

Short Communication

One portion size of foods frequently consumed by Korean adults

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Abstract

This study aimed to define a one portion size of food items frequently consumed for convenient use by Koreans in food selection, diet planning, and nutritional evaluation. We analyzed using the original data on 5,436 persons (60.87%) aged 20 ~ 64 years among 8,930 persons to whom NHANES 2005 and selected food items consumed by the intake frequency of 30 or higher among the 500 most frequently consumed food items. A total of 374 varieties of food items of regular use were selected. And the portion size of food items was set on the basis of the median (50th percentile) of the portion size for a single intake by a single person was analyzed. In cereals, the portion size of well polished rice was 80 g. In meats, the portion size of Korean beef cattle was 25 g. Among vegetable items, the portion size of Baechukimchi was 40 g. The portion size of the food items of regular use set in this study will be conveniently and effectively used by general consumers in selecting food items for a nutritionally balanced diet. In addition, these will be used as the basic data in setting the serving size in meal planning.

Key Words: Portion size, frequently consumed foods, Korean adults

Introduction

As the public's awareness increases on the high relevance between health, life style-related diseases and obesity to nutrition and dietary habits, interest in dietetic therapy for patients or food and nutrition for general consumers is gradually increasing. In particular, interest in nutritional values of food items and desire for the related information rise in case continuous dietetic therapy is necessary for weight control, diabetes, kidney diseases, osteoporosis, and children's growth. Accordingly, the necessity of a nutrient database for convenient use by general consumers is increasing.

However, the existing nutrient databases available in Korea are only for use by the experts. The nutrient contents in food items are expressed per 100 g of the edible portion of a food item [1]. Therefore, in order for general consumers to understand nutrient contents in the actual intake, it involves the difficulty of converting the contents per 100 g into those per the actual intake quantity.

In the United States (US) and Japan, the portion size for a single intake by a single person is set based on the actual intake quantities [2,3]. On the basis of this, a variety of nutrient

databases are being developed and published as small booklets for convenient use by general people. Contrary to this, previous studies in Korea on the portion size for a single intake by a single person mostly used data of diet survey per household rather than individual and of diet survey in certain regions rather than a nationwide survey or were dependent on document review or experimental cooking [4-6]. Consequently, these results display differences from the actual intake quantities per individual and therefore are difficult to be applied to the actual lives of general people.

This study aimed to establish one portion size of food items frequently consumed for convenient use by general consumers in food selection, diet planning, and nutritional evaluation. For this, we selected food items of regular use by adults aged 20 ~ 64 years and analyzed the portion size based on the quantity of food intake per individual using the original data of National Health and Nutrition Examination Survey 2005 (NHANES 2005) a nationwide survey on dietary intake per 'individual' conducted in Korea [7].

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Subjects and Methods

Subjects

The portion size was analyzed using the original data on 5,436 persons (60.87%) aged 20 ~ 64 years among 8,930 persons to whom NHANES 2005, a nationwide dietary intake survey per individual, was conducted [7].

Selecting food items of regular use

For food items of regular use, we selected food items consumed by the intake frequency of 30 or higher among the 500 most frequently consumed food items. Although not among the top 500, those of frequent intake supplied for foodservice operations or in restaurants were added to the food items of regular use.

Analyzing portion size of food items of regular use

Estimation of portion size for a single intake by a single person was carried out based on the portion size analysis data and methods to calculate reference values for nutrition labeling of the US [8,9]. The portion size of food items was set on the basis of the median (50th percentile) of the portion size for a single intake by a single person was analyzed. This is because median is generally used rather than the mean value as a measurement of central position since the original data of NHANES 2005 is not of normal distribution; diverse and extreme values can be eliminated and average of values measured in the units of 5 and 10 may even be subject to the problem of validity. Therefore,

in this study, the portion size was based on the median and was rounded off in the units of 5 and 10 g considering the mean value and mode. Here, for items of which the quantities are less than 10 g, portion size was set in the unit of 1 g. Also, for items in liquid form, portion size was set in the unit of mL. For seasonal food items, portion size was set with the quantities used in the main season. As for food items that include bones, skin and shell, portion size was set based on the edible part.

