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Influence of Body Weight Perception on Weight Management Behavior among Korean Female Adolescents

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This study investigated the influence of weight perception on weight management strategies including diet and exercise in Korean female adolescents. Junior (J) and senior (S) high school girls were divided in two groups; those who had ≤100% (BI) and >100% (AI) of ideal weight (J-BI, n=376, 14.8 yr, 46.1 kg; J-AI, n=128, 15.0 yr, 57.4 kg; S-BI, n=325, 17.4 yr, 50.1 kg; and S-AI, n=133, 17.5 yr, 58.2 kg, mean values). Questionnaires to assess weight perception, desire to lose weight, body image, eating behavior, weight control strategies and physical activity (PPA) were administered. J-AI (9.4 kg) and S-AI (9.8 kg) desired to lose weight more than J-BI (2.5 kg) and S-BI (3.6 kg), respectively ($p<0.001$). 85% of J-AI and 93% of S-AI perceived their weight being above average and 23% of J-BI and 34% of S-BI responded similarly ($p<0.001$). Body dissatisfaction index (BDI) and eating attitude (EAT26) scores were lower in J-BI (9.7, 12.0) vs. J-AI (16.4, 14.7) and S-BI (12.4, 12.4) vs. S-AI (19.5, 15.4) ($p<0.001$). However, PPA was not different for J-BI vs. J-AI, and S-BI vs. S-AI. Only 17, 18, 9, and 15% of J-BI, J-AI, S-BI, and S-AI, respectively, exercised regularly. PPA and BDI were only slightly correlated in J-BI ($r=0.194$, $p<0.005$) and S-BI ($r=0.220$, $p<0.005$). Even that the majority of Korean female adolescents perceived they were heavy and desired to lose weight, appropriate exercise and physical activities were not practiced.

Key Words: Body image, Physical activity, Exercise, Diet, Eating behavior

INTRODUCTION

Adequate physical activities and proper dietary habits during early childhood and adolescence are crucial, not only to maintain good health in early years, but to prevent adult diseases such as obesity,[1)] cardiovascular diseases,[2,3)] and osteoporosis.[4)] Despite the emphasis on the importance of obesity prevention in early years of lifespan for better health, many studies reported an increasing prevalence of either overweight or at risk of becoming overweight in recent years.[5-7)] In addition, youths are employing improper methods of weight control including fasting or skipping meals,[8)] use of diet pills or laxatives,[9,10)] smoking,[5)] and purging.[9,10)]

A further concern is that many adolescents perceive themselves as overweight and are dissatisfied with their body image, and subsequently desire to lose weight.[8)] Many variables are thought to influence adolescents' perception of their body weight and image. It has been suggested that body image was a strong drive of adolescent's nutritional habits.[11)] However, those who perceived themselves as overweight are less likely committed to physical activities and/or healthy diet choices.[8,12)] Cultural and peer influences may promote and idealize slimness as the standard of beauty and attraction that may lead them to set unreasonable goals and adoption of inappropriate weight loss attempts.[8,13)] Thus, it is necessary to educate adolescents to conceptualize more accurately their weight and to practice appropriate weight management strategies.

During the last few decades in the Western society, changes of social environment were very likely associated with reduced physical labor that resulted in insufficient activity in all ages. These changes now appear in the Asian countries since they have undergone "Western" style cultural and economic changes. With these changes, body weight and statue have increased sharply, contributing to health related behavioral problems such as improper dieting and inadequate exercise. For example, in the last 20 years, 12-17 years old Korean female adolescents have grown an average of 5 cm taller and 6 kg heavier.[14)] Their daily activities have been

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reduced and the consumption of "Western" style meals has increased.

Although several studies reported that body-image and desire to achieve thinness were related to modified diet and exercise behavior in college and adults populations,[15,16] it has not been documented that this prevalence is similar in female adolescents in Asian countries. Therefore, the purpose of this study was to investigate the influence of weight and its perception on weight control behaviors in Korean high school girls.

