | 0.001 |
| 18 | Supplementation | 39( 7.8) | 165(33.0) | 296(59.2) | 6( 4.3) | 28(20.1) | 105(75.5) | 0.002 |
| 19 | Utilize of nutrition information | 50(10.0) | 309(61.9) | 140(28.1) | 4( 2.9) | 81(58.3) | 81(58.3) | 0.003 |
| 20 | Contribution for health | 144(28.7) | 280(55.9) | 77(15.4) | 31(22.3) | 83(59.7) | 25(18.0) | 0.031 |

products were 39.5% of middle school girls and 44.6% of high school girls.

Behavior of leading balanced life was not practised in 27.5% of middle school girls and 44.2% of high school girls did not lead balanced lives. 28.1% of middle school girls and 58.3% of high school girls never utilize health information.

## 6. Analysis of variables affecting subjects body image

### (1) Body image

The results of questions related to body image, which includes ones feelings and attitudes towards ones body, are presented in Table 8. The results of the objective evaluations, PIBW and BMI, show that body image scores were higher among slim and normal weight groups, and were lower among the overweight group. The body image score was generally lower in middle school girls compared with high school girls, and was very low in high school girls who perceived themselves as obese or who would be obese according to the objective evaluation. The body image score was higher in slim girls than normal weight girls.

Our results are consistent with other studies[29)-32)] in that the subjects of our study had a distorted body image and considered themselves to be fatter than they actually were under the objective evaluation. This phenomenon is attributed to a negative reaction to becoming fat[33)] and to the skewed attitude of slimness as an ideal body image.

**Table 8.** The body Image according to obesity status

| Obesity Status | | Middle | High | p-value |
|---|---|---|---|---|
| PIBW | -90 | 41.5± 7.2 | 40.5± 8.2 | df=3 $x_2$=5.1 p=0.017 |
| | 90-110 | 42.2± 9.5 | 41.9± 9.8 | |
| | 110-120 | 38.3±10.8 | 37.5± 9.8 | |
| | 120- | 35.5±11.2 | 32.5±10.2 | |
| BMI | 30.1~40 | 42.9± 7.2 | 41.9± 6.9 | df=3 $x_2$=3.8 p=0.004 |
| | 25.1~30 | 41.5±10.2 | 40.9±11.2 | |
| | 20.1~25 | 39.5± 9.8 | 38.9±10.7 | |
| | ~20 | 35.9± 8.2 | 34.8±12.2 | |
| Weight Perception | Severe thin | 43.5± 8.2 | 43.0±10.6 | df=5 $x_2$=16.2 p=0.006 |
| | Thin | 42.7±11.2 | 42.9±13.2 | |
| | Moderate | 42.9±12.2 | 42.5±11.3 | |
| | Overweight | 39.9±10.2 | 39.5± 9.5 | |
| | Obese | 37.5± 6.2 | 36.7± 9.7 | |
| | Severe obese | 34.9±12.2 | 34.5±13.2 | |
| | Average | 40.5± 7.2 | 38.5±10.2 | |

### (2) Analysis of variables affecting body image

① Relationship of body image with an individuals environment

As presented in Table 9, the ages of the parents had

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no influence on body image, but distorted body images occurred more frequently in subjects who had younger siblings and whose mothers worked long hours. The distortion of body image was higher in subjects whose birth weights were high, and who had early menarche.

**Table 9.** The influence of general characteristics on the distorted body image

| | Total | Middle | High |
|---|---|---|---|
| Father age | 0.019 | 0.030 | 0.025 |
| Mother age | 0.078 | 0.121 | -0.031 |
| Older brother age | 0.019 | 0.044 | 0.222 |
| Younger brother age | -0.174* | -0.267** | -0.020 |
| Working time of mom | -0.200* | -0.351** | 0.065 |
| Total income | 0.038 | 0.030 | 0.041 |
| Birth weight | -0.319* | -0.289* | -0.389* |
| Menarche | -0.218* | -0.209* | -0.248* |
| Total | 895 | 425 | 134 |

*p<0.05    **p<0.01

② Weight control practices

Body image scores were significantly lower in subjects who had experience of weight control. Methods of weight control such as skipping meals and controlling the quantity of food were highly correlated with body image scores; also, the use of slimming drugs and slimming machines was highly related to a distorted body image (Table 10).

This distorted body image, combined with the fear of becoming fat and the desire for slimness, might cause undesirable weight control phenomena.[34)] In the USA, 44% of high school girls wanted to lose weight and 26% tried hard not to gain weight; this means that adolescent girls have a heightened interest in weight reduction, which is significantly related to a low body image score.[35)] This means that various weight control behaviors are positively related to a distorted body image. It appears that adolescent girls are troubled with their distorted body image and are involved in various weight control activities; this is a serious problem both in the USA and in Korea.

**Table 10.** The body image score according to weight control practices

| Variables | | Score | p - value |
|---|---|---|---|
| Experience | Yes | 33.2±12.9 | 0.000 |
| | Keep in mind | 39.3±11.6 | |
| | No | 45.8±12.3 | |
| Method | Fasting | 31.6±11.7 | 0.000 |
| | Reducing diet | 30.0±11.1 | |
| | Excercise | 36.3±13.4 | |
| | Drug | 30.0±12.0 | |
| | Slim machine | 37.3±12.4 | |
| | Others | 35.1±12.5 | |

## (2) Body image score and eating behavior

The rate of distortion in body image was significantly higher in girls who place the most value on food to control weight, and who eat light meals. A low degree of satisfaction with food was correlated with a high degree of dissatisfaction with the subjects body image.