Results

Portion size for a single intake by a single person of food items of regular use selected per each category of food items is shown in Table 1. The food items of frequent consumption were classified into 16 categories based on the food groups of Korean food composition table [1]. For convenient use by consumers, general food items were classified into the generally recognized food categories. 374 varieties of food items of regular use have been selected. These include 60 varieties of cereals and cereal products, 8 of potatoes and starches, 10 of sugars and sugar products, 12 of legumes, 9 of nuts and seeds, 74 of vegetables, 6 of mushrooms, 23 of fruits, 28 of meats and meat products, 2 of eggs, 56 of fish, shellfish and fish/shellfish products, 7 of seaweeds, 12 of milk and dairy products, 10 of oils and fats, 29 of beverages and alcoholic beverages and 26 of seasonings. In cereals, the portion size of well polished rice was 80 g. In meats, the portion size of Korean beef cattle was 25 g. Among vegetable items, the portion size of Baechukimchi was 40 g.

Table 1. The portion sizes of food items frequently consumed by Korean adults

Item No. ¹⁾	Food and description	1 portion size (g)	Item No.	Food and description	1 portion size (g)
1. Cereals and cereal products					
1-1. Cereals					
1143	Barley	10	1054	Bread, dock marked	70
1165	Brown rice	12	1026	Bread crumbs	8
1159	Cereals	25	1126	Bread, with small red bean paste	85
1261	Corn, canned	12	1110	Cakes, chocolate	100
1258	Corn, for popped	25	1113	Cakes, pound	85
1255	Glutinous corn	90	1104	Cakes, roll	60
1271	Glutinous millet	6	1105	Cakes, Whipping cream	130
1195	Glutinous rice	15	1100	Castella, sponge cake	50
1151	Parched barley powder	20	1125	Cream bread	105
1004	Prosomillet	6	1124	Croquette	80
1154	Sorghum	7	1056	Doughnuts, ring type	75
1173	Well polished rice	80	1056	Doughnuts, with small red bean	110
1019	Wheat flour	45	1135	Hamburgers	150
1-2. Noodles					
1009	Buckwheat noodle, dry form	130	1134	Hotdog, fast food	50
1043	Chinese noodle, wet form	140	1084	Loaf bread	55
1051	Kalguksu, semi-dried form	90	1132	Pizza	145
1035	Somyeon, dry form	135	1059	Roll breads	45
1037	Spaghetti, dry form	85	1072	Sandwiches	150
1039	Udong, wet form	115	1138	Steamed breads, with small red bean	90
1-5. Cookies					
			1052	Biscuit, military type	25

