



단체급식소에서 적용 가능한 저나트륨 식단 개발

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Development of Low Sodium Menu Applicable to Institutional Food Service

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Abstract

Low sodium (1,300 mg) containing menu items and recipes applicable to institutional food services were developed while maintaining taste and nutrition contents. These developed recipes were used in a total of 258 dish items, including 39 one-dish meals, 43 guk or jjigae (soups or pot stews), 59 meat or fish side-dishes, 94 vegetable side-dishes, 9 jeons (pan-fried dishes), and 14 kimchis or pickles. A total of 90 menu items using 258 dishes were categorized into one-dish menu items or Korean dining table-setting items. They were re-sorted to soup or pot stew containing or not containing items. The protein content was significantly higher in one-dish menus than in Korean dining table-setting menus ($p < 0.05$), whereas the energy, carbohydrates, lipids, and sodium did not differ significantly between them. Menus including guk showed no significant differences in energy, carbohydrates, lipids, or sodium when compared with menus not including guk. For practical application of these developed low sodium menu items for institutional food services, education manuals for nutrition should be developed, and networks among governmental agencies, institutional food services and research institutions should be established.

Key Words: Development of menu, low-sodium recipe, low-sodium menu, institutional food service

1. 서 론

2016년 국민건강영양조사 결과에 의하면 19세 이상 우리나라 성인의 일일 나트륨 섭취량은 2013년 4,583 mg, 2014년 4,027 mg, 2015년 3,890 mg, 2016년 3,890 mg 등으로 거의 해마다 감소하고 있으며(Ministry of Health and Welfare 2017), 이는 일본 4,280 mg, 영국 3,440 mg, 미국 3,436 mg에 비하여 매우 높은 편이다(Kim et al. 2012). 나트륨의 과잉 섭취는 고혈압, 심혈관질환, 뇌혈관질환, 신장질환 등을 유발할 뿐 아니라(Meneton et al. 2005; Kumanyika 2007), 뼈 속의 칼슘 배출을 증가시켜 골다공증에 걸릴 위험을 증가시킨다(Chobanian & Hill 2000; Wardner de & MacGreger 2002; Tsugane 2005). 세계보건기구(WHO)는 나트륨 2,000 mg 이하로 권고수준을 제시하고 있으며 2005년 한국영양학회는 하루 나트륨 목표량을 2,000 mg으로 설정하였다(The Korean Nutrition Society 2005). 보건복지부 자료에 의하면, 2011년의 경우 가정식을 통한 나트륨 섭취는

52.7%로 2008년의 66%보다 감소한 반면, 외식을 통한 나트륨 섭취는 2008년의 29%에 비해 2011년의 경우 36.1%로 증가된 것으로 조사되었다. 특히, 외식 빈도가 잦은 30~40대 남자는 나트륨의 50% 가량을 외식으로 섭취하는 것으로 나타나, 전체 에너지의 41.5%, 나트륨의 48.6%를 외식으로 섭취하였다(Ministry of Health and Welfare 2014). 이러한 결과를 볼 때 전체 나트륨 섭취의 저감화는 가정에서 싱겁게 조리하려는 노력뿐만 아니라 외식 및 단체급식을 통한 나트륨 섭취를 줄일 수 있는 노력이 필요한 것으로 나타났다.

전국적으로 집단급식소는 점차 증가하고 있는데, 영유아보육시설, 유치원, 학교뿐만 아니라 군대, 산업체, 병원에서의 급식 보급률이 증가함에 따라 개인별 급식 경험도 증가하게 되었다. 국민의 식생활에 대한 단체급식 의존도가 증가함에 따라 단체급식소의 효율적 나트륨 저감화 노력은 전 국민의 나트륨 섭취 저하에 매우 중요한 사안이며 이에 나트륨 저감화 식단의 효율적 보급 노력이 매우 절실한 상황이다. 식품의약품안전처는 2020년까지 나트륨 목표 섭취량을 1일

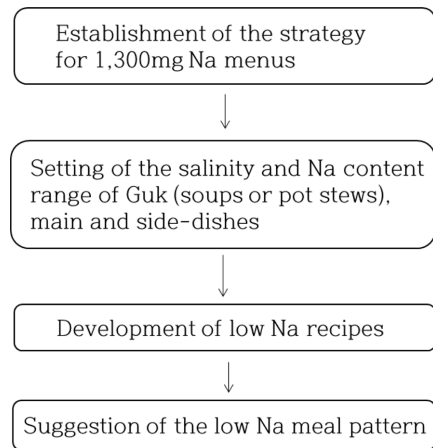
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3,500 mg까지 저감화하여(YonhapNews. 2018) 단체급식소 등 일반 음식점에서 1일 1식 나트륨 함량 1,300 mg 이하로 줄이는 나트륨 줄이기 실천음식점을 확대하고 있다(Ministry of Food and Drug Safety 2015). 이러한 상황에서 나트륨 함량이 감소해도 맛과 영양이 유지되는 식단 모델이 확산되어야 하며 일반 음식점과 급식소에서 활용하기 쉬운 식사패턴을 보급하여야 할 것이다. 이에 본 연구에서는 나트륨을 줄인 국, 주요리, 반찬류의 메뉴개발을 통하여 1식 1,300 mg 나트륨 식단 모델을 개발하고 단체급식소 맞춤형 나트륨 저감화 방안을 제시하여 단체급식 나트륨 저감화 정책의 기초 자료를 제공하고자 하였다.

