

Selected data on the dietary habits of Korean students in Jeonju/South Korea

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Summary

From April to May 2011, 334 pupils in the 7th and 8th classes in six middle schools in Jeonju (South Korea) were asked about their dietary habits, using a standardised questionnaire. The group of pupils consisted of 49.4 % girls and 50.6 % boys, with an average age of 15.3 ± 0.7 or 15.5 ± 0.5 years, respectively. 85.5 % of the girls and 82.2 % of the boys were of normal weight. 51.1 % of the girls and 66.3 % of the boys had breakfast every day. The pupils regularly ate lunch at school. However, only 67.3 % of the girls and 84.6 % of the boys had an evening meal. 84.2 % of the girls and 79.9 % of the boys ate at least one snack between meals every day. Their favourite snacks consisted of biscuits, fruit, bread, *ramen*, *ddeokbokki* and *gimbab*. There was a significant difference between the boys and the girls with respect to the frequency with which they ate specific foods and their preference for these foods – especially chocolate and sweets.

Keywords: nutritional habits, meal frequency, BMI, adolescents, Korea

Background

Adequate and healthy eating habits are of great importance for children and adolescents, as nutritional habits and behaviour and preferences for specific foods are already developed at this age and may last a lifetime [1].

The present study presents data on the nutritional habits of school pupils in Jeonju in South Korea.

Nutritional and breakfasting habits of Korean and German children and adolescents

Korean nutritional scientists assume that many Korean adolescents have unhealthy eating habits, as they miss meals, often eat fast food or

snacks and take little exercise [2–4]. A study by KIM et al. on the nutritional behaviour of 10- to 13-year old children showed that 7.4 % of girls and 16.5 % of boys do not eat vegetables and 4.2 % of girls and 9.2 % of boys only consume the meat in a meal [5]. In addition, the results of the Korean National Health and Nutrition Examination Survey in 2010 show that 69.9 % of girls and 71.3 % of boys aged 12 to 18 years regularly breakfasted on school days [6].

The dietary and breakfast habits of German adolescents are quite similar. According to RICHTER et al. [1], most children and adolescents eat much less fruit and vegetables than recommended. Moreover, the results of the HBSC Study (Health Behaviour in School-aged Children) of 2009/2010 show that, in Germany, 63.6 % of girls and 67.4 % of boys aged 11 to 15 years regularly ate breakfast on school days. 20.4 % of children and adolescents did not breakfast on school days [7].

With increasing age, fewer German and Korean children regularly ate breakfast [2, 8].

School meals in Korea

School meals in Korean schools play a decisive role in physical development and in improving dietary habits [9]. According to the statistics of the Ministry of Education, Science and Technology for 2010, a total of 7,156,000 pupils at 11,246 schools

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were given a midday meal. Thus, 98.9% of all pupils were provided with school meals [10].

In order to increase satisfaction with school food, many Korean schools use organic products – such as organic rice or organic tofu. According to the Korean Ministry for Agriculture and Forestry, a total of 6,508 schools purchased ca. 61,000 tons of organic food for school food in 2011 [11].

RHO has carried out a study on satisfaction with school food [12]. This showed that about half of the pupils surveyed achieved a balanced diet by eating school meals. Because of the school food, about a third of the pupils ate little or nothing at all between meals.

Questionnaire and survey methods

The objective of the present study was to present selected aspects of the dietary habits of Korean adolescents in Jeonju, South Korea. Jeonju lies in the south of the country in the Jeonbuk region. It has ca. 650,000 inhabitants.

Data collection

As part of the research project entitled “The relationship with eating behaviour and weight control behaviour of the middle school students in Jeonju”, 360 pupils in Jeonju aged 15 to 16 years (7th to 8th class) were surveyed in writing from April to May 2011, using a standardised questionnaire. 334 of the 360 questionnaires could be evaluated. The surveyed pupils were randomly selected from six state middle schools in Jeonju – three schools each from the administrative districts of Dukjin-gu and Wansan-gu. The survey was performed by specially trained students in nutritional sci-

