

# The Correlation between Dietary Habits and Unidentified Complaints of Elementary School Children

Junke Gao<sup>\*</sup>, Yoshiko Misho<sup>\*\*</sup>, Yoshimi Kozono<sup>\*\*</sup>, Mayumi Mikami<sup>\*\*\*</sup>, Junko Kurimoto<sup>\*\*\*</sup>,  
Hinako Yamamoto<sup>\*\*\*\*</sup>, Noriko Kishida<sup>\*\*\*\*\*</sup> and Masayuki Kakehashi<sup>\*\*\*\*\*</sup>

<sup>\*</sup>Graduate School of Health Sciences, University of Hiroshima

1-2-3 Kasumi, Minamiku, Hiroshima 734-8551 Japan

<sup>\*\*</sup>School Meals and Health Section of the Secretariat of Education Committee in Hiroshima City

1-6-34 Kokutajimati, Nakaku, Hiroshima 730-8586 Japan

<sup>\*\*\*</sup>Hiroshima City Hijiyama Elementary School

28-28 Kamishinonomeyo, Minamiku, Hiroshima 734-0021 Japan

<sup>\*\*\*\*</sup>Hiroshima City Minami Elementary School

1-15-32 Minamimati, Minamiku, Hiroshima 734-0007 Japan

<sup>\*\*\*\*\*</sup>Health and Longevity Section of Higashiku in Hiroshima City

9-34 Higashikaniyatyo, Higashiku, Hiroshima 732-8510 Japan

<sup>\*\*\*\*\*</sup>Yasuda Women's University

6-13-1 Yasuhigashi, Asaminamiku, Hiroshima 731-0153 Japan

<sup>\*\*\*\*\*</sup>Graduate School of Health Sciences, University of Hiroshima

1-2-3 Kasumi, Minamiku, Hiroshima 734-8551 Japan

kakehashi@hiroshima-u.ac.jp

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**The objective of this study was to clarify the effect of dietary habits on unidentified complaints. A questionnaire survey was carried out in 2004 and the subjects were 901 children including 458 males and 443 females, from the 3rd grade to the 6th grade at two elementary schools. A chi-square test was applied to test the correlation between lifestyle and unidentified complaints. Then, cumulative logistic regression analysis was applied and odds ratios with 95% confidence intervals were calculated. The results showed that lifestyle correlated with unidentified complaints significantly. Furthermore, disordered lifestyles showed higher odds ratios for unidentified complaints. Especially, compared with children who had breakfast everyday, odds ratio was 2.9 for males who seldom had breakfast, 4.2 for females. In addition, the frequency of defecation correlated not only with unidentified complaints, but also with the habit of having breakfast. Therefore, we concluded that dietary habits are an imported part of the lifestyle of children and it is possible to reduce unidentified complaints through modifying disordered dietary habits.**

**Keywords:** school health, dietary habits, unidentified complaints, odds ratio

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## 1. Introduction

Lifestyle-related diseases are reported as becoming more frequent among children recently. It is well accepted that prevalence of the lifestyle-related diseases is associated with disordered lifestyle rhythm and unbalanced diet (Eto, 2000; Murata, 2000). Therefore, lifestyle modification should be considered important as the primary prevention measure. When children have unidentified complaints such as chronic fatigue and headache, we should start paying attention to the lifestyle of the children. Dietary habit had been accounted for

the largest part among the avoidable risks on cancer onset rates (Doll and Peto, 1981; Wynder and Gori, 1977). Thus, we focused on dietary habits in the various aspects of lifestyle.