Table 1. Continued

Item No. ¹⁾	Food and description	1 portion size (g)	Item No.	Food and description	1 portion size (g)
1-3. Rice cakes					
1215	Baekseolgi	95	1070	Biscuits, hard type	20
1211	Garaetteok, rice cake soup	130	1069	Biscuits, soft type	25
1211	Garaetteok, Tteokbokki	40	1099	Choco pie	35
1244	Glutinous rice cake	70	1117	Cookie	30
1239	Gyeongdan	60	1118	Cracker	35
1241	Injeolmi	50	1120	Crackers, sandwich with cheese filling	35
1221	Jeolpyeon	50	1266	Popcorn	10
1220	Sirutteok	95	2011	Potato chips	45
1218	Songpyeon	45	1233	Rice cracker	40
1089	Yakgwa	60	1082	Snacks, corn	45
			1080	Snacks, wheat flour	30
1-4. Breads					
2. Potatoes and starches					
2-1. Potatoes			2-2. Starches		
2012	French fried	115	5010	Acorns starch jelly	70
2001	Potato	65	2030	Potato starch	5
2016	Sweet potato	70	4009	Starch jelly	30
2043	Taro	45	2039	Sweet potato starch vermicelli, dried	20
3. Sugars and sugar products					
3021	Candies, hard	6	3024	Sugars, white sugar	12
3051	Caramel, milk	10	3025	Sugars, yellow sugar	12
3050	Chocolate bar	50	3014	Starch syrup	20
3043	Chocolates	25	8038	Strawberry jam	20
3004	Honey	20	3037	Yeot	45
4. Legumes					
4027	Cowpeas	6	4017	Soybean curd	60
4001	Kidney beans	7	4022	Soybean curd, curd residue	25
4004	Mungbeans, dried	45	4021	Soybean curd, fried	13
4033	Peas	6	4020	Soybean curd, soft	110
4044	Small red beans	10	4019	Soybean curd, unpressed	85
4010	Soybean	15	4023	Soybean milk	205
5. Nuts and seeds					
5048	Almonds, dried	8	5011	Perilla seeds, dried	2
5059	Black sesame, roasted	2	5054	Pine nuts, dried	3
5028	Chestnuts	10	5077	Walnuts, dried	15
5052	Gingko nuts, raw	5	5061	White sesame, roasted	2
5017	Peanuts, roasted	13			
6. Vegetables					
6203	<i>Amaranthus mangostanus</i> , Pig weed	40	6058	Kimchi, Godeulppaegi	40
6107	<i>Aralia elata</i> , bud	60	.	Kimchi, Kkaetipkimchi	30
6271	Asparagus	3	6059	Kimchi, Kkakduki	35
6354	<i>Aster scaber</i> , wild vegetables	45	6062	Kimchi, Mucheongkimchi	35
6355	<i>Aster scaber</i> , wild vegetables, dried	10	6060	Kimchi, Nabakkimchi	100
6100	Balloom flower, root	30	.	Kimchi, Oilkimchi	50
6338	Bamboo shoot	20	6070	Kimchi, Pakimchi	30
6025	Bracken	40	6065	Kimchi, Yeolmukimchi	35
6026	Bracken, dried	30	6145	Korean radish, leaves	60
6200	Broccoli	30	6055	Leaf beet	45
6320	Burdock	15	6217	Lettuce	30
6134	Butterbur, petiole	35	6298	Lotus root	25
6279	Cabbage	30	6274	Mallow	50
6096	Carrot	8	6263	Mugwort	45
6235	Celery	9	6241	Mungbean sprout	35
6359	Chicory	10	6285	Onion	10
6186	Chinese cabbage	55	6071	Perilla, leaves	15