Parameters	Pupils (girls) (n = 165) (49.4 %) mean ± standard deviation	Pupils (boys) (n = 169) (50.6 %) mean ± standard deviation	Total (n = 334) (100 %) mean ± standard deviation	Signi- fiance p
height (cm)	159.4 ± 5.4	167.7 ± 7.4	163.6 ± 7.7	0.000
weight (kg)	50.2 ± 8.1	58.1 ± 12.3	54.2 ± 11.1	0.000
BMI (kg/m ²)	19.7 ± 2.7	20.5 ± 3.8	20.1 ± 3.3	0.024
underweight	9 (5.5)	10 (5.9)	19 (5.7)	0.373
normal weight	141 (85.5)	139 (82.2)	280 (83.8)	
overweight	10 (6.1)	8 (4.7)	18 (5.4)	
obese	5 (3.0)	12 (7.1)	17 (5.1)	

Tab. 1: Anthropometric data of the pupils surveyed

ence from the Chonbuk National University. The questions covered included socio-demographic and anthropometric data, as well as data on dietary habits. The survey concentrated on recording meal frequencies, the types of snacks between meals and the evaluation of personal dietary habits. Other themes included sporting activity, satisfaction with one's own body and ways to control weight. These data were evaluated in another study.

In order to characterise the nutritional state, height and weight were measured and the body mass index (BMI) calculated from these. Age- and sex-specific percentiles were calculated based on the Korean reference population [13]. A BMI value under the fifth percentile then counts as “underweight”, between the fifth and the 85th percentiles as “normal weight”, between the 85th and the 95th percentile as “overweight”, and above the 95th percentile as “obese”.

Parameters	Pupils (girls) (n = 165) n (%)	Pupils (boys) (n = 169) n (%)	Total (n = 334) n (%)	Signi- fiance p
frequency of breakfast				
every morning	86 (52.1)	112 (66.3)	198 (59.3)	0.038
3–4 times per week	35 (21.2)	25 (14.8)	60 (18.0)	
1–2 times per week	12 (7.3)	10 (5.9)	22 (6.6)	
only at the weekend	6 (3.6)	9 (5.3)	15 (4.5)	
never	26 (15.8)	13 (7.7)	39 (11.7)	
regular midday meal				
yes	158 (95.8)	163 (96.4)	321 (96.1)	0.744
no	7 (4.2)	6 (3.6)	13 (3.9)	
regular evening meal				
yes	111 (67.3)	143 (84.6)	254 (76.0)	0.000
no	54 (32.7)	26 (15.4)	80 (24.0)	
frequency of snacks between meals				
4-times or more daily	24 (14.5)	18 (10.7)	42 (12.6)	0.582
2- to 3-times daily	64 (38.8)	67 (39.6)	131 (39.2)	
once daily	51 (30.9)	50 (29.6)	101 (30.2)	
never	26 (15.8)	34 (20.1)	60 (18.0)	

Tab. 2: Frequency of meals eaten by the pupils

Types of snack	Pupils (girls) (n = 165) n (%)	Pupils (boys) (n = 169) n (%)	Total (n = 334) n (%)
biscuits	83 (70.3)	71 (42.0)	196 (70.5)
fruit	85 (51.5)	62 (36.7)	147 (44.0)
bread/sandwich	72 (43.6)	64 (37.9)	136 (40.7)
milk	59 (35.8)	53 (31.4)	112 (33.5)
ramen ¹ /ddeokbokki ² /gimbab ³	54 (32.7)	43 (25.4)	97 (29.0)
soft drinks	33 (20.0)	38 (22.5)	71 (21.3)
yogurt	45 (27.3)	26 (15.4)	71 (21.3)
hamburger/pizza	18 (10.9)	25 (14.8)	43 (12.9)
sausage	12 (7.3)	24 (14.2)	36 (10.8)
other	11 (6.7)	3 (1.8)	14 (4.2)

¹Instant noodles
²Pan stirred rice cake with chilli sauce and vegetables
³Rice roll with vegetables and dried algae: resembles *maki*, a type of sushi

Tab. 3: Types of snacks between meals (multiple answers allowed)

Data analysis

The statistical evaluation was performed with the program SPSS 12.0 for Windows. Data for male and fe-

male subjects were evaluated separately. For the group comparison, the t-test was used for numerical variables and the Chi²-test for non-

inal scaled variables. A p value < 0.05 was taken as significant.

Results and discussion

Of the 334 evaluable questionnaires, 165 were from girl pupils and 169 from boy pupils.