METHODS

1. Subjects

From March through June of 2003, 1025 female students at 7-12th grades from 11 public and private high schools participated in this study. All schools were located in Seoul Metropolitan Area and were randomly selected, but regionally balanced. Within a school, one or two classes, depending on the size of enrollment, were randomly assigned to participate in the study. All subjects were Korean and participated voluntarily. No additional selection criteria were employed. Cases of incomplete or missing data (n=63) were excluded from analyses. Subsequently, data from a total of 962 girls including 504 junior (J) and 458 senior (S) high students were analyzed. This study was reviewed and approved by the Institutional Review Board of Human Studies of Kookmin University.

2. Instruments

A self-report questionnaire designed by Korean Sport Science Institute was administered to each individual. The questionnaire consisted of four sections including: 1) demographic data, 2) body shape/body weight, 3) exercise habits, and 4) dieting behavior.

To assess desired body weight and weight control, subjects responded to the questions: "What is your current weight?", "How much do you want to weigh?", "Do you want to lose weight?", and "Do you want to gain weight?" Perception of current body weight was evaluated by the question: "What do you think about yourself?" and they responded to a five-point Likert scale with responses ranging from "very overweight" to "very underweight." Body image was determined utilizing an appropriately translated Body Dissatisfaction Index (BDI).[17] In addition, they were asked "How would you rate yourself in terms of your body figure?", and they choose answers from "within top 10%," "within top 30%," "about average," "within bottom 30%," to "within bottom 10%." To assess the knowledge of adequate weight management methods, subjects were asked "What is the appropriate method(s) to manage body weight?", and they answered among "eating control," "adequate exercise" and "both eating control and adequate exercise."

A five-point Likert scale was used to rate perceived physical activity level (PPA) relative to age-sex matched population. Responses ranged from 1, very active, to 5, very inactive. Subjects also responded yes or no to the questions: "Do you practice enough daily activity?" and "Do you exercise regularly?"

Eating behavior was assessed, answering a five-point Likert response format of: "How do you rate your eating habit?", "How much do you think you eat?", and "How do you think about your nutrient intake level?" Frequency of meals was measured by the question "How many meals do you have in a week?". Perceived need to lose weight and dieting experiences were also questioned. The Eating Attitudes Test (EAT26) was utilized to screen pathogenic eating attitudes and behaviors.[17]

3. Analyses

The data of self-reported demographic characteristics were utilized and body mass index (BMI; kg/m^2) was calculated. Subjects were divided in two groups, based on either $\leq$100% (BI) or >100% (AI) of their ideal weight, calculated by Broca's equation: (height-100) $\times$0.85. Korean female adolescents were relatively shorter and lighter, and subsequently, they had lower BMI than their Western counterparts. This resulted in a small population size for BMI over 26. For both BDI and EAT26, scores of 20 or above was considered high, and used as an indicator of low body satisfaction level and possibility of pathogenic eating disorders, respectively. Weight differences were calculated from the current body weight minus the desired weight. Analysis of variance was utilized for comparing means of weight, height, BMI, desired weight, weight difference, BDI and EAT26 scores between BI and AI for J and S. Chi-square was performed accordingly for comparisons between BI and AI in other variables. Correlation coefficients were determined for selected variables.

RESULTS

As shown in Table 1, the body weight and BMI were significantly higher in AI compared to BI in both J and S (ANOVA, p<0.001). The prevalence of BMI equal and above 26 was 12 in J and 7 in S. About height of S, BI was taller than AI (ANOVA, p<0.001), while no difference was found in J (p>0.05). The desired body weight was much lower in BI than AI in both J and S. The mean values of BDI and EAT26 scores were statistically higher for AI than BI in both S and J. The prevalence of low body satisfaction level was 20% in J and 37% in S, and the prevalence of potential eating

Table 1. Subjects' Demographic Characteristics and Scores for the Inventory Scales

Ideal body weight	Junior High School ≤100% (376)	Junior High School 100%< (128)	Senior High School ≤100% (325)	Senior High School 100%< (133)
Age (yrs)	14.8±0.9	15.0±0.9	17.4±1.2	17.5±1.3
Wt (kg)	46.1±5.7***	57.4±8.7	50.1±4.7***	58.2±7.3
Ht (cm)	158.2±5.6	157.7±5.4	162.4±4.8***	159.3±5.7
BMI (kg/m^2)	18.4±1.6***	23.0±2.5	19.0±1.4***	22.9±1.8
Wt_{des} (kg)	43.7±4.5***	48.0±5.0	46.5±3.1***	48.4±4.4
Wt_{diff} (kg)	2.5±4.3**	9.4±7.2	3.6±3.7**	9.8±5.2
BDI	9.7±7.0***	16.4±6.8	12.4±7.4***	19.5±5.5
EAT26	12.0±8.3***	14.7±9.5	12.4±7.9***	15.4±8.9