II. 연구내용 및 방법

1. 단체급식소에서 활용 가능한 저나트륨 식단 개발 추진 전략 수립

1식에 포함된 나트륨 함량은 나트륨 줄이기 실천음식점에서 정책적으로 선정된 나트륨 1,300 mg 기준을 적용하였다(Ministry of Food and Drug Safety 2015). 또한 2012년 진행된 식품의약품안전처 용역연구 한국형 DASH (Dietary Approaches to Stop Hypertension) 가이드 라인(Kim 2012)을 반영하여 단체급식에 보다 쉽게 적용할 수 있는 나트륨 1,300 mg 함유 단체급식 1식 메뉴를 개발하였다 1식 메뉴는 일품식단 또는 1식 5찬 정찬으로 구성된 반상 차림 식단으로 구성하였고 다시 국의 유무에 따라 분류함으로써 단체급식소에서 적용 가능한 식단 모델을 제시하고자 하였다 <Figure 1>. 또한 구성된 저나트륨 식단은 식단별로 영양성분을 평가하고, 일품식단과 반상 차림 또는 국의 유무 등에



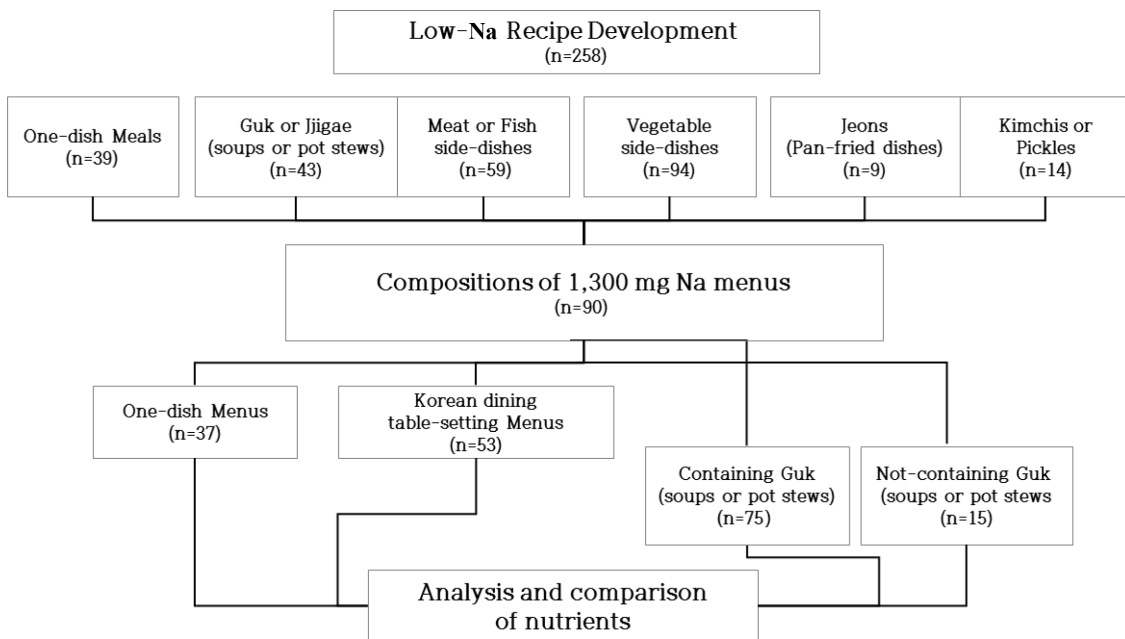
<Figure 1> Diagram of the low-sodium meal development

따라 식단을 분류하고 영양성분을 비교하였다. 메뉴개발은 국, 주요리, 일품요리, 김치류, 가공식품별 나트륨 함량 범위를 정하고 이에 따라 식단을 구성하였다.

2. 저나트륨 식단 개발

저나트륨 레시피가 개발된 음식의 종류는 단체급식소에서의 활용도와 나트륨 기여도 등을 고려하여 선정하였으며 일품요리 39가지, 국 또는 찌개 43가지, 육류 또는 생선 반찬 59가지, 채소반찬 94가지, 전 9가지, 김치 또는 절임 14가지 등 총 258가지였다<Figure 2>.

일품요리는 단체급식소에서 활용도가 높은 반면, 나트륨 기여도가 높은 음식의 종류이므로 다빈도 일품요리 39종(Kim 2012)을 선정하여 우선적으로 저염 레시피를 개발하였다. 일품요리의 나트륨 함량을 저감시키기 위해서 맛국물을 이용



<Figure 2> Development and composition of Low-sodium menus

하여 밥을 짓거나, 양념장에 각종 채소를 더해 염분의 농도를 낮추거나, 양파, 마늘, 고추 등의 향신료를 이용하여 향미를 더하거나, 각종 견과류를 이용하여 고소한 맛을 높이고 염분의 농도를 낮추는 방법을 이용하였다. 맛국물은 감칠맛이 있기 때문에 1인분을 기준으로, 재료 자체의 염분과 간을 맞추기 위해 사용된 소금 0.3 g (나트륨 182 mg)을 합하여 총 0.5 g의 소금(나트륨 303 mg)이 함유되었다. 간을 맞추기 위해서는 나트륨의 양은 줄이면서도 맛을 유지한 저염양념장을 이용하였는데, 1인분을 기준으로 국물요리에 사용한 저염양념장은 소금 0.5 g (나트륨 303 mg), 반찬에 사용되는 양념장은 소금 0.3 g (나트륨 182 mg)을 함유하도록 하였다.