The average age of the surveyed girls and boys was 15.3 (\pm 0.7) years or 15.5 (\pm 0.5) years, respectively. More than 98 % of the subjects lived with their parents.

Anthropometric data

In comparison with the Dietary Reference Intakes for Koreans (KDRI) [14], the children examined were smaller and lighter (167.7 versus 171.4 cm; 58.1 versus 62.1 kg). The mean height of the children examined was 159.4 cm, which is also below the mean of the KDRI (160.0 cm); the mean weight (53.4 kg) was also similarly low.

Parameter	Underweight				Normal weight			
	Pupils (girls) (n = 9) n (%)	Pupils (boys) (n = 10) n (%)	Total (n = 19) n (%)	Significance p	Pupils (girls) (n = 141) n (%)	Pupils (boys) (n = 139) n (%)	Total (n = 280) n (%)	Significance p
frequency of breakfast								
every morning	2 (22.2)	10 (100.0)	12 (63.2)	0.002	72 (51.1)	92 (66.2)	164 (58.6)	0.066
3–4 times per week	5 (55.6)	0 (0.0)	(26.3)		30 (21.3)	22 (15.8)	52 (18.6)	
1–2 times per week	0 (0.0)	0 (0.0)	(0.0)		10 (7.1)	8 (5.8)	18 (6.4)	
only at the weekend	0 (0.0)	0 (0.0)	(0.0)		5 (3.5)	6 (4.3)	11 (3.9)	
never	2 (22.2)	0 (0.0)	(10.5)		24 (17.0)	11 (7.9)	35 (12.5)	
regular midday meal								
yes	9 (100.0)	10 (100.0)	19 (100.0)	–	134 (95.0)	133 (95.7)	267 (95.4)	0.511
no	0 (0.0)	0 (0.0)	(0.0)		7 (5.0)	6 (4.3)	13 (4.6)	
regular evening meal								
yes	4 (44.4)	10 (100)	14 (73.7)	0.011	95 (67.4)	120 (86.3)	215 (76.8)	0.000
no	5 (55.6)	0 (0.0)	5 (26.3)		46 (32.6)	19 (13.7)	65 (23.2)	
frequency of snacks between meals								
4-times or more daily	2 (22.2)	1 (10.0)	3 (15.8)	0.526	19 (13.5)	15 (10.8)	34 (12.1)	0.766
2–3-times daily	4 (44.4)	3 (30.0)	7 (36.8)		57 (40.4)	53 (38.1)	110 (39.3)	
once daily	2 (22.2)	2 (20.0)	4 (21.1)		44 (31.2)	45 (32.4)	89 (31.8)	
never	1 (11.1)	4 (40.0)	5 (26.3)		21 (14.9)	26 (18.7)	47 (16.8)	

Tab. 4: Relationship between meal frequencies and BMI

The mean BMIs of the girls and boys were 19.7 and 20.5, respectively. 85.5 % of the girls and 82.2 % of the boys were of normal weight. 5.5 % of the girls and 5.9 % of the boys were underweight. About 9 % of the girls and 12 % of the boys were overweight or obese (◆ Table 1).

Frequency of the meals

Breakfast

◆ Table 2 shows the results on the frequencies of the meals. 52.1 % of the girls and 66.3 % of the boys reported that they had breakfast at home every day ($p < 0.05$); 15.8 % of the girls and 7.7 % of the boys had no breakfast.

The same tendency with respect to breakfast can be observed in Germany. According to the HBSC data for 2009/10, 58.6 % of German boys and 57.4 % of German girls aged 15 years regularly had breakfast on schooldays [7]. KIM and

SHIN's study [4] on the content of breakfast showed that 86.4 % of the surveyed Korean adolescents consumed typical Korean meals for breakfast, e. g. boiled rice or hot soup with various side dishes, including *kimchi* (Chinese cabbage cooked in sour milk). Only 7.6 % of those surveyed ate bread and milk for breakfast.

Midday and evening meals

95.8 % of the girls and 96.4 % of the boys confirmed that they ate a midday meal, which is consistent with the figures for school meals in Korea, as 99.9 % of Korean schools provide a midday meal [10].