Wt; weight, Ht: height, BMI: body mass index, Wtdes: desired body weight, Wt_{diff}=Wt-Wt_{des}, BDI; body dissatisfaction index, EAT26; eating attitude test.
** significantly different between groups at p<0.005 (ANOVA)
*** significantly different between groups at p<0.001 (ANOVA)

Table 2. Percent Distribution of Body Image and Weight Perception

Ideal body weight	Junior High School ≤100%	Junior High School 100%<	Junior High School total	Senior High School ≤100%	Senior High School 100%<	Senior High School total
Weight Perception						
Below average	30.9	5.6	24.0	20.9	1.6	13.8
Average	46.4	9.6	35.3	47.7	5.3	34.4
Above average	22.6	84.8	40.6	34.3	93.1	51.7
X^2	168.4***			165.1***		
Height Perception						
Below average	40.0	56.7	44.3	43.7	60.9	47.6
Average	41.6	34.6	39.8	40.9	28.6	38.1
Above average	18.4	8.7	15.9	15.4	10.6	14.3
X^2	17.6***			22.3***		
Satisfy Your Body Figure						
Satisfy	21.3	7.8	17.4	13.6	3.8	9.7
So so	35.7	17.2	30.1	27.6	8.3	21.1
Dissatisfy	42.9	75.0	52.5	58.8	88.0	69.2
X^2	49.9***			46.8***		
If You Rate Your Body Style						
Top 10%	5.2	2.4	4.6	3.1	1.5	2.6
Top 30%	9.3	0.8	6.4	7.5	2.3	5.7
About average	67.6	38.1	59.6	64.2	29.0	51.5
Bottom 30%	9.9	25.4	13.8	16.0	42.0	24.5
Bottom 10%	8.0	33.3	15.6	9.0	25.2	15.8
X^2	82.6***			70.2***		
What is an Adequate Weight Control Strategy						
Diet	6.9	2.4	5.5	7.1	4.5	6.2
Exercise	38.1	26.8	35.8	20.7	13.5	17.4
Diet and exercise	54.9	70.9	58.7	72.2	82.0	76.4
X^2	11.0**			4.7		

Values are percentage. Comparisons were made using Chi-square.
** significantly different between groups at P<0.005
*** significantly different between groups at P<0.001

disorders was 24% in J and 23% in S.

When their perceived body weight was questioned, approximately 85% of J-AI and 93% of S-AI responded that their weight was above the average compared to their peer groups (Table 2). However, the majority of the subjects were within the normal range (80-120% of ideal weight) of body weight of their age group, and only 2.8% in J and 2.8% in S were more than 120% of ideal weight. In contrast, 23% of J-BI and 34% of S-BI perceived themselves over the ideal weight. Regarding their current height, BI and AI in both J and S responded differently, and four of ten perceived themselves shorter than the average. The majority of AI in both J and S were

