Eating Patterns, Weight Status and Egogram Characteristics among Japanese Pupils

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Abstract

The purpose of this study was to investigate the actual conditions of eating patterns and the relationships among eating patterns, degree of overweightness and egogram characteristics among pupils. The subjects were 871 boys and girls whose grades ranged from 4th to 6th. They were selected from five elementary schools in Hirosaki and its suburbs, Japan. They were classified into the following 5 groups by the degree of overweightness: lean group, standard group, slightly obese group, moderately obese group, and extremely obese group. Eating patterns were measured by questionnaires, and AN-egogram was used for the measurement of egogram characteristics.

The results were as follows:

1. The ego state of pupils who eat their favorite dish even with a full stomach showed significantly lower A (adult) qualities and higher FC (free child) qualities than those who would not eat in this situation. The egogram pattern of the former pupils exhibited the NP (nurturing parent)-low type.
2. The egogram pattern of pupils who engage in substitutive food intake exhibited the NP-low type.
3. Significant differences existed among the ego states CP (critical parent), NP, A, and FC as to reasons given for eating between meals.
4. The egogram pattern of the person who eats between meals at the time of "an empty stomach" showed a flat type of ego state with relatively low NP. The person who eats "just at meal time" showed an A-dominant type. The person who eats "when food is present" showed an NP - low type with relatively low CP.
5. The ego state A was significantly less common in the extremely obese group than in the lean group.
6. The egogram pattern of the lean, standard, and slightly obese groups showed an A - dominant type of ego state, and that of moderately and extremely obese groups showed an AC-dominant type with CP slightly high.

Key words: Eating Patterns, Egogram, Pupils, Obesity, Leanness

INTRODUCTION

Simple obesity and leanness are caused by an imbalance between energy intake and energy expenditure. However, in

many cases, meal guidance and active therapeutic exercise are ineffective in improving obesity and leanness and in maintaining good conditioning because of difficulties in continuing them over the course of time. Therefore, other means are sought to resolve the underlying causes of obesity and leanness in addition to meal guidance and therapeutic exercise.

In recent years, many researchers have focused their attention on the eating attitude that causes obesity and leanness. Obesity patients has distorted eating attitude that was strongly managed by cognitive control that composed of perceptual cognition, conceptual cognition and so on. They have excessive eating,

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eating between meals, and substitutive food intake, that were also recognized in healthy person when that eating attitude was not morbid^{1,2)}. However, all reports regarding the psychological background that causes such an eating attitude have only taken adults as their subjects, and have neglected to study children³⁻⁵⁾. We paid attention to children and their eating patterns, and set three eating patterns; food intake reaction to a favorite dish on a full stomach, food intake reaction for stress annulment and eating patterns for between meals.

The present research therefore investigated the actual conditions of eating patterns and the relationships among eating patterns, degree of overweightness and egogram characteristics of pupils whose eating habits were still in the final stages of development.

SUBJECTS AND METHODS

1. SUBJECTS

Our subjects were 871 pupils (291 in the fourth grade, 293 in the fifth grade, and 287 in the sixth grade) from five elementary schools in Hirosaki city and its suburbs in Aomori prefecture, Japan. Among these, 699 pupils from four schools were considered for the analysis of eating patterns.

2. METHODS

Eating patterns were investigated in terms of food intake reaction to a favorite dish on a full stomach, food intake reaction for stress annulment, and reasons for eating between meals. A survey was conducted using questionnaires. The two questionnaire choices for food intake reaction to a favorite dish were: "I do not eat it because of a full stomach" and "I eat it because it is my favorite dish". Moreover, the two choices for food intake reaction for stress annulment were: "I always or often eat when feeling unpleasant and irritated" and "I have never eaten when feeling unpleasant and irritated". There were four choices for intake reasons: "I had an empty stomach", "It was just at meal time", "there was food present", and "others".

AN-egogram was used for the measurement of egogram characteristics. It consisted of 5 ego states; CP (critical parent), NP (nurturing parent), A(adult), FC (free child), AC (adapted child). The score of T which showed the mental energy condition, was calculated from a total of 5 raw ego state scores. These scores were converted to a T-score after corrected for biases of gender and grade. AN-egogram was developed for children by Akasaka and Nezu. Standardized egogram questionnaire for children was regarded as reliable and valuable psychological test in pediatric practice^{6,7)}.