In contrast to this, about 33 % of girls and 15 % of boys did not regularly eat an evening meal ($p < 0.001$, ◆ Table 2). The main reason given for this was the lack of time due to private teaching sessions after school. A third of the pupils also said that they did not regularly

have an evening meal as they had eaten a late snack and wanted to watch their weight.

Snacks between meals

There is no significant difference between girls and boys with respect to the frequency of snacks between meals. About 84 % of the girls and 80 % of the boys ate at least one snack between meals every day.

◆ Table 3 shows which foods were eaten as snacks. For both girls and boys, these were mainly biscuits, fruit, bread or sandwiches, milk and *ramen* (instant noodles), *ddeokbokki* (pan stirred rice cake with chilli sauce and vegetables) and *gimbab* (rice roll with vegetables and dried algae: resembles *maki*, a type of sushi) (◆ Figure 1). In Korea, *ramen*, *ddeokbokki* and *gimbab* are normally eaten in fast food restaurants. As these dishes are cheap, Korean adolescents very often eat them as snacks. As regards snack consump-

Parameter	Overweight				Obesity			
	Pupils (girls) (n = 10) n (%)	Pupils (boys) (n = 8) n (%)	Total (n = 18) n (%)	Significance p	Pupils (girls) (n = 5) n (%)	Pupils (boys) (n = 12) n (%)	Total (n = 17) n (%)	Significance p
frequency of breakfast								
every morning	8 (80.0)	4 (50.0)	12 (66.7)	0.105	4 (80.0)	6 (50.0)	10 (58.8)	0.245
3–4 times per week	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	3 (25.0)	3 (17.6)	
1–2 times per week	2 (20.0)	1 (12.5)	3 (16.7)		0 (0.0)	1 (8.3)	1 (5.9)	
only at the weekend	0 (0.0)	3 (37.5)	3 (16.7)		1 (20.0)	0 (0.0)	1 (5.9)	
never	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	2 (16.7)	2 (11.8)	
regular midday meal								
yes	10 (100.0)	8 (100.0)	18 (100.0)	–	5 (100.0)	12 (100.0)	17 (100.0)	–
no	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
regular evening meal								
yes	8 (80.0)	6 (75.0)	14 (77.8)	0.618	4 (80.0)	7 (58.3)	11 (64.7)	0.395
no	2 (20.0)	2 (25.0)	4 (22.2)		1 (20.0)	5 (41.7)	6 (35.3)	
frequency of snacks between meals								
4-times or more daily	3 (30.0)	1 (12.5)	4 (22.2)	0.281	0 (0.0)	1 (8.3)	1 (5.9)	0.443
2–3-times daily	1 (10.0)	4 (50.0)	5 (27.8)		2 (40.0)	7 (58.3)	9 (52.9)	
once daily	3 (30.0)	2 (25.0)	5 (27.8)		2 (40.0)	1 (8.3)	3 (17.6)	
never	3 (30.0)	1 (12.5)	4 (22.2)		1 (10.0)	3 (25.0)	4 (23.5)	

BMI = body mass index



Fig. 1: Three typical Korean snacks

tion by Korean adolescents, JO and KIM [15] have shown that the boys ate more ramen than the girls, while the girls preferred *ddeokbokki*.

According to KIM and KIM [16], pupils have to eat snacks and drink adequately, if they are not to lose concentration during classes. In addition, the KDRI [14] recommends the consumption of snacks between meals (including fruit, vegetables and milk or milk products, such as yogurt). In comparison with the recommendations of the KDRI for snacks during the school day, the Korean pupils ate more biscuits and high energy foods, such as hamburgers, pizza and *ramen* [17].

Meal frequency and BMI

◆ Table 4 compares the BMI groups and the meal frequencies. The underweight and normal weight pupils more often did without breakfast than did those who were overweight or obese. Underweight girls breakfasted more rarely than underweight boys ($p < 0.05$). About two thirds of underweight girls only occasionally ate an evening meal ($p < 0.05$). A third of the girls of normal weight and a fifth of the boys of normal weight only occasionally ate an evening meal ($p < 0.001$).