Skipping breakfast has been considered as an unhealthy dietary habit in all population. Many cases of skipping breakfast were reported not only in Japan (Haruki and Kawabata, 2005; Nagai, et al., 2003), but also in foreign countries (Nicklas, et al., 2004; Siega-Riz, et al., 1998). Skipping breakfast could lead to malnutrition or obesity (Shiraisi and Kawada, 2001). In addition, examination results of breakfast non-consumers were inferior (Kagawa, et al., 1980)

**Table 1** Detail profiles of the subjects.

Grade	Males	Females	Total	%
the 3rd	104	109	213	100.0
the 4th	103	117	220	100.0
the 5th	116 (1)	109	225 (1)	99.6
the 6th	135	108	243	100.0
Total	458 (1)	443	901 (1)	99.9

% Response rate

( ) Non-respondent children

and skipping breakfast affected mental activity adversely (Haruki and Kawabata, 2005; Nagai, et al., 2003). With regard to having snacks, conflicting findings were reported in previous studies. It was reported that high-energy snack foods were correlated with obesity (Kimura, 1999). In contrast, it was also reported that the intake of snack foods was not correlated with changes in Body Mass Index (Field, et al., 2004). Furthermore, low-fat snack foods could improve the nutritional quality (Sullivan, et al., 2002).

Some studies have focused on the correlation between dietary habits and unidentified complaints. It was reported that, compared to breakfast consumers, non-consumers tended to speak loudly (Nagai, et al., 2003) and showed higher frequency of unidentified complaints (Shiraki and Fukaya, 1993). However, no study shows the exact degree of unidentified complaints owing to disordered dietary habits. Therefore, in the present study we aim to evaluate the effect of dietary habits on unidentified complaints, so that we could clarify whether it is possible to reduce the unidentified complaints by modifying the disordered dietary habits.

## 2. Subjects/ Methods

An anonymous questionnaire survey focused on dietary habits and unidentified complaints was conducted in two schools in Hiroshima city in 2004. The survey was a part of the Project of Dietary Health Promotion in Schools planned by the Ministry of Education, Culture, Sports, Science, and Technology of Japan. A simple questionnaire regarding lifestyle was used for the children in the 1st and the 2nd grades. For the 3rd grade to the 6th grade, a questionnaire including lifestyle and unidentified complaints was used.

The lifestyle of questionnaire included the following questions: the habit of having breakfast,

the frequency of defecation, and afterschool snacks. The reply for the habit of having breakfast was assigned as follows: "everyday", "often", "seldom", and "never". For the frequency of defecation, it was "almost everyday", "sometimes", and "about once a week". For afterschool snacks it was "almost everyday", "sometimes", and "seldom". The items of unidentified complaints included "be fatigued", "have a headache", "eyes are tired", "have a stomachache", "have no appetite", "feel nervous", "feel sleepy", and "feel depressed". The reply for unidentified complaints was assigned as "yes", "sometimes", and "no".

To test the correlation between lifestyle and unidentified complaints, we applied a chi-square test. In chi-square tests, categories of the habit of having breakfast and unidentified complaints were 4×3, the frequency of defecation and unidentified complaints were 3×3, afterschool snacks and unidentified complaints were 3×3. Then, cumulative logistic regression analysis was applied. We chose lifestyle, grade and gender as independent variables. For dependent variables, unidentified complaints were used and the replies of "yes", "sometimes", and "no" were assigned as "1", "2" and "3".

The significance of goodness-of-fit statistics showed the validity of the cumulative logistic regression model. Furthermore, we calculated odds ratios with 95% confidence intervals to evaluate the degree of the effect on unidentified complaints.

We used Statistical Package for the Social Sciences 12.0J for Windows. All tests of significance were two-tailed and significance was defined as  $p < 0.05$ .

## 3. Results

### 3.1. Descriptive results

We merged the data of the two schools because significant differences were not found in any of the replies when we applied chi-square tests. Our subjects were 901 children including 458 males and 443 females, who were from the 3rd grade to the 6th grade. One child was non-respondent and the response rate was 99.9%. Detail profiles of the subjects are shown in **Table 1**.