The degree of overweightness was calculated using the following formulas: the degree of overweightness (%)=(actual body weight(kg) - standard body weight(kg)) / standard body weight(kg) × 100. The standard body weight was calculated from Murata's formulas⁸⁾ on the basis of the height and body weight observed in physical examinations in the fall.

Subjects were classified into the following 5 groups by their degrees of overweightness: lean group (-10% ≤), standard group (-10% < ~< 20%), slightly obese group (20% ≤ ~30% ≤), moderately obese group (30% ≤ ~50% <), extremely obese group (50% ≤).

3. SURVEY PERIOD

This research was performed from October to December in

1993 and from September to November in 1995.

4. STATISTICAL ANALYSIS

Statistical analyses used included a chi-squared test and an unpaired t-test for comparison between the 2 groups. One-way factorial analysis of variance (ANOVA) and multiple comparison tests were carried out over 3 groups. The level of significance was set at $p < 0.05$.

RESULTS

1. Eating patterns

Statistically significant differences in terms of food intake reaction based on schools were obtained, but in the other terms no significant difference was obtained.

A) Reaction to a favorite dish with a full stomach

Table 1 shows pupils' reactions to a favorite dish when their stomachs were full. No statistically significant differences in food intake reactions based on gender and grade or degree of overweightness were obtained. However, there was a tendency that more persons answered "do not eat" as the degree of overweightness increased.

B) Presence of substitutive food intake

Table 2 shows the presence of substitutive food intake. Similarly, no statistically significant differences based on gender or degree of overweightness were recognized. However, a trend appeared to show that in groups of some degree of overweightness, many persons eat when feeling unpleasant and irritated. Significant differences based on grade were recognized ($p < 0.05$).

C) Reasons for eating between meals

Table 3 shows reasons given for eating between meals. No significant differences based on gender or degree of overweightness were recognized with one exception. A slightly higher proportion of girls than boys selected "there was food present" as a reason for eating between meals. Significant differences based on grade were recognized ($p < 0.01$).

2. Food intake reactions and egogram characteristics

A) Food intake reaction with a full stomach and egogram characteristics

Table 4 shows food intake reactions to a favorite dish with a full stomach along with egogram characteristics. From the score of A(adult) of the 5 ego states, individuals in A were much more likely to not eat a favorite dish on a full stomach than individuals in other ego states ($p < 0.05$). Also, persons in the FC (free child) category were significantly more likely to eat a favorite dish on a full stomach ($p < 0.01$). And these results were remarkably for girls.

Significant differences concerning other ego states were not recognized. From the egogram pattern of each group, it was seen that person who does not eat a favorite dish with a full stomach showed an A-dominant type, and person who eats showed an NP-low type.

B) Substitutive food intake and egogram characteristics

Table 5 shows substitutive food intake along with egogram characteristics. No significant differences appeared in either group on the basis of ego state. The characteristic FC was found to have some correspondence with the persons who had substitutive food intake, and the characteristic A was slightly more likely to be found among those who did not exhibit substitutive food intake. No significant differences based on

Table 1 Reaction to a favorite dish with a full stomach.

Terms	Groups	Total number of subjects	Not eat %	Eat %	No answer %
Gender	Girls	340	36.5	61.5	2.0
	Boys	359	30.9	66.9	2.2
Degree of overweightness	Lean	97	29.9	68.0	2.1
	Standard	477	32.1	65.8	2.1
	Slightly obese	58	36.2	60.3	3.5
	Moderately obese	49	47.0	51.0	2.0
	Extremely obese	18	50.0	50.0	0.0

Not eat: I do not eat food because of a full stomach.

Eat: I eat food because it is my favorite dish.

Table 3 Reasons for eating between meals.

Terms	Groups	Total number of subjects	Empty stomach %	Meal time %	Food present %	Others %
Gender	Girls	340	51.5	19.7	12.6	16.2
	Boys	359	55.2	14.2	6.2	14.5
Grade**	4th	230	45.2	24.8	13.0	17.0
	5th	231	55.4	15.6	16.9	12.1
	6th	238	59.2	10.5	13.5	16.8
Degree of overweightness	Lean	97	57.7	17.5	15.5	9.3
	Standard	477	51.6	15.7	15.5	17.2
	Slightly obese	58	58.6	20.7	5.2	15.5
	Moderately obese	49	53.1	22.4	14.3	10.2
	Extremely obese	18	61.1	16.7	11.1	11.1

**p<0.01

Empty stomach: I had an empty stomach.

Meal time: It was just at meal time.