In addition, when food behavior was classified into excellent, good, and poor, the rate of distortion of body image was higher in subjects whose food behavior was poor.(Table 11)

Table 11. The body image score according to eating behavior

| Variables | | Score | p-value |
|---|---|---|---|
| Resons for Eating | Hunger | 35.6±16.6 | 0.003 |
| | For Health | 46.4±13.7 | |
| | Delicacies | 45.5±16.7 | |
| | Light meal | 29.0±13.2 | |
| | Dieting | 29.7±14.2 | |
| | Other | 36.3±15.9 | |
| Food Satisfaction | Very satisfy | 45.1±17.3 | 0.027 |
| | Satisfy | 43.5±16.1 | |
| | So - so | 35.8±14.3 | |
| | Dissatisfy | 30.5±15.6 | |
| | Very dissatisfy | 29.5±15.3 | |
| Food Behavior | Excellent | 45.1±17.3 | 0.047 |
| | Good | 42.8±16.3 | |
| | poor | 33.5±15.6 | |

Among adolescent girls in the USA, over 21% attempted weight control by missing meals, and this behaviour was highly correlated with distorted body image.[35-36] In our study, the subjects with distorted body image had poor eating behavior; thus, food and nutrition education is urgently needed for adolescent girls.

The results of our study showed that the rate of distortion of body image was positively related with the obesity index and with subjects perception of themselves as obese. Variables which affected body image were the individuals environment, weight control behavior, and eating behavior. The most serious problem lies in the individuals misconception of their body size. Nutrition education programs for adolescents are needed in order to correct distorted body image, improper weight control behavior, and eating behavior.

## CONCLUSION

The objective of this research was to investigate, among adolescent girls attending middle and high school, the interrelationships between body image, weight control behavior and eating behavior.

The results of the study showed that girls tended to consider themselves as fatter than their actual body weight. Many of the subjects with an ideal body weight according to the objective evaluation, considered themselves overweight; this was more frequent in high school girls than in middle school girls (p<0.05). Adolescence is a period when ones value system is formed in close relationships with people surrounding oneself. This psychological factor plays an important role in establishing ones own body image. The middle school girls expectations were not realistic in that they all wished to be taller and thinner. The subjects were dissatisfied with their present height and weight. They all expressed a strong wish to be thin and tall in the future. Analyses of the level of dissatisfaction with different areas or attributes of the body revealed that subjects were mostly dissatisfied with their heights and weights as well as with the length and thickness of their legs. 41% of the subjects attempted weight control, among which 61.5% skipped meals or reduced food intake, 25.8% exercised, 5.1% used drugs for weight reduction, and 6.9% attended commercial obesity management centers. Approximately 45% of the subjects obtained information on weight control from the mass media, and many from magazines, or from family and friends.

The rate of the subjects distorted body image (the difference between subjective and objective evaluations of body size) was not related to the ages of their parents; however, this rate was higher in subjects who had younger siblings or working mothers, or who had higher birth weights. The earlier the menarche, the higher the rate of distorted body image. The highest rates of distorted body image were found in subjects who had used drugs for weight control, followed by subjects who perceived themselves as overweight, and those who had used other methods of weight control such as skipping meals and reducing food intake.

Also, a high rate of distorted body image was found in subjects who value thinness, who believe in consuming light meals, who have lower satisfaction with their meals, and who have unsound eating behavior. Thus, the variables which affect body image among adolescent girls were environmental factors, subjective and objective evaluations of body image, weight control behavior and eating behavior.

Modern society encourages people to be thin, and adolescent girls are interested in their body weights and body shapes. The mass media and fashion exert powerful pressures on adolescent girls to be thin. The level of interest in weight control among Korean adolescents tended to be slightly lower than their counterparts in the USA or Japan. The majority of adolescents become interested in weight control from their early adolescence.

According to a study conducted by Seldura et al35) on high school girls in the USA, 41% perceived themselves as overweight, 40% were dissatisfied with their body weights, 48% attempted weight reduction in the past, 27% tried vomiting as an attempt to lose weight, and 11% tried drugs for weight reduction. Recently, many more Korean adolescent girls want to be thin, and even the normal weight girls set unrealistic goals and attempt to control weight. Subjective perceptions among girls of being overweight, even though they may not be fat using an objective assessment, influence weight reduction behaviour.

Adolescence is a period when rapid physical growth occurs, with an increased number of body fat cells; body shape changes, and different hormones are secreted. Especially, Korean adolescents are under severe stress from school work and worries about their future. Psychological struggles, dissatisfaction and unstable emotions among adolescents result in a tendency to have unstable eating behavior. Excessive school work prevents adolescents from participating in physical activities, which would constitute a main factor causing obesity. Especially among adolescent girls, sensitiveness and increased interest in their appearance and body shape would prompt them to try weight control methods. There are serious problems among adolescents in using improper weight control methods without proper knowledge. A distorted body image, disappointment with their efforts to control food intake, and inadequate and unhealthful food intakes, may all interfere with growth and development; thus, the study of abnormal behavior among adolescents is an urgent task, and new approaches should be used to solve these problems. Adolescence is a special phase of life where values are rapidly changing and becoming established; thus, establishment of correct body image, positive habits in weight control, and establishment of healthful eating habits, are important to ensure good nutrition and health in adolescents. Nutrition and health education programs should be researched and implemented in order for adolescents to establish desirable food behavior.

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