국과 찌개류는 재료의 단가와 단체급식소에서의 활용도를 고려하여 43종을 선정하였다. 국과 찌개는 한국인에서 나트륨 기여도가 매우 높은 음식이므로 다시마, 멸치, 새우 등의 재료를 이용하여 제조한 맛국물을 이용함으로써 소금과 장류의 사용을 줄였다.

단체급식 메뉴에 어육류 반찬은 반드시 포함되므로 여러 가지 재료와 조리법을 이용하여 다양한 육류 및 생선 음식으로 구성하고자 하였다. 건어물류 5종, 생선 및 어패류 17종, 돈육 22종, 우육 5종, 계육 9종, 달걀 1종 등 총 59종의 음식으로 구성하였으며 볶음, 구이, 찜, 조림 등의 조리방법을 이용하였다. 채소 반찬류는 높은 칼륨과 낮은 나트륨 함량으로 인하여 저염 메뉴 구성에 매우 효과적으로 이용할 수 음식이므로 다양한 재료와 조리법을 이용하여 샐러드 20종, 생채류 34종, 숙채류 11종, 쌈 4종, 잡채 3종, 볶음 9종, 구이 4종, 조림 3종, 튀김 6종 등 총 94종의 음식을 구성하였다. 주재료인 채소 자체의 향을 강조하는 동시에 설탕, 유자청, 사과, 식초, 마요네즈, 땅콩, 들깨가루, 두부, 유부, 겨자 등의 부재료를 추가하여 단맛, 신맛과 고소한 맛, 매운 맛 등을 줌으로써 밋밋하지 않은 다양한 맛을 시도하였다. 전류는 9종을 개발하였으며 단체급식소에서의 활용도를 높이기 위하여 조리 과정을 단순화하였다. 김치는 저염메뉴 구성 시 기존의 김치를 활용하기에 어려움이 있으므로 저염 절절이 및 피클 등 절임류를 이용하여 나트륨의 함량을 저감시켰다.

본 연구에서는 저나트륨 1식을 구성할 수 있는 대표 저염식 리스트를 작성하고 이에 따른 저나트륨 1식의 권장 패턴 90식을 제시하여 나트륨 저감화 방안을 보다 구체화하였다. 나트륨 1,300 mg이 함유된 식단 작성을 위해 식단 작성 가이드라인(Kim 2012) 및 권장패턴에 근거하여 국을 포함한 식단 국을 포함하지 않는 식단으로 1식 식단 90종 나트륨 1,300 mg 함유 나트륨 저감 1식 모델을 제시하였다.

3. 데이터 분석

저나트륨 레시피의 영양소는 Can-Pro 4.0 프로그램(Korean Nutrition Society, 2011)을 이용하여 분석하였고, 모든 통계 자료는 SPSS package program (18.0 ver. Chicago. USA)를 활용하였으며 평균±표준편차로 표시하였다. 일품요리와 반상 차림, 국의 유무에 따른 영양소 함량의 비교는 Student's t-test를 이용하여 비교하였고 p<0.05에서 유의성을 검증하였다.

III. 결과 및 고찰

1. 단체급식소에서 활용 가능한 저나트륨 식단 개발 방향 수립

단체급식소에서 활용 가능한 나트륨 저감화 식단의 보급을 위하여 영양과 맛을 유지하는 저나트륨 음식으로 구성된 나트륨 저감 1식의 개발 방향을 제시하였다<Figure 1>. 우선 나트륨 1,300 mg을 포함하는 1식 메뉴의 구성 전략을 마련하였는데, 영양 및 식품 구성 측면의 가이드라인을 설정하고 나트륨 섭취 고기여 음식에 대한 저염 요리 방법을 선정하였다. 다음으로 국, 주요리, 찬류, 가공식품별 나트륨 함량 범위를 선정하였다. 다음으로 일품메뉴 또는 1식 5찬 정찬으로 구성된 반상 차림 식단을 국의 유무에 따라 메뉴 패턴을 제시하고 이를 통해 나트륨 저감 식단을 개발하였다.

단체급식소의 나트륨 1,300 mg의 메뉴 구성을 위하여 국, 주요리, 일품요리, 김치류, 가공식품의 나트륨 함량 범위를 제안하였다<Table 1>. 식단 구성시 국, 주요리, 반찬, 가공식품, 주식 등에 대한 염도 및 나트륨 함량 범위의 설정은 저나트륨 1식의 메뉴의 활용도 증진을 위해 매우 중요한 내용이다. 우리나라는 김치, 장류, 젓갈 등의 소금 함량이 높은 음식의 섭취와 국류, 찌개류, 탕류 등의 국물이 많은 음식의 섭취로 인한 과다 소금 섭취가 식사의 문제점으로 지적된 바 있다(Kim et al. 2012; Son et al. 2007). 본 연구에서는 Kim et al. (2012)의 연구를 바탕으로 나트륨 1,300 mg 식의 구성을 위하여 전략적으로 범위를 제시하였으며 주요한 나트륨 제공 음식에 대한 나트륨의 범위를 제한하여 식단의 구성을 좀 더 용이하게 하였다. 본 연구에서 제시한 일품요리의 나트륨 범위는 250-600 mg, 국찌개류의 나트륨 범위는 250-650 mg, 주요리의 나트륨 범위는 250-650 mg, 김치류의 나트륨 범위는 250-450 mg 그리고 가공식품의 나트륨 범위는 200-500 mg으로, 나트륨 1,300 mg 1식 메뉴를 구성하는 방안을 제안하였다. 일부 산업체급식소 대상 염도 조사 결과에 따르면, 1인 분량 당 소금함량은 탕 및 찌개류 3.33±