Food present: There was food present.

grade were recognized.

From the egogram pattern of each group, it was often the NP-low type who reported substitutive food intake, and the persons who reported no substitutive food intake were often the flat type with NP relatively low.

3. Reasons for eating between meals and egogram characteristics

Table 6 shows reasons for eating between meals along with egogram characteristics. Significant differences were recognized in the reasons given by subjects with four ego states: CP, NP, A, and FC. These results were remarkably for boys.

On the post hoc test for CP, the value of "when food was present" was lower than "empty stomach" and "It was just at meal time" as a reason given for eating between meals. For NP ego states, the value of "It was just at meal time" was higher than "empty stomach" and "when food was present". For the A-states, the value of "when food was present" was lower than "empty stomach" and "It was just at meal time". For FC-states, the value of "when at meal time" was lower than "empty stomach" and "when food was present". Egogram characteristics of the persons who eat when food was present involved low values of CP, NP and A types, but a high value of FC type.

Overall, persons who eat on an empty stomach were predominantly flat types with relatively low NP values; the persons who eat at meal time of eating between meals were predominantly A-dominant types; and the persons who eat when food was present were predominantly NP-low types with relatively low CP values.

Table 2 Presence of substitutive food intake.

Terms	Groups	Total number of subjects	Eat %	Never eaten %	No answer %
Gender	Girls	340	39.4	59.7	2.1
	Boys	359	36.8	63.0	2.2
Grade*	4th	230	45.2	53.9	0.9
	5th	231	30.3	68.8	0.9
	6th	238	38.7	61.3	0.0
Degree of overweightness	Lean	97	29.9	70.1	0.0
	Standard	477	40.3	59.1	0.6
	Slightly obese	58	34.5	65.5	0.0
	Moderately obese	49	34.7	63.3	2.0
	Extremely obese	18	44.4	55.6	0.0

*p<0.05

Eat: I always or often eat when feeling unpleasant and irritated.

Never eaten: I have never eaten when feeling unpleasant and irritated.

4. Relationship between the degree of overweightness and egogram characteristics

Table 7 shows the degree of association between the egogram characteristics and the degree of overweightness. No significant differences were recognized among the ego states by one-way factorial ANOVA among the 5 groups. No significant differences based on gender were recognized. However, the value of A in the lean group was the highest among the 5 groups. All ego states in the extremely obese group were lower than the other 4 groups. In the comparison between the lean group and the extremely obese group, the values of A and T in the lean group were higher than that in the extremely obese group. Similarly, in a comparison between the standard group and the extremely obese group, the states A, FC, and T were found to have a higher value in the standard group.

Overall, while the moderately obese and the extremely obese groups showed AC as the dominant type with CP relatively high, the standard, the slightly obese, and the lean groups showed A as the dominant type.

Discussion

It is important to clarify the psychological backgrounds that cause obesity and leanness in order to shape the health education for pupils as they establish their lifelong eating habits this period. In this research, we attempted to analyze the relationship of eating patterns and egogram characteristics among pupils, who had not been previously given adequate attention. Questionnaires of eating patterns referred from previous research was composed for this research, though reliability and validity were not confirmed. Consequently, these results could not be generalized, and were with limitation.

There was no difference in terms of gender distinction and degree of overweightness concerning individuals' reaction to eating a favorite dish with a full stomach. However, the rate of people answering that they did not eat a favorite dish on a full stomach was high among those whose degree of overweightness was high. In this research, the moderately obese and the extremely obese group showed relatively high CP. Moreover, in previous research⁹⁾, the egogram pattern of the obese group indicated that CP among them was moderately high. Therefore, in the obese group, the rate of people who did not eat a favorite dish on a full stomach was higher than in the other groups. We

Table 4 Food intake reactions to a favorite dish with a full stomach and egogram characteristics (T-score).

Food intake reactions	Total number of subjects		CP	NP	A	FC	AC	T
Not eat	235	Mean	47.56	46.57	49.96	47.35	48.62	47.02
		S.D.	9.38	9.68	9.06	9.67	10.22	9.53
Eat	449	Mean	47.35	45.87	48.29	49.43	49.84	47.07
		S.D.	10.21	9.93	10.30	9.79	10.15	10.38
unpaired t test					*	**		

**; p<0.01, *; p<0.05

Not eat: I do not eat it because of a full stomach.

Eat: I eat it because it is my favorite dish.

CP: Critical parent.