76% of the children had breakfast everyday, while 24% had experience of skipping it as children who replied "often", "seldom" or "never" were regarded as breakfast non-consumers. The percentage of those

who skip breakfast significantly increased with the grade ( $p=0.002$ ), however, there was no significant difference between males and females ( $p=0.728$ ). For afterschool snacks, there was a significant difference between males and females ( $p<0.001$ ). 54% of the females had afterschool snacks "sometimes", 27% of them had it "almost everyday", and 19% of them "seldom" had it. While 47% of the males had afterschool snacks "sometimes", 30% of them replied "seldom". There was no significant difference among the grades (females  $p=0.083$ ; males  $p=0.334$ ). Concerning the frequency of defecation, there was a significant difference between males and females ( $p<0.001$ ). 58% of males had defecation "almost once a day". 38% of them replied "sometimes", whereas 47% of females replied "almost once a day" and 48% replied "sometimes". As the grade increased, the percentage of females who had defecation "almost once a day" significantly decreased ( $p<0.001$ ). On the other hand, there was no significant change in males ( $p=0.827$ ).

The replies for unidentified complaints had significant differences among grades except "have a headache" and "have a stomachache". As the grade increased, the percentage of unidentified complaints who replied "yes" or "sometimes" was significantly increased. However, "have a headache" and "have a stomachache" significantly differed for males and females while other items did not. 45% of the males replied "no" for "have a headache", while this was 37% for the females. Concerning "have a stomachache", 41% of the males replied "no", against 31% of the females.

The reply for unidentified complaints is as follows. 42% replied "yes" for "feel sleepy", 31% replied "feel nervous", and 22% replied "eyes are tired", while the percentage for other items ranged from 10% to 20%. The reply of "sometimes" for each item was between 30% and 50%. Then, the reply of "no" for "have no appetite" was 57%, for "feel sleepy" was 21%, while other items ranged from 30% to 50%.

### 3.2. The correlation between lifestyle and unidentified complaints

A chi-square test showed the habit of having breakfast significantly related to "have no appetite" for both males and females (males  $p=0.001$ ; females  $p<0.001$ ). Afterschool snacks significantly related to "be fatigued" ( $p=0.012$ ), "have a headache"

( $p=0.009$ ), "feel nervous" ( $p=0.017$ ) and "feel sleepy" ( $p=0.024$ ) for males, but no significant relation was found among females. The frequency of defecation significantly related to "have a headache" ( $p<0.001$ ), "have a stomachache" ( $p=0.008$ ), "have no appetite" ( $p<0.001$ ) for males, while "be fatigued" ( $p=0.015$ ), and "feel depressed" ( $p=0.022$ ) have a significant relation for females.

All the models of cumulative logistic regression for males showed that the goodness-of-fit statistics were significant, while all the models for females except for "feel nervous" showed the same results.

Odds ratios with 95% confidence intervals for the habit of having breakfast for males and females are shown in **Table 2**. We regarded children who had breakfast everyday as the reference group. Odds ratio of "have no appetite" was the highest (odds ratio=2.9) for males who seldom had breakfast, followed by "feel depressed" (odds ratio=2.5), "have a headache" (odds ratio=2.3) and "be fatigued" (odds ratio=2.2). On the other hand, odds ratio was 4.2 for "have no appetite" for females who seldom had breakfast. Even for females who often had breakfast, odds ratio was 3.3 for "have no appetite" compared to the reference group.

Concerning afterschool snacks, we regarded children who seldom have snacks as the reference group. Some of the odds ratios were significant for males, but there were no significant odds ratio for females. Odds ratios with 95% confidence intervals for afterschool snacks for males are shown in **Table 3**. Odds ratio was 2.2 for "be fatigued" and 2.5 for "feel sleepy" for males who have snacks almost everyday, while odds ratio was 1.7 for "be fatigued" and 1.6 for "feel sleepy" for males who had afterschool snacks sometimes.