<Table 1> Na content range of developed menus according to dish types

	One-dish Meals	Guk or Jjigae (soups or pot stews)	Main Dishes	Kimchis and Pickles	Processed Foods
Na (mg)	250-600	250-650	250-650	200-450	200-500

<Table 2> Classification and composition of the developed low Na dishes

	Item
One-dish Meals (n=39)	chamnamul bokkeumbap (Japanese Hornwort Fried Rice), gamja sujebi (Potato Handpulled Dough Soup), gondeure bap (Steamed Rice and Cirsium), kimchi somyeon (Kimchi and Thin Noodles), naeng kongguksu (Noodles in Cold Soybean Soup), dak kalguksu (Noodle Soup with Chicken), dotorimuk bibimbap (Acorn Jelly Bibimbap), dubu kimchi deopbap (Steamed Rice with Tofu and Kimchi), dubu soboro deopbap (Steamed Rice with Mashed Tofu), dubu hyeonmi bibimbap (Brown Rice Bibimbap with Tofu), deulkkae miyeok guk (Seaweed and Perilla Seed Soup), mapa dubu deopbap (Steamed Rice with Mapa Tofu), maesaengi gul tteokguk (Sliced Rice Cake Soup with Seaweed Fulvescens and Oysters), jeoyeom memil guksu (Low-sodium Buckwheat Noodles), modum beoseot bap (Steamed Rice and Assorted Mushrooms), mu hyeonmi bap (Steamed Brown Rice and Radish), mukchae bibimbap (Shredded Acorn Jelly Bibimbap), bajirak buchu kal-guksu (Noodle Soup with Leek and Clams), ppuri chaeso bulgogi deopbap (Steamed Rice with Root Vegetables and Bulgogi), saessak chamchi bibimbap (Canned Tuna Bibimbap), soegogi dubu bokkeumbap (Beef and Tofu Fried Rice), soegogi kongnamul bap (Steamed Rice and Bean Sprouts with Beef), spaghetti (Spaghetti), ssalguksu (Rice Noodles), ssalbak & gyeongwa ssamjang (Leaf Wraps and Rice with Seasoned Nuts and Soybean Paste), jeoyeom yachae bokkeumbap (Low-sodium Vegetable Fried Rice), jeoyeom omurice (Low-sodium Omelette with Fried Rice), yogurt curry rice (Yogurt Curry over Steamed Rice), udon (Udon), jjajang myeon (Noodles with Black Soybean Sauce), chaeso bibimbap (Vegetable Bibimbap), jeoyeom cheonggukjang deopbap (Steamed Rice with Rich Soybean Paste), chwinamul gamja bap (Steamed Rice, Wild Aster and Potato), jeoyeom chwinamul bap (Low-sodium Steamed Rice and Wild Aster), pyogo beoseot kongnamul bap (Steamed Rice and Bean Sprouts with Shiitake Mushrooms), haemul bokkeumbap (Seafood Fried Rice), haemul yachae bokkeumbap (Seafood and Vegetable Fried Rice), hamburger (Hamburger), fruit curry rice (Fruit Curry over Steamed Rice)
Guk or Jjigae (soups or pot stews) (n=43)	gaji naengguk (Chilled Eggplant Soup), jeoyeom ganjang dubu guk (Low-sodium Tofu Soup with Soy Sauce), geonsaeu auk guk (Curled Mallow and Dried Shrimp Soup), gul guk (Oyster Soup), jeoyeom dasima mu guk (Low-sodium Kelp and Radish Soup), danhobak soup (Sweet Pumpkin Soup), dak gaseumsa jat naengguk (Chilled Chicken Breast and Persimmon Soup), jeoyeom dak gaejang (Low-sodium Spicy Chicken Soup), daegu jiri (Codfish Stew), jeoyeom dongtae maeuntang (Low-sodium Spicy Pollack Stew), jeoyeom dubu saeujeot guk (Low-sodium Tofu Soup with Salted Shrimp), deulkkae miyeok guk (Seaweed and Perilla Seed Soup), deulkkae siraegi doenjang guk (Soybean Paste Soup with Dried Radish Leaves and Perilla Seeds), malgeun baechu guk (Clear Soup with Napa Cabbage), malgeun udon gukmul (Clear Udon Soup), maeun kongnamul guk (Spicy Bean Sprout Soup), musun wae doenjang guk (Japanese Miso soup with radish sprouts), miso ilsik doenjang guk (Japanese Miso soup), Miyeok guk (Seaweed Soup), miyeok naengguk (Cold Seaweed Soup), miyeok oi naengguk (Cold Seaweed and Cucumber Soup), beoseot deulkkae tang (Mushrooms and Perilla Seeds Soup), jeoyeom bugeo guk (Low-sodium Dried Pollack Soup), broccoli soup (Broccoli Soup), seolleongtang (Ox Bone Soup), soegogi dubu guk (Tofu and Beef Soup), jeoyeom soegogi miyeok guk (Low-sodium Seaweed Soup with Beef), soegogi baechu malgeun guk (Clear Soup with Beef and Napa Cabbage), sundubu saeujeot guk (Soft Tofu Soup with Salted Shrimp), jeoyeom sigeumchi doenjang guk (Low-sodium Soybean Paste Soup with Spinach), sigeumchi duyu doenjang guk (Soybean Paste Soup with Spinach and Soya Milk), eolgari doenjang guk (Soybean Paste Soup with Spring Napa Cabbage), yeolmu doenjang guk (Soybean Paste Soup with Young Summer Radish), jeoyeom oi naengguk (Low-sodium Chilled Cucumber Soup), jeoyeom oi miyeok naengguk (Low-sodium Chilled Cucumber and Seaweed Soup), jeoyeom ugeoji doenjang guk (Low-sodium Soybean Paste Soup with Outer Leaves of Napa Cabbage), jeoyeom yukgaejang (Low-sodium Spicy Beef Soup), jogaetsal baechu guk (Clam Meat and Napa Cabbage Soup), cheongyang kongnamul guk (Bean Sprout Soup with Hot Pepper), Chodang-sundubuguk (Chodang-style Soft Tofu Soup), konggaru baechu doenjang guk (Soybean Paste Soup with Napa Cabbage and Roasted Soybean Powder), kongnamul guk (Bean Sprout Soup), paengi beoseot bugeo guk (Dried Pollack Soup with Enokitake)