Table 3. Percent Distribution of Exercise and Eating Behaviors

Ideal body weight	Junior High School ≤100%	Junior High School 100%<	Junior High School total	Junior High School ≤100%	Junior High School 100%<	Junior High School total
Physical Activity Level						
Very active	12.9	10.2	12.2	6.2	6.8	6.0
Active	28.0	21.3	25.9	24.8	18.8	22.5
Average	46.5	47.2	46.9	48.4	45.9	48.2
Inactive	9.9	15.7	11.3	13.0	23.3	15.9
Very inactive	2.7	5.5	3.6	7.5	5.3	7.4
X^2	7.2			8.5		
Enough Daily Activity?						
Yes	39.8	35.2	38.4	23.3	18.8	21.2
No	60.2	64.8	61.6	76.7	81.2	78.8
X^2	0.9			1.1		
Regular Exercise?						
Yes	17.4	17.7	17.4	9.0	14.5	9.8
No	82.6	82.3	82.6	91.0	85.5	90.2
X^2	0.1			3.0		
Eating Behavior Perception						
Good	23.9	19.5	21.8	15.9	12.8	14.8
Average	48.9	44.5	48.0	38.0	36.8	37.0
Inadequate	27.1	36.0	30.2	46.1	50.4	48.3
X^2	5.7			4.1		
Eating Amount						
Too much	56.8	70.1	61.2	60.0	69.9	64.1
Adequate	30.4	23.6	28.3	27.8	21.1	25.5
Too little	12.9	6.3	10.5	12.2	9.0	10.3
X^2	8.3			5.6		
Enough Nutrient Intake?						
Too much	47.4	75.4	55.5	55.5	73.8	63.4
Adequate	30.2	16.7	26.9	21.1	16.2	19.0
Too little	22.3	7.9	17.7	23.4	10.0	17.6
X^2	30.4***			19.5***		
Meal Frequencies / wk						
≥21	31.3	19.0	28.1	27.6	22.6	26.4
18-20	36.9	50.0	39.1	33.5	40.6	37.1
15-17	22.6	20.6	23.4	27.0	30.1	27.0
≤14	9.2	10.3	9.4	11.8	6.8	9.5
X^2	9.3*			4.9		
Instant Food for Meals?						
Yes	83.3	79.4	81.8	90.6	92.5	91.6
No	16.7	20.6	18.2	9.4	7.5	8.4
X^2	1.0			0.4		
How many times / wk						
1-2	46.3	46.3	45.9	35.4	32.5	34.4
3-4	35.2	38.0	35.7	40.4	42.1	41.2
5-7	16.5	11.1	15.3	19.5	22.2	19.5
≥8	1.9	4.6	3.2	4.6	3.2	4.9
X^2	4.0			1.0		
Need Diet?						
Absolutely yes	16.7	56.7	28.5	23.8	66.2	39.8
Yes	51.3	40.2	47.8	54.1	33.1	45.4
No	25.5	1.6	18.9	16.6	0.8	11.3
Absolutely no	6.5	1.6	4.8	5.6	0.0	3.5
X^2	91.2***			82.5***		
Diet Experience?						
Yes	32.4	56.0	39.3	38.9	66.9	49.0
No	67.6	44.0	60.7	61.1	33.1	51.0
X^2	22.2***			29.5***		

Values are percentage. Comparisons were made using Chi-square.
* significantly different between groups at P<0.05
*** significantly different between groups at P<0.001

dissatisfied with their body style and rated themselves as below the average in terms of body style. These responses were significant when compared with BI (Chi-square, $p<0.001$). The majority of subjects in all groups responded that the combination of diet and exercise was the proper intervention to manage weight.

When PPA was compared between BI and AI in both J and S, no differences were found (Table 3). When they were asked whether they exercised regularly, only 17, 18, 9, and 15% of J-BI, J-AI, S-BI, and S-AI, respectively, responded affirmatively. Responses to perceived eating behavior and amount of eating between BI and AI in both J and S were not statistically different. Both J and S in the AI group perceived that they had more than adequate nutrient intake in their meals, and this trend was statistically different than BI (Chi-square, $p<0.001$). Further, both J and S in the AI group responded that they needed diet control to change their weight, and this answer was different than BI (Chi-square, $p<0.001$). In general, approximately three quarters of all students perceived the need to diet. In fact, more than half of J and S in AI group had controlled their diet to lose weight and this was statistically greater than BI (Chi-square, $p<0.001$).

When the selected variables were linearly compared for their relationships, PPA and BDI were slightly but positively correlated in J-BI ($p<0.005$) and S-BI ($p<0.005$), but not in J-AI and S-AI (Table 4). Their current body weight was not related to PPA. In all groups, as dissatisfaction with body weight increased (BDI), so did their desire to lose more weight (Wt_{diff}).