As the frequency of defecation, children who had defecation almost once a day were regarded as the reference group. Odds ratio was 4.4 for "have a stomachache" and 4.7 for "have no appetite" for males who had defecation almost once a week. Furthermore, odds ratio was 1.7 for "have no appetite" for males who had defecation sometimes. On the other hand, odds ratio was 1.8 for "be fatigued" and 1.6 for "feel depressed" for females who had defecation sometimes compared to the reference group.

**Table 2** Odds ratios with 95% confidence intervals for the habit of having breakfast for males and females.

Unidentified complaints	Never		Seldom		Often	
	OR(95% CI)		OR(95% CI)		OR(95% CI)	
<b>Be fatigued</b>						
males	1.8	(0.4-8.1)	2.2	(1.3-3.8) **	1.9	(1.0-3.6) *
females	15.5	(1.3-191.4) *	1.1	(0.6-2.2)	1.2	(0.7-2.0)
<b>Have a headache</b>						
males	0.8	(0.2-3.8)	2.3	(1.3-4.0) **	1.5	(0.8-2.9)
females	10.3	(0.9-119.3)	1.7	(0.9-3.2)	1.0	(0.6-1.7)
<b>Eyes are tired</b>						
males	1.4	(0.3-6.4)	1.5	(0.9-2.6)	1.1	(0.6-2.1)
females	8.7	(0.7-104.5)	1.2	(0.6-2.3)	1.7	(1.0-2.8) *
<b>Have a stomachache</b>						
males	0.3	(0.1-1.9)	1.7	(1.0-3.0)	1.1	(0.6-2.0)
females	4.3	(0.5-39.7)	1.2	(0.6-2.4)	1.4	(0.8-2.3)
<b>Have no appetite</b>						
males	3.3	(0.7-14.9)	2.9	(1.7-5.1) **	1.6	(0.8-3.1)
females	7.3	(0.8-65.3)	4.2	(2.2-8.3) **	3.3	(2.0-5.7) **
<b>Feel nervous</b>						
males	2.2	(0.5-10.2)	1.4	(0.8-2.5)	0.9	(0.5-1.7)
females	-	-	-	-	-	-
<b>Feel sleepy</b>						
males	1.0	(0.2-4.9)	1.4	(0.8-2.5)	1.2	(0.6-2.4)
females	1.6	(0.2-16.5)	1.3	(0.6-2.5)	1.4	(0.8-2.4)
<b>Feel depressed</b>						
males	1.0	(0.2-4.9)	2.5	(1.4-4.3) **	1.0	(0.5-1.9)
females	3.9	(0.5-34.4)	1.6	(0.8-3.1)	1.3	(0.8-2.2)

the reference group: children who had breakfast everyday

OR(95% CI): Odds ratio (95% confidence interval)

\* $p < 0.05$  \*\* $p < 0.01$

**Table 3** Odds ratios with 95% confidence intervals for afterschool snacks for males.

Unidentified compl:	Almost everyday		Sometimes	
	OR(95% CI)		OR(95% CI)	
Be fatigued	2.2	(1.3-3.6) **	1.7	(1.1-2.5) *
Have a headache	2.7	(1.6-4.4) **	1.5	(1.0-2.4)
Eyes are tired	2.0	(1.2-3.2) **	1.4	(0.9-2.1)
Have a stomachache	1.5	(0.9-2.4)	1.2	(0.8-1.8)
Have no appetite	1.3	(0.7-2.2)	1.1	(0.7-1.8)
Feel nervous	1.9	(1.1-3.0) *	1.0	(0.7-1.5)
Feel sleepy	2.5	(1.5-4.1) **	1.6	(1.1-2.5) *
Feel depressed	2.1	(1.2-3.4) **	1.4	(0.9-2.2)

the reference group: children who seldom have snacks

OR(95% CI): Odds ratio (95% confidence interval)