Assessment of personal dietary habits

The results on dietary habits are summarised in ◆ Table 5. There was an enormously wide variety of answers to the question “What are your dietary habits?” and these permit conclusions about the current dietary habits of Korean pupils. There were four different ratings: “always true (4)”, “sometimes true (3)”, “rarely true (2)” or “never true (1)”. “I like snacks between meals” was given the highest marks, with 3.2 ± 0.7 . Girls had a significantly greater preference for snacks between meals ($p < 0.001$), specifically for chocolate and sweets ($p < 0.001$).

This is consistent with the results of SUNG et al. [18], who showed that girls eat more snacks between meals than boys. As regards the type of snack, JO and KIM [15] showed that girls ate much more fruit and chocolate than boys. Moreover, VERZELETTI et al. [19] have shown that the consumption of soft drinks is correlated with frequent visits to fast food restaurants, many hours of watching television and the frequent consumption of snacks during television. JO and KIM [15] and SUNG and BAE [20] studied the dietary habits of adolescents in different areas of South Korea and came to similar

conclusions. They found that girls prefer fast food and boys soft drinks.

Conclusion

The objective of this study was to investigate the dietary habits of 334 pupils in Jeonju, South Korea. It was found that half the girls and two thirds of the boys regularly ate breakfast at home. Among the underweight pupils, the girls had poorer breakfast habits than the boys. Various Korean studies [15–17, 20] have shown that the consumption of breakfast is sex dependent. Among adolescents, young women tend to do without breakfast.

Most of the pupils ate a midday meal, which was supplied by the school. In contrast, only about three quarters of the pupils regularly ate an evening meal. Interestingly, the results showed that 56 % of underweight girls, but only 33 % of normal weight girls, only occasionally ate an evening meal. As regards meal irregularity, JO and KIM [15] consider that Korean pupils take a late evening meal or snack and go to bed late due to private teaching. They then often do without breakfast.

In addition, the present study showed that Korean pupils – of any BMI – frequently eat snacks between

meals. The adolescents often eat biscuits, fruit, bread or sandwiches, milk, ramen, ddeokbokki or gimbab, which have a high energy density. It is clear that the selection of foods for snacks can be improved.

With respect to the frequency and type of snacks between meals, this study found significant sex-specific differences, e. g. in the preference of the girls for chocolate and sweets. Many Korean studies confirm that the general nutritional habits of pupils must be regarded critically. For example, adolescents frequently do without breakfast, but more often consume energy rich snacks between meals.

The results of the present study show that the dietary habits of the pupils in all weight classes must be regarded as “critical”, particularly with respect to the regularity of meals taken and the selection of

snacks between meals. The situation might be improved by a nutritional educational program for adolescents. This could provide information about the selection of healthy food, as well as a healthy lifestyle, that could be practiced in daily life.

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Conflict of Interest

The authors declare no conflict of interest according to the guidelines of the International Committee of Medical Journal Editors.

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Statements	Pupils (girls) (n = 165) mean ± standard deviation	Pupils (boys) (n = 169) mean ± standard deviation	Total (n = 334) mean ± standard deviation	Signi- ficance p
I like snacks between meals.	3.4 ± 0.6	3.0 ± 0.7	3.2 ± 0.7	0.000
I like fried food.	2.8 ± 0.8	2.7 ± 0.9	2.7 ± 0.8	0.088
I only eat what tastes good.	2.6 ± 0.9	2.4 ± 0.8	2.5 ± 0.9	0.092
I like fast food.	2.5 ± 0.8	2.4 ± 0.8	2.4 ± 0.8	0.222
I like soft drinks rather than fruit juice.	2.2 ± 0.9	2.3 ± 0.9	2.7 ± 0.9	0.337
It tastes so good that I go on eating even when I am full.	2.7 ± 1.0	2.8 ± 0.9	2.7 ± 0.9	0.405
I always eat more in the evenings than at other times.	2.6 ± 0.9	2.5 ± 0.9	2.6 ± 0.9	0.745
I watch television or the computer when eating.	2.6 ± 1.0	2.4 ± 1.0	2.5 ± 1.0	0.127
I like eating products that I have recently seen advertised.	2.2 ± 0.9	2.1 ± 0.9	2.1 ± 0.9	0.080
I like chocolate and sweets.	2.8 ± 0.9	2.3 ± 0.9	2.6 ± 0.9	0.000

4: always true, 3: sometimes true, 2: rarely true, 1: never true

Tab. 5: Assessment of personal dietary habits

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