Table 4. Correlations between Variables in Each Group

J-BI	BDI	EAT26	Wt	Wt_{diff}	PPA
Age	0.208**	0.089	0.345**	0.172**	0.038
BDI		0.290**	0.409**	0.321**	0.194**
EAT26			0.154**	0.154**	0.064
Wt				0.633**	0.042
Wt_{diff}					0.022
J-AI	BDI	EAT26	Wt	Wt_{diff}	PPA
age	0.226**	0.022	0.266**	0.246**	-0.067
BDI		0.341**	0.238*	0.276**	0.060
EAT26			0.074	0.133	-0.072
Wt				0.816**	-0.076
Wt_{diff}					0.018
S-BI	BDI	EAT26	Wt	Wt_{diff}	PPA
age	0.074	0.004	0.150*	0.115	0.005
BDI		0.323**	0.355**	0.487**	0.220**
EAT26			0.179**	0.275**	-0.039
Wt				0.744**	0.118
Wt_{diff}					0.093
S-AI	BDI	EAT26	Wt	Wt_{diff}	PPA
age	0.096	0.052	-0.166	-0.117	-0.031
BDI		0.221*	0.193*	0.291**	0.097
EAT26			0.143	0.296**	-0.232*
Wt				0.800**	0.143
Wt_{diff}					-0.043

J; Junior, S; Senior, BI; equal to or below 100% of ideal weight, AI; above 100% of ideal weight
* significantly different at $P<0.05$,
** significantly different at $P<0.005$

DISCUSSION

The present study was designed to examine the effects of weight perception on weight management behavior in Korean adolescent girls. Primarily, the present study revealed that about 41% of junior and 52% of senior high school girls perceived themselves weighing more than the average of their peer groups, although most of them were not actually overweight or obese as indicated by the BMI of these subjects. They wanted to lose weight in a marginal amount, especially those who were heavier than the ideal body weight. More than half of the Korean female adolescents had experiences of diet to lose weight, but few had regular exercises.

Compared to previous studies of Western adolescent females, the perception of being over average weight and possessing the desire to lose weight were comparable. It has been reported that 42% of Western adolescent females felt that they were overweight[9,10] and more than half of these females attempted to lose weight.[9] However, the prevalence of either overweight or at risk of being overweight in Western girls was about 25%,[6] which is higher than those of the present study. This indicated that Korean female adolescents not only desired to have a slimmer body than their peer group, but misperceived their body weight with a greater degree. It has been reported that body image is one of the strongest factor associated with the desire to change body weight.[8,9,11] Considering the high prevalence of body dissatisfaction related to desire for weight reduction, the Korean girls appeared to be influenced by body image. It is not clear if the desire for slimness reflects an ideal of attractiveness in Korean society as seen in Western society,[18] but it is highly probable.

One concern was the practice of weight control behaviors. Despite the majority of Korean girls acknowledging the importance of physical activity combination with diet for weight management, they did not actually practice both. Instead, a few of them participated in regular exercises, and the majority of them had less than the enough physical activity. Their nutritional and eating behaviors were not healthy and they relied primarily on diet to manage their weight. The rate of exercises adoption to control body weight appeared to be lower than previously reported.[19,20] While Neumark-Sztainer and her colleagues[20] reported that exercise was the most frequently used weight control behavior among Western female adolescents, and the Korean girls were less engaged.

The high prevalence of dieting and eating disorders among adolescent females has been reported in many studies,[8,11,21-23] and body image is seen as a strong determinant of adolescent nutritional habits.[11] Regarding it, subjects in this study were similar to those of previous studies.

An expectation of racial differences in perceiving and managing body weight has been reported previously.[5,9,10,13,24,25] It has been attributed to cultural differences in the perception of body weight and weight control desire. Although we did not directly compare our subjects with other ethnic groups, the perception of body weight and the desire to be thin in Korean girls was similar to that observed in various Western groups. There are few studies that contain an adequately heterogeneous sample to make direct comparison and methodological differences, limiting the meta-analysis.[26,27]

Our data indicated that perceived physical activity level was highly correlated with body dissatisfaction only in those that were ≤100% of ideal weight. This finding was consistent with previous reports, indicating that those who perceived themselves as 'too fat' were less likely to participate in physical activities.[8,12] The restriction of participating in physical activity in this group may be due to inferior physical fitness or lack of willingness to display their body in public while exercising.

In conclusion, Korean female adolescents perceived themselves as overweight although they were not. They desired to manage their weight, but proper weight management strategies such as increased physical activity and/or exercise was not adequately utilized.

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