Table 1. Continued

Item No. ¹⁾	Food and description	1 portion size (g)	Item No.	Food and description	1 portion size (g)
6196	Chinese chive	30	6346	<i>Pimpinella brachycarpa</i> , wild vegetables	40
6098	<i>Codonopsis lanceolata</i>	20	6404	Pumpkin	60
6265	Crown daisy	5	6030	Red pepper	2
6309	Cucumber	40	6038	Red pepper, leaves	3
6311	Cucumber preserved with salt	15	6037	Red pepper, pickled	10
6147	Danmuji	20	6104	Sedum	35
6148	Dried radish cubes	4	6080	Shepherd's purse	30
6004	Eggplant	30	6268	Sowthistle	30
6121	Garlic-Bulb	10	6367	Soybean sprout	40
6140	Gegeol radish, root	50	6249	Spinach	45
6227	Ginger, tuber	1	6313	Stuffed cucumber pickle	35
6126	Green garlic	10	6400	Sweet pepper, green	6
6034	Green pepper	10	6014	Sweet potato, stalks	10
6283	Head lettuce	30	6377	Taro, stalks, dried	20
6063	Kimchi, Baechukimchi	40	6388	Welsh onion	10
6064	Kimchi, Baegkimchi	90	6092	Wild garlic	10
	Kimchi, Buchukimchi	30	6165	Wild water dropwort	30
6069	Kimchi, Chongkakkimchi	35	6300	Young leafy radish	45
6061	Kimchi, Dongchimi	100	6407	Young pumpkin	35
6057	Kimchi, Gatkimchi	35	6017	<i>Youngia sonchifolia</i>	35
7. Mushrooms					
7025	<i>Agaricus bisporus</i>	10	7046	Oak mushroom, <i>Lentinus edodes</i> , dried	3
7006	Ear mushroom, dried	2	7003	Oyster mushroom	25
7044	Oak mushroom, <i>Lentinus edodes</i> , wet	10	7038	Winter mushroom, <i>Flammulina velutipes</i>	10
8. Fruits					
8092	Apple	150	8121	Orange	200
8063	Banana	135	8122	Orange juice	200 ml
8013	Citrus fruit juice	200 ml	8137	Oriental Melon	140
8011	Citrus fruit, <i>Satsuma mandarin</i>	100	8065	Pear	150
8169	Fruit for salad	40	8001	Persimmon	45
8155	Grape	70	8007	Persimmon, dried	50
8161	Grape juice	200 ml	8144	Pineapple	45
8160	Grape raisin	4	8036	Strawberry	75
8033	Jujube, dried	4	6379	Tomato	100
8143	Kiwi	45	6381	Tomato juice	210 ml
8028	Kumquat	85	8110	Watermelon	130
8127	Olive	5			
9. Meats and meat products					
9178	Beef, blood	40	9159	Imported beef cattle, round	25
9162	Beef, liver	30	9151	Imported beef cattle, shank	35
9171	Beef, small intestine	40	9135	Korean beef cattle	25
9015	Chicken	95	9137	Korean beef cattle, loin	45
9021	Chicken, breast	95	9142	Korean beef cattle, plate	35
9026	Chicken, breast, lean only	95	9139	Korean beef cattle, shank	35
9041	Chicken, leg	95	9070	Pork	65
9046	Chicken, leg, lean only	95	9085	Pork, belly	155
9029	Chicken, wing	95	9071	Pork, rib	130
9001	Dog meat	55	9108	Pork products, bacon	10
9230	Duck meat	165	9116	Pork products, Frankfurt sausage	35
9148	Imported beef cattle, loin	45	9120	Pork products, ham, loin	15
9157	Imported beef cattle, plate	35	9128	Pork products, Luncheon meat	15
9146	Imported beef cattle, rib	100	9114	Pork products, Vienna or wiener sausage	35
10. Eggs					
10005	Hen's egg, whole egg	40	10015	Quail's egg, whole egg	40

Table 1. Continued

Item No. ¹⁾	Food and description	1 portion size (g)	Item No.	Food and description	1 portion size (g)
11. Fish, shellfish and fish/shellfish products					
11527	Abalone	10	11218	Icefish, dried strip	10
11345	Alabesque greenling	50	11663	Jelly-fish, salted	20
11172	Alaska pollack, dried	20	11491	Little neck clam	35
11174	Alaska pollack, frozen	50	11495	Little neck clam, salt-fermented	10
11180	Alaska pollack, roe	25	11193	Loach	60
11181	Alaska pollack, roe, salt-fermented	15	11039	Mackerel	50
11182	Alaska pollack, viscera, salt-fermented	10	11044	Mackerel, salted	55
11165	Anchovy, dried	5	11524	Marsh clam	35
11168	Anchovy, salt-fermented, liquid type	3	11498	Orient hard clam	25
11303	Angler	70	11466	Oyster	20
11065	Bastard halibut	50	11099	Pacific cod	90
11560	Blue crab	45	11056	Pacific saury, dried	45
11092	Bluefin tuna, canned in oil	20	11229	Puffer	90
11089	Bluefin tuna, frozen	30	11239	Raw-Black rockfish	45
11162	Cat fish	75	11135	Sea bream	50
11328	Chum salmon	20	11659	Sea cucumber	20
11582	Common octopus	10	11612	Shrimp	35
11650	Common sea squirt	25	11614	Shrimp, dried	5
11636	Common squid	35	11625	Shrimp, salt-fermented	5
11637	Common squid, dried	15	11424	Skate ray	30
11352	Eel	80	11267	Spanish mackerel	40
11401	File fish, dried	15	11516	Turban shell	20
11442	Fish paste, fried	25	11585	Warty sea squirt	15
11018	Flat fish	45	11652	Webfoot octopus	45
11477	Granulated ark shell	25	11488	Whelk, canned	40
11032	Hair tail	40	11581	Whip-arm octopus, thin arms	60
11438	Hard roe	5	11392	Yellow croaker	45
11550	Hard-shelled mussel	20	11393	Yellow croaker, salt-cured and dried	80
12. Seaweeds					
12006	Laver	2	12017	Sea tangle	35
12058	Sea lettuce	40	12018	Sea tangle, dried	1
12035	Sea mustard, dried	6	12055	Seaweed fusiforme	50
12033	Sea mustard, raw	30			
13. Milk and dairy products					
13023	Ice cream	120	13029	Yoghurt, curd type	110
13026	Ice cream, chocolate	80	13028	Yoghurt, liquid type	150 ml
13027	Ice cream, soft, vanilla	80	13033	Cheese	20
13025	Ice cream, vanilla	90	13034	Cheese, mozzarella	15
13020	Sherbet	80	13032	Cheese, processed	20
.	Yoghurt beverage	84 ml	13010	Whole milk	200 ml
14. Oils and fats					
14010	Butter	5	14018	Olive oil	4
14024	Coffee creamer	6	14005	Peanut butter	5
14017	Corn oil	4	14003	Perilla seed oil	4
14008	Margarine	5	14023	Sesame oil	4
16025	Mayonnaise	10	14028	Soybean oil	4
15. Beverages and alcoholic beverages					
15031	Beer	355 ml	15081	Ginseng tea, granule	7
15098	Black tea, canned	240 ml	15066	Green tea, dried, infusion	150 ml
15099	Black tea, ice tea	200 ml	15066	Green tea, canned	175 ml
15097	Black tea, infusion	150 ml	15012	Isotonic drink	250 ml
15013	Carbonated beverages	250 ml	15079	Job's tears tea, powder	15
15078	Citron tea, powder	10	15060	Red wine	120 ml
15088	Coffee, canned	180 ml	15046	Sake	45 ml

Table 1. Continued

Item No. ¹⁾	Food and description	1 portion size (g)	Item No.	Food and description	1 portion size (g)
.	Coffee mix	12	15046	Sake	180 ml
15087	Coffee, percolated	150 ml	15011	Sikhye	240 ml
15084	Coffee, powder	2	15039	Soju, mild	45 ml
.	Coffee with sugar	150 ml	15039	Soju, bottled	200 ml
.	Coffee with creamer	150 ml	15073	Ssanghwa tea, powder	20
.	Coffee with sugar and creamer	150 ml	15029	Takju	400 ml
15022	Coke	250 ml	15042	Whisky	30 ml
15019	Clear soda pop	250 ml			
16. Seasonings					
16059	Cheonggukjang	18	16058	97.5% MSG & 2.5% nucleic acid	1
16062	Curry sauce, powder	8	16071	Pepper	1
16018	Doenjang, soup	10	16009	Red pepper powder	2
16018	Doenjang	18	16030	Seasoning powder	1
16017	Doenjang, soybean paste, powdered	11	16014	Sesame, roasted and ground	2
16010	Gochujang	18	16001	Soy sauce	15
16012	Gochujang with vinegar and sugar	18	16038	Table salt	1
16007	Horseradish	2	16032	Thousand island dressing	15
16055	Jajang sauce	18	16067	Tomato ketchup	5
16027	Mirim	5	6383	Tomato paste	18
16049	Mixed soybean paste with red pepper paste	18	16048	Vinegar	4
16057	Modified soybean sauce	1	16053	Worcester sauce	5
16004	Mustard	3	18043	Yeast	1

1) National Rural Resources Development Institute (2007). *Food Composition Table*, 7th revision, Rural Development Administration, Seoul, Republic of Korea

Discussion

Setting of taking size for a single intake by a single person may differ according to the purpose of use or guidelines such as meal planning, nutrient database, and nutrition labeling [10,11]. Taking size for a single intake by a single person is interpreted in two ways. One is as a serving size and the other is as the actual portion size. The serving size can be utilized as the guidelines of nutritional education for healthful meal planning. For example, a reference quantity recommended for a single intake in the food pyramid is the serving size. On the other hand, portion size refers to the amount individual consumers select for eating at a single intake. This may be smaller or larger than the serving size.

As such, setting portion size of food items is very important not only in terms of meal planning, nutrition education and nutrition assessment, but also in establishing the government's food policies [12]. Nevertheless, due to the characteristics of culinary culture in Korea to make most dishes by mixing a number of ingredients, it is very difficult to set the portion size of food items. Furthermore, there is yet to be any nationwide data on quantities of food intake per individual. So, almost no studies have been conducted on this subject. Several researchers have carried out studies on setting portion size for a single intake by a single person or representative recipes using the limited data available [4-6]. However, these cannot be regarded as nationwide information. In Korea, NHANES, the nationwide survey on dietary intake, was conducted in individual units for

the first time in 1998 [13]. Based on the data of food intake quantities produced by this survey, Lee *et al.* developed the 'food composition table for convenient use by general consumers' by setting portion size of the representative food items and dishes [14]. This study is very much significant in terms of setting portion size on the basis of the nationwide data of food intake quantities for the first time. The main objective of this study was to assist consumers in conveniently and easily estimating quantities of food items consumed.

As Korean NHANES began to be conducted in a new cycle and the result of the survey in 2005 was announced [7], this study intended to select representative food items and dishes for amendment of 'nutrient database for convenient use by general consumers' using the original data of the Korean NHANES 2005 and therefore to set the portion size of these food items [15]. While 314 varieties of representative food items respectively were used in the study by Rural Development Administration [14], approximately 60 varieties of food items were added in this study, which was conducted on 374 varieties of food items. Although it is difficult to compare portion size of all food items and dishes against those of the previous studies, there was no change in the portion size of white rice (80 g). As mentioned, the Korean Nutrition Society has set the serving size for a single intake by a single person of white rice as 90 g [16]. Therefore, the result and use are different from those of this study.

In the US, portion size has continuously increased over the last 30 years. This is being pointed out as one of the causes of the increase in the obese population [17,18]. Accordingly, it

is necessary in Korea to conduct NHANES on a periodical basis, to announce the results and to continuously conduct studies on setting the portion size of the food items of regular use in the future. As data builds up, it will also be necessary to conduct studies to compare and analyze the data.

In this study, we selected food items of regular use by adults aged 20~64 years using the data of Korean NHANES 2005 and therefore set and reported the portion size of these food items. For portion size of food items of regular use set in this study, life-sized photographs and nutritive values of food items per portion size for a single intake by a single person have been added to enhance usefulness of the data. With this, the 'food composition table for convenient use by general consumers' of 2009 was published [15]. These data and the results of this study will be conveniently and effectively used by general consumers in making food selections for a nutritionally balanced diet. In addition, these will be used as the basic data in setting the serving size for a single intake by a single person in meal planning, single intake quantities in nutrition labeling of processed food items and quantities for a single meal supply outside homes, which are the national nutrition education guidelines.

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