NP: Nurturing parent.

A: Adult.

FC: Free child.

AC: Adapted child.

T: Calculated from a total of 5 raw ego state scores and shows the mental energy.

T-score: Corrected for biases of gender and grade.

Table 6 Reasons for eating between meals and egogram characteristics (T-score).

Reasons	Total number of subjects		CP	NP	A	FC	AC	T
Empty stomach	373	Mean	47.40	45.78	48.82	48.83	49.47	46.99
		S.D.	9.84	9.56	9.54	9.79	9.94	9.90
Meal time	118	Mean	48.53	47.95	49.92	46.67	48.93	47.51
		S.D.	9.46	9.23	9.06	8.70	10.10	9.25
Food present	101	Mean	45.13	43.77	46.51	49.99	49.07	45.24
		S.D.	10.65	10.99	10.77	10.22	10.87	10.97
ANOVA			*	**	*	*		

**; p<0.01, *; p<0.05

Empty stomach: I had an empty stomach.

Meal time: It was just at meal time.

Food present: There was food present.

CP: Critical parent.

NP: Nurturing parent.

A: Adult.

FC: Free child.

AC: Adapted child.

T: Calculated from a total of 5 raw ego state scores and shows the mental energy.

T-score: Corrected for biases of gender and grade.

Table 5 Substitutive food intake and egogram characteristics (T-score).

Food intake reactions	Total number of subjects		CP	NP	A	FC	AC	T
Eat	266	Mean	47.27	45.64	47.91	49.55	49.33	46.83
		S.D.	10.20	10.14	9.68	9.48	9.75	10.14
Never eaten	429	Mean	47.55	46.32	49.36	48.13	49.36	47.11
		S.D.	9.72	9.65	9.96	9.93	10.44	10.01

Eat: I always or often eat when feeling unpleasant and irritated.

Never Eaten: I have never eaten when feeling unpleasant and irritated.

CP: Critical parent.

NP: Nurturing parent.

A: Adult.

FC: Free child.

AC: Adapted child.

T: Calculated from a total of 5 raw ego state scores and shows the mental energy.

T-score: Corrected for biases of gender and grade

Table 7 Relationship between the degree of overweightness and egogram characteristics (T-score).

Degree of overweightness	Total number of subjects		CP	NP	A	FC	AC	T
Lean	115	Mean	47.57	46.77	50.61	48.51	48.71	46.67
		S.D.	9.47	9.61	8.96	8.30	9.56	9.49
Standard	598	Mean	47.36	46.07	48.81	48.75	48.97	47.01
		S.D.	9.64	9.68	9.75	9.73	10.41	10.04
Slightly obese	72	Mean	48.12	46.01	49.33	48.49	49.17	47.01
		S.D.	9.82	10.06	10.38	10.52	10.08	10.62
Moderately obese	62	Mean	47.94	46.4	48.92	46.82	51.53	47.24
		S.D.	9.36	9.67	11.36	9.75	9.55	9.96
Extremely obese	24	Mean	45.67	44.71	45.38	44.83	46.33	43.23
		S.D.	10.63	8.94	9.44	9.71	7.54	9.28

CP: Critical parent.

NP: Nurturing parent.

A: Adult.

FC: Free child.

AC: Adapted child.

T: Calculated from a total of 5 raw ego state scores and shows the mental energy.

T-score: Corrected for biases of gender and grade.

concluded that food intake reaction was controlled by a high CP.

Although the guidance of a weight loss program for obese persons was found to be difficult to maintain for a long time, it is reported that such guidance has proven effective for short-term weight loss^(10,11). This case suggests that it is possible to control food intake reaction as well as food intake reaction after a full stomach by the action of CP temporarily. However, persons who had substitutive food intake for stress annulment were numerous among those with a high overweight degree. In spite of the low rate of food intake on a full stomach, substitutive food intake was higher in the extremely obese group than in other groups. The reason for this may be that they cannot adhere to continuous treatment behavior.

The egogram pattern of the extremely obese group was of the NP-low type, and there existed emotional instability as well among individuals from this group. It is thought that these conditions may provide the background for a tendency toward substitutive food intake.

Analyses of the relationship between eating patterns and egogram characteristics revealed that ego state A was low and FC was high in persons who did eat after a full stomach. Therefore,

it can be concluded that the level of the free child (FC) ego state and the ability for judging the present situation objectively influence the after meal food intake reaction.