\* $p < 0.05$  \*\* $p < 0.01$

## 4. Discussions

### 4.1. The habit of having breakfast

According to the Children's Health Condition

Surveillance Report, 7.8% of the males and 7.5% of the females were breakfast non-consumers, while children having breakfast everyday or almost everyday were regarded as breakfast consumers. Concerning the 5th grade children of elementary schools in Osaka, the percentage of breakfast non-consumers were 22% for males and 30% for females (Haruki and Kawabata, 2005). On the other hand, in rural elementary schools, 18% of the children from the 4th to the 6th grade skipped breakfast (Nagai, et al., 2003). In another study, a lower level of 0% was reported on weekdays and 2.3% on holidays (Itoi, et al., 2003). In our study, the percentage of breakfast non-consumers were 24% including children who replied "often", "seldom" or "never" for having breakfast. The above differences suggest that skipping breakfast might depend on region, age, or other factors. Skipping breakfast is also reported in foreign countries. In the United

States, the percentage of 10-year-old children who skip breakfast had increased from 8% to 30% during the period of 1973 to 1978, and then decreased to 13% in 1981 because of the school-meal program (Nicklas, et al., 2004). An age tracking study showed that as the age increased from 1 to 18-year-old from 1965 to 1991, the percentage that skipped breakfast increased (Siega-Riz, et al., 1998). In our study, breakfast non-consumers also increased with the grade.

The increase for those who skip breakfast was supposed to be related with the fact that sleeping time tended to become late, therefore the time for next morning's breakfast was limited (Haruki, 2002). In the Children's Health Condition Surveillance Report, it was reported that the tendency of bed time become late was due to the popularization of computer games, midnight TV programs and the use of cellular phone late at night. In a future study, sleeping time and wake up time need to be investigated.

It was demonstrated that skipping breakfast led to malnutrition or obesity (Shiraisi and Kawada, 2001). Furthermore, the energy ingestion from breakfast is necessary for the activity of the brain. It was reported that examination results of children who skip breakfast were inferior to those who have breakfast everyday (Kagawa, et al., 1980). Moreover, mental activity was also affected by skipping breakfast. Comparing to breakfast consumers, non-consumers got to be impatient easily, got higher scores for aggressive behavior (Nagai, et al., 2003), and showed higher frequency of unidentified complaints (Shiraki and Fukaya, 1993). However, there has been no study to show the exact degree of the correlation between the habit of having breakfast and unidentified complaints.

Although there were some differences between the result of chi-square tests and that of the cumulative logistic regression analyses, similar tendency of the correlation between the habit of having breakfast and unidentified complaints was obtained. Skipping breakfast significantly related to "have no appetite" for both males and females through a chi-square test. Odds ratios were significantly higher for "have no appetite" for the children who seldom have breakfast comparing to those who have breakfast everyday. It would be suggested that children who "have no appetite" had a tendency of skipping breakfast. On the other hand, skipping breakfast would lead the rhythm of the dietary occasion become disordered,

and it would lead to "have no appetite" on the next morning. Although we could not identify a causal relationship between skipping breakfast and "have no appetite", it is evident that a correlation exists between the habit of having breakfast and unidentified complains.

#### 4.2. Afterschool snacks

The quantity of energy and nutrient per kilogram of weight which is necessary for children are several times those for adults. Since the digestive function of children is immature, having snacks can improve the nutrient quality of the diet for children (Mizuno, 2005).

However, various results were reported for having snacks in previous studies. Kimura reported that high-energy snacks had a significant correlation with obesity among the 5th and the 6th grade elementary children (Kimura, 1999). In contrast, it was reported that correlation between the intake of snacks and subsequent changes in Body Mass Index was not significant among 9-14-year-old children (Field, et al., 2004). Additionally, it was reported that low-fat snacks could improve the nutritional quality of the total daily nutrient profile (Sullivan, et al., 2002). The discrepancy in these studies seemed to be related to the nutritious ingredient or the number of eating occasions.