1.17 g, 국류 3.00±0.83 g, 면류 2.96±0.86 g가 김치류 1.61 ±0.26 g, 조림류 1.17±0.42 g, 구이류 1.09±0.17 g, 볶음류 0.90±0.26 g, 튀김류 0.79±0.35 g, 부침류 0.79±0.24 g, 생채 류 0.71±0.36 g, 숙채류 0.66±0.21 g으로 나타났다(Park 2007). 본 연구에서 제안한 나트륨 범위와 비교할 때 국류, 김치류를 과감하게 낮춰야 하며 이러한 저염 국류 및 저염 김치류의 보급이 시급하다고 생각된다.

2. 단체급식소에서 활용 가능한 저염 레시피 개발

단체급식소에서의 활용도와 나트륨 기여도 등을 고려하여

일품요리 39가지, 국 또는 찌개 43가지, 육류 또는 생선 반찬 59가지, 채소반찬 94가지, 전류 9가지, 김치 또는 절임 14가지 등 총 258가지의 저염레시피를 개발하였다<Table 2>. 선정된 일품요리 39종은 비빔밥 5종, 채소밥 6종, 찜밥 2종, 덮밥 7종, 볶음밥 6종 등 26종의 밥류와 떡국 1종, 면류 11종, 햄버거 1종 등 총 39종이었다. 국과 찌개류는 재료의 단가와 단체급식소에서의 활용도를 고려하여 된장국 13종, 채소국 4종, 두부국 5종, 미역국 3종, 해물국 3종, 찌개 및 탕 6종, 냉국 6종, 기타 국 1종과 스프 2종 등 총 43종으로 구성하였다.

<Table 2> Classification and composition of the developed low Na dishes (continued)

	Item
Meat or Fish side-dishes (n=59)	gajami yeotjang gui (Grilled Sole with Sweet Soy Sauce), gaji tangsu (Sweet and Sour Eggplants), galchi hobak jorim (Braised Cutlassfish and Pumpkin), jeoyeom gyeran mari (Low-sodium Rolled Omelet), godeungeo gochujang gui (Spicy-grilled Mackerel with Red Chili Paste), jeoyeom godeungeo jorim (Low-sodium Braised Mackerel), jeoyeom godeungeo jjim (Low-sodium Braised Mackerel), godeungeo curry gui (Grilled Mackerel with Curry), jeoyeom kimchi tteokgalbi (Low-sodium Grilled Short Rib and Kimchi Patties), kkanso saeu maeunsoseu bokkeum (Fried Shrimp in Hot Pepper and Chili Sauce), jeoyeom kkomak chaeso muchim (Seasoned Cockles and Vegetables), kkwarigochu myeolchi bokkeum (Stir-fried Baby Anchovies with Shishito Peppers), dak gaseumsal beoseot gui (Grilled Chicken Breast and Mushrooms), jeoyeom dak gaseumsal juksun bokkeum (Low-sodium Stir-fried Chicken Breast and Bamboo Shoots), jeoyeom dakgogi gyeongwa jorim (Low-sodium Braised Chicken and Nuts), daksal gyeoja naengchae (Chilled Chicken Salad with Mustard Sauce), daksal teriyaki bokkeum (Stir-fried Chicken Teriyaki), daksal teriyaki gui (Chicken Teriyaki), daksal maneuljong bokkeu (Stir-fried Chicken and Garlic Stems), daksal beoseot gui (Grilled Chicken and Mushrooms), jeoyeom daegu jjim (Low-sodium Braised Codfish), dongaseu roll (Pork Cutlet Rolls), dongaseu kimchi sauce (Pork Cutlet with Kimchi Sauce), don satae tteok jjim (Braised Pork Hock and Rice Cake), donyuk goguma gochujang gangjeong (Fried Pork and Sweet Potatoes in Sweet and Sour Red Chili Paste Sauce), jeoyeom donyuk maesilcheong bulgogi (Low-sodium Green-plum Seasoned Pork Bulgogi), donyuk broccoli bokkeum (Stir-fried Pork and Broccoli), donyuk suyuk (Boiled Pork Slices), donyuk chaeso jjim (Braised Pork and Vegetables), donyuk cheolpan kkaennip bokkeum (Pan-fried Pork and Sesame Leaf), donyuk tongmaneu jangjorim (Soy Sauce Braised Pork and Garlic Cloves), dwaejigogi doraji bokkeum (Stir-fried Pork and Bellflower Roots), dwaejigogi buchu bokkeum (Stir-fried Leek and Bellflower Roots), dwaejigogi broccoli bokkeum (Stir-fried Broccoli and Bellflower Roots), jeoyeom dwaejigogi sukju bokkeum (Low-sodium Stir-fried Pork and Mung Bean Sprouts), dwaejigogi chop steak (Pork Chop Steak), dwaegi deungsim & pineapple salsa gui (Grilled Pork and Pineapple with Salsa), jeoyeom dubu so bulgogi (Low-sodium Bulgogi with Tofu), dubu ssam (Tofu Sheet Wraps), maneuljong geonsaeu bokkeum (Stir-fried Garlic Stems and Dried Shrimps), jeoyeom maneuljong myeolchi bokkeum (Low-sodium Stir-fried Garlic Stems and Dried Anchovies), myeolchi gyeongwa ryu jorim (Braised Nuts and Dried Anchovies), samchi lemon sauce gui (Grilled Cero with Lemon Sauce), samchi mu jorim (Braised Cero with Radish), samchi curry gui (Grilled Cero with Curry), shabu-shabu salad (Shabu-shabu Salad), soegogi dangmyeon bokkeum (Stir-fried Beef and Glass Noodles), soegogi jangjorim (Soy Sauce Braised Beef), yeoneo salad (Salmon Salad), osam bulgogi (Squid and Pork Belly Bulgogi), jeoyeom ojingeo bokkeum (Low-sodium Stir-fried Squid), jeoyeom yuja jeyuk jorim (Low-sodium Braised Pork with Citron), imyeonsueo gui (Grilled Atka Mackerel), jan myeolchi bokkeum (Stir-fried Baby Anchovies), jeoyeom japchae (Low-sodium Stir-fried Glass Noodles and Vegetables), jeoyeom kodari kongnamul jjim (Low-sodium Braised Pollack and Bean Sprouts), pa dak (Fried Chicken with Shredded Green Onion and Sweet Soy Sauce), hamburger steak (Hamburger Steak), hamburger steak & garlic sauce (Hamburger Steak and Garlic Sauce)

단체급식 메뉴에 어육류 반찬은 반드시 포함되므로 여러 가지 재료와 조리법을 이용하여 다양한 음식으로 구성하고자 하였다. 건어물류 5종, 생선 및 어패류 17종, 돈육 22종, 우육 5종, 계육 9종, 달걀 1종 등 총 59종의 음식으로 구성하였으며 볶음, 구이, 찜, 조림 등의 조리방법을 이용하였다. 채소 반찬류는 다양한 재료와 조리법을 이용하여 샐러드 20종, 생채류 34종, 숙채류 11종, 찜 4종, 잡채 3종, 볶음 9종, 구이 4종, 조림 3종, 튀김 6종 등 총 94종의 음식을 구성하였다. 단체급식 메뉴에 별미음식으로 이용될 수 있는 전류 9종을 개발하였으며 단체급식소에서의 활용도를 높이기 위하여 조리 과정을 단순화하였다. 김치는 나트륨의 함량이 높기 때문에 일반 김치 대신 저염 겉절이 및 피클 등 절임류를 이용하는 것이 저염메뉴의 구성에 도움이 된다. 이에 따라 김치는 절이는 과정으로 인하여 많은 양의 나트륨을 함유하게 되므로 절이는 과정을 생략할 수 있는 양배추, 오이를 김치의 재료로 사용하고 신맛을 강조한 피클과 겉절이를 14가지 개발하여 활용하였다.

또한 개발한 저염레시피는 제시된 분류에 따라 에너지와

나트륨 함량을 조사하여 제시하였다<Table 3>. 나트륨 함량이 가장 낮은 음식군은 채소반찬으로서 평균은 152.4 mg의 나트륨을 함유하고 있었으며 나트륨 함량이 가장 높은 음식군은 일품요리로서 나트륨 함량의 평균은 351.6 mg이었다. 또한 국 또는 찌개와 일품요리의 나트륨 수준은 단체급식소 식단에서 나트륨 섭취의 주요한 원인으로 볼 수 있는 정도로 높게 나타났다. 에너지 함량은 일품요리가 가장 높았고, 지방 함량이 높은 육류 또는 생선 반찬과 채소전의 에너지 함량도 다른 음식류에 비하여 높은 편이었다. 부산·경북 지역 초·중학교 단체급식에 함유된 나트륨 함량을 조사한 결과를 보면 식품군별 나트륨 함량은 소스류(1459 mg/100 g)와 절임류(1165 mg/100 g)가 높게 나타났고, 이어서 구이류(894 mg/100 g), 조림류(786 mg/100 g), 김치류(737 mg/100 g), 볶음류(624 mg/100 g), 무침·나물류(444 mg/100 g), 튀김류(434 mg/100 g) 순으로 높게 나타났다(Lee et al. 2010). 본 연구에서도 Lee et al.(2010)의 연구결과와 거의 비슷한 방향으로 나타난 것을 볼 수 있다.

<Table 2> Classification and composition of the developed low Na dishes (continued)

	Item
Vegetable side-dishes (n=94)	gaji muchim (Seasoned Eggplant), beoseot bokkeum (Assorted Stir-fried Mushrooms), gamja manejjong bokkeum (Stir-fried Potatoes and Garlic Stems), jeoyeom gamja jorim (Low-sodium Braised Potatoes), gamjachae bokkeum (Stir-fried Shredded Potatoes), gamjachae ham bokkeum (Stir-fried Ham and Shredded Potatoes), gamja twigim (French Fries), gematsal tteok salad (Crabmeat and Rice Cake Salad), gyeoja chae (Assorted Meats and Vegetables with Mustard Sauce), green salad (Green Salad), geundae yubu muchim (Seasoned Swiss Chard and Fried Tofu), kkaennip baechu & ssamjang (Sesame Leaves and Napa Cabbage with Seasoned Soybean Paste), kkaennip dubu muchim (Seasoned Tofu and Sesame Leaves), kkotmatsal salad (Crabmeat Salad), kkwarigochu muchim (Seasoned Shishito Peppers), danhobak salad (Sweet Pumpkin Salad), deodeok saengchae (Deodeok Salad), doraji yujacheong muchim (Seasoned Bellflower Roots with Citron Marmalade), dotorimuk yachae muchim (Seasoned Acorn Jelly and Vegetable Salad), dolnamul (Seasoned Sedum), dubu steak (Tofu Steak), dubu chicory salad (Tofu and Chicory Salad), maemun chwinamul muchim (Spicy-seasoned Wild Aster), modum ssam & ssamjang (Assorted Leaf Wraps with Seasoned Soybean Paste), kkaennip baechu ssamjang (Sesame Leaves and Napa Cabbage with Seasoned Soybean Paste), jeoyeom mu namul (Low-sodium Seasoned Julienne Radish), mu saengchae (Julienne Korean Radish Salad), minari mu saengchae (Water Parsley and Julienne Korean Radish Salad), baechu mari (Napa Cabbage Rolls), jeoyeom beoseot gangjeong (Low-sodium Fried Mushrooms in Sweet and Sour Sauce), baby chaeso salad (Baby Vegetable Salad), buchu yangpa gyeoja muchim (Seasoned Leek and Onions with Mustard), buchu japchae (Stir-fried Glass Noodles and Leek), buchu yangnyeomjang (Spicy-marinated Leek), buchu konggaru muchim (Seasoned Leek with Roasted Soybean Powder), broccoli maneul bokkeum (Stir-fried Broccoli and Garlic), broccoli butter bokkeum (Stir-fried Broccoli with Butter), vitamin green salad (Tatsoi Salad), sagwa goguma salad (Apple and Sweet Potato Salad), sagwa dressing gyeran salad (Egg Salad with a Apple Dressing), samsaek gyeoja naengchae (Three-colored Chilled Mustard Salad), sangchu muchim (Seasoned Lettuce), jeoyeom sangchu ssam (Low-sodium Lettuce Wraps), saessak yeondubu (Silken Tofu with Sprouts), saeng minari muchim (Seasoned Fresh Water Parsley), sukju namul ttangkong muchim (Seasoned Mung Bean Sprouts with Peanuts), sukju namul muchim (Seasoned Mung Bean Sprouts), sukju minari muchim (Seasoned Mung Bean Sprouts and Water Parsley), sigeumchi namul (Seasoned Spinach), sigeumchi dubu muchim (Seasoned Spinach with Tofu), sigeumchi salad (Spinach Salad), sigeumchi saeng muchim (Seasoned Fresh Spinach), shil gonyak muchim (Seasoned Devil's-tongue Jelly Noodles), Italian dressing (Italian Dressing), jeoyeom algamja jorim (Low-sodium Braised Potatoes), yachae twigim (Deep-fried Vegetables), yangbaechu kkaennip saengchae (Cabbage and Sesame Leaves Salad), yangbaechu ssam (Cabbage Wraps), yangsangchu salad (Lettuce Salad), yangsangchu yangbaechu salad (Lettuce and Cabbage Salad), eorinnip green salad (Baby Leaf Green Salad), yeongeun deulkkae muchim (Seasoned Lotus Root with Perilla Seeds), yeongeun beoseot bokkeum (Stir-fried Lotus Root and Mushrooms), yeongeun curry twigim (Deep-fried Lotus Root with Curry), orange eoggeundae salad (Orange and Beet Leaf Salad), oriental dressing (Oriental Dressing), oven gamja frittata (Frittata with Oven Roasted Potatoes), oi kkakdug muchim (Seasoned Diced Cucumbers), oi saengchae (Cucumber Salad), ueong japchae (Stir-fried Burdock with Vegetables), ueong chamkkae sauce muchim (Seasoned Burdock with Sesame Sauce), wollam ssam (Vietnamese Spring Rolls), joraengitteok jangjorim (Braised Rice Cake Balls with Soy Sauce), jeoyeom jungguksik dubu (Low-sodium Deep-fried Tofu in Hot Pepper Sauce), jimmichae gochujang yachae muchim (Seasoned Dried Squid and Vegetables with Red Chili Paste), jjin goguma (Steamed Sweet Potato), chamnamul deulkkae muchim (Seasoned Japanese Hornwort with Perilla Seeds), chamnamul oi saengchae (Japanese Hornwort and Cucumber Salad), chamnamul yujacho saengchae (Japanese Hornwort Salad with Citron Venegar), chaeso japchae (Stir-fried Glass Noodles and Vegetables), jeoyeom chaeso palbochae (Low-sodium Stir-fried Vegetables), cheongpomuk muchim (Seasoned Mung Bean Jelly Salad), cheongpomuk minari oriental muchim (Seasoned Mung Bean Jelly and Water Parsley Salad with Oriental Sauce), chicory sagwa yujacheong muchim (Seasoned Chicory and Apple with Citron Marmalade), cauliflower pimang bokkeum (Stir-fried Cauliflower and Bell Pepper), kongnamul samsaek chae (Three-colored Chilled Salad with Bean Sprouts), crouton salad (Crouton Salad), tomato salad (Tomato Salad), tomato short pasta (Tomato Short Pasta), tong doraji gui (Grilled Bellflower Roots), pyogo beoseot geomeunkkae dubu tangsu (Sweet and Sour Shiitake Mushrooms and Black Sesame Tofu), putgochu doenjang muchim (Seasoned Young Green Chili Pepper with Soybean Paste), hyeonmi salad (Brown Rice Salad)
Jeons (Pan-fried dishes) (n=9)	gematsal paengi beoseot jeon (Crabmeat and Enokitake Pancake), gyeran dubu gui (Tofu Pancake), gogi kkaennip jeon (Sesame Leaf and Meat Pancake), gun mandu (Fried Dumplings), neutari beoseot pajeon (Oyster Mushroom and Green Onion Pancake), dongtaepo herb gui (Grilled Dried Pollack with Herb), beoseot pa sanjeok (Mushroom and Green Onion Brochette), yangbaechu jeon (Cabbage Pancake), wang mandu jjim (Steamed King-sized Dumplings)

3. 단체급식소에서 활용 가능한 1,300 mg Na 식단 제안
 1일 나트륨 3,900 mg 섭취 달성을 위하여 1식 1,300 mg 나트륨을 포함하는 90식을 개발하였다. 이를 위하여 앞서 개

발한 258가지 저나트륨 레시피를 이용하여 일품 또는 반상 차림 여부에 따라 각 37식과 53식의 식단을 구성하였고, 국의 유무에 따라 75식과 15식의 식단을 구성함으로써 단체급

<Table 2> Classification and composition of the developed low Na dishes (continued)

Item
jeoyeom ganjang yangpa mu sugchae (Low-sodium Seasoned Onions and Radish with Soy Sauce), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi), baechu geotjeori (Fresh Napa Cabbage Kimchi), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), buchu geotjeori (Fresh Leak Kimchi), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi), yangbaechu kkaennip pickle (Cabbage and Sesame Leaf Pickle), yeolmu kimchi (Young Summer Radish Kimchi), orange musuk chojeorim (Pickled Orange and Radish), jeoyeom oi kimchi (Low-sodium Cucumber Kimchi), oi chojeorim (Pickled Cucumber), jeukseok baechu geotjeori (Fresh Napa Cabbage Kimchi), chamnamul deulkkae geotjeori (Fresh Japanese Hornwort Kimchi with Perilla Seeds), pa chae chamnamul geotjeori (Shredded Green Onion and Fresh Japanese Hornwort Kimchi)

<Table 3> Energy and Na contents in the developed dishes

	One-dish Meals (n=39)	Guk or Jjigae (soups or pot stews) (n=43)	Meat or Fish side-dishes (n=59)	Vegetable side-dishes (n=94)	Jeons (Pan-fried dishes) (n=9)	Kimchis or Pickles (n=14)
Energy (kcal)	361.6±115.2 ¹⁾	59.0±56.5	196.5±75.6	72.6±60.5	173.4±119.8	28.4±23.5
Na (mg)	351.6±250.6	345.1±165.5	250.2±143.5	152.4±122.5	182.0±124.0	255.7±172.8

¹⁾Values are Mean±SD.

<Table 4> Composition of One-dish Menus

Menu	Item
Menu1	chamnamul bokkeumbap (Japanese Hornwort Fried Rice), kongnamul guk (Bean Sprout Soup), dongtaepo herb gui (Grilled Dried Pollack with Herb), tomato short pasta (Tomato Short Pasta), sigeumchi salad (Spinach Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu2	haemulyachae bokkeumbap (Seafood and Vegetable Fried Rice), Chodang sundubuguk (Chodang-style Soft Tofu Soup), donyuk broccoli bokkeum (Stir-fried Pork and Broccoli), yangbaechu kkaennip saengchae (Cabbage and Sesame Leaves Salad), neutari beoseot pajeon (Oyster Mushroom and Green Onion Pancake), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu3	heungmi nut yeongyang bap (Steamed Multi-grain Rice with Black Rice and Nuts), beoseot deulkkae tang (Mushrooms and Perilla Seeds Soup), godeungeo curry gui (Grilled Mackerel with Curry), dotorimuk yachae muchim (Seasoned Acorn Jelly and Vegetable Salad), buchu yangnyeomjang (Spicy-marinated Leak), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu4	fruit curry rice (Fruit Curry over Steamed Rice), dubu ssam (Tofu Sheet Wraps), gamja maneuljong bokkeum (Stir-fried Potatoes and Garlic Stems), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu5	dubu soboro deopbap (Steamed Rice with Mashed Tofu), miso ilsik doenjang guk (Japanese Miso soup), jeoyeom gamja jorim (Low-sodium Braised Potatoes), vitamin green salad (Tatsoi Salad), jeoyeom gyeran mari (Low-sodium Rolled Omelet), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu6	gondeure bap (Steamed Rice and Cirsium), malgeun udon gukmul (Clear Udon Soup), jeoyeom palbochae (Low-sodium Stir-fried Seafood and Vegetables), jeoyeom algamja jorim (Low-sodium Braised Potatoes), shil gonyak muchim (Seasoned Devil's-tongue Jelly Noodles), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu7	ppuri chaeso bulgogi deopbap (Steamed Rice with Root Vegetables and Bulgogi), kongnamul guk (Bean Sprout Soup), daksal teriyaki gui (Chicken Teriyaki), saessak yeondubu (Silken Tofu with Sprouts), oi kkakdug muchim (Seasoned Diced Cucumbers), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu8	chajo bap (Low-sodium Steamed Rice and Glutinous millet), jeoyeom gamja sujebi guk (Low-sodium Potato Handpulled Dough Soup), dwaengi deungsim & pineapple salsa gui (Grilled Pork