In this research, egogram characteristics of the persons who have substitutive food intake showed low NP, low A, and moderately high FC. Low NP signifies self negating behavior and without self-confidence, while high FC reflects one cannot control one's emotions⁽¹²⁾. Therefore, it was concluded that a psychological conflict exists in the person who has substitutive food intake. It was pointed out in a survey by Kodama et al.⁽¹³⁾ that conflicts within family, problems in school or workplace were commonly seen in the lives of obese persons. Also, individuals with substitutive food intake commonly showed a high degree of overweightness. Kurokawa⁽¹⁴⁾ pointed out that even though there are disorders and habits such as excessive eating/eating attitude between meals and unbalanced diets in healthy persons, obese persons do not become conscious of their own eating (attitude) disorders. This is supported by our research results.

Significant differences were recognized among CP, NP, A, and FC ego states in terms of their reasons for eating between

meals. In particular, the ego state of the person who eats when food is placed before them showed low measures of CP, NP and A. Low CP signifies that one does not comply with rules and customs, and low A means that one is not able to cope with a fact rationally and objectively¹²⁾. Therefore, it is conceivable that when food is placed before such individuals their food intake reaction is caused by not being able to judge the present situation appropriately.

The egogram characteristics of the person who eats food because it was meal time involved high CP, high NP, and low FC levels. High CP means that one values rules and customs. Very high NP is related to the eating disorder of excessive eating, while low FC signifies that emotional reactions are often suppressed¹²⁾. These results suggest that eating disorder in pupils correlate with low CP, NP and high FC.

It was seen that the egogram characteristics of the extremely obese group differ from the egogram pattern of the lean and standard groups. The mental energy of the person in the extremely obese group is low, and a passivity in the obese pupils that is often noted conventionally¹⁵⁾ was confirmed by our research. From the egogram pattern, the lean group exhibited A-dominant types which signified a high level of objective judgment as applied to diet and therapeutic exercise. On the other hand, the moderately obese and extremely obese groups were dominated by AC -dominant types. This evidence suggests that the obese group is lacking in objective judgment, finds it easy to compromise with facts, and is less likely to succeed at self-realization¹⁶⁾. These attributes may be the causing factors in difficulty of continuing diet and therapeutic exercise.

Bandini et al.¹⁷⁾ pointed out that the ME (daily metabolizable energy intake) of obese persons was significantly lower than that of non-obese persons, as shown by their measurement of TEE (total daily energy expenditure) and ME. These findings suggest that obese persons cannot grasp precisely the level of their own caloric intake.

In researches that utilized Rorschach tests^{3,4,18)}, the personalities of simple obese patients were classified into 4 groups: type I a (peaceful living type), type I b (immature type), type II (pseudo peaceful living type), and type III (maladjustment type). Azuma et al.³⁾ found that the core personality characteristics of simple obese patients was a passive disposition, a repression and denial of

reality, and value placed on peaceful living for the state of feeling good.

Azuma et al.³⁾ emphasized that therapy programs should be selected to correspond to these personalities. Adachi et al.^{19,20)} pointed out that behavioral therapy is the safest and most effective method for slightly and moderately obese persons. Improving of the ego state CP, NP and A is especially needed to prevent excessive eating and to control meal volume appropriately.

CONCLUSION

The relationship between eating patterns and egogram characteristics among pupils from the 4th grade through the 6th grade in 5 elementary schools in Aomori Prefecture were surveyed by using the AN-egogram scale.

The results were as follows:

1. The ego state of pupils who eat their favorite dish even with a full stomach showed significantly lower A qualities and higher FC qualities than those who would not eat in this situation. The egogram pattern of the former pupils exhibited the NP-low type.
2. The egogram pattern of pupils who engage in substitutive food intake exhibited the NP-low type.
3. Significant differences existed among the ego states CP, NP, A, and FC as to reasons given for eating between meals.
4. The egogram pattern of the person who eats between meals at the time of "an empty stomach" showed a flat type of ego state with relatively low NP. The person who eats "just at meal time" showed an A-dominant type. The person who eats "when food is present" showed an NP - low type with a relatively low CP.
5. The ego state A was significantly less common in the extremely obese group than in the lean group.
6. The egogram pattern of the lean, standard, and slightly obese groups showed an A -dominant type of ego state, and that of moderately and extremely obese groups showed an AC-dominant type with slightly high CP.

(This research included additional new data and were reanalyzed after the announcement of the 43rd Japanese School Health Care Academy.)

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