Intake of unhealthy snacks or eating at an inappropriate time such as midnight leads to not only obesity but also unidentified complaints. It was reported that children who often had snacks tended to have more unidentified complaints about their health condition than those who seldom had snacks (Sakuma, et al., 2004). In our subjects, odds ratios of some of the items of unidentified complaints were higher for males who had afterschool snacks "almost everyday" than those who "seldom" had it. For females, significant odds ratio was not found. The difference between the odds ratios of males and females seemed to be caused by the limitation of the present study in which only the frequency of afterschool snacks was investigated. In a future study, to clarify the effect on unidentified complains, detailed information about snack foods needs to be surveyed. In our study, another limitation is that there might be some confounding variables in this survey because we focused on the dietary habits and unidentified complaints. If other aspects of lifestyle

were added as independent variables, the odds ratios might be changed.

Overall, the prevalence of having snack has increased at present (Jahns, et al., 2001). It is suggested that to replenish the shortage of energy and nutrients, efforts need to be made to encourage children to select healthier snacks (Haruki, 2002) once or twice a day (Mizuno, 2005).

### 4.3. The frequency of defecation

It is generally agreed that a healthy person should have defecation once a day (Connell, et al., 1965). In the Children's Health Condition Surveillance Report, 28% of the males and 59% of the females had complaints about defecation. It seemed that percentage of males who had regular defecation was higher than that of females. Similar result was found in our subjects. The percentage of those who had defecation once a day was 58% for males and 47% for females. In another study which focused on the 3rd and the 4th grade elementary school children it was reported that 41% of males and 29% of females had regular defecations everyday (Miyagawa, et al., 1989). Previous studies demonstrated the frequency was correlated not only with gender but also with age. Children's Health Condition Surveillance Report reported the percentage of children who had regular defecation everyday tended to decrease with the rising of age which is 62% for the 3rd grade and the 4th grade in elementary school females and 31% for high school females. A similar result was obtained in our study, namely, the percentage of regular defecation significantly decreased while the grade became higher.

There was a significant correlation between defecation and the habit of having breakfast in our study. Children who had breakfast everyday tended to have defecation once a day, while those who skipped breakfast tended to have irregular defecations. The same tendency was reported in a previous study that children who skip breakfast suffered from constipation easily while those who often have breakfast tended to have more defecations (Miyagawa, et al., 1989). It was suggested that the irregular defecation could be modified through making efforts to avoid skipping breakfast.

It was reported that children with defecation disorders had more behavioral problems than the normal subjects (Benninga, et al., 2004). In our

subjects, odds ratios of some items of unidentified complaints are higher for those who had defecation "sometimes" than for those who had it "almost once a day". The correlation between unidentified complaints and the frequency of the defecation was clarified by odds ratios.

## 5. Conclusions

Dietary habits are an important part of the lifestyle. In our study, it showed that odds ratios of unidentified complaints are higher for those who had disordered dietary habits than the reference group. It also showed the habit of having breakfast and afterschool snacks correlated with unidentified complaints. Defecation had a correlation not only with unidentified complaints, but also with the habit of having breakfast. Therefore, we concluded that it was possible to reduce unidentified complaints through modifying the disordered dietary habits.

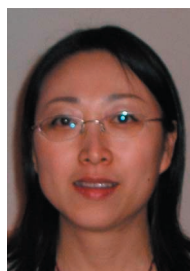
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**Name:**  
Junke Gao

**Affiliation:**  
Graduate School of Health Sciences,  
University of Hiroshima

**Address:**  
1-2-3 Kasumi, Minamiku, Hiroshima 734-8551 Japan

**Brief Biographical History:**  
2004- Doctoral Program in Graduate School of Health Sciences,  
Hiroshima University

**Main Works:**

- Junke Gao and Masayuki Kakehashi: The relationship between life expectancy and indexes of socioeconomic and nutrition at the prefectural level. *Journal of Health Sciences Hiroshima University*. Vol.5(2), 62-69. (2006)

**Membership in Learned Societies:**

- The Japanese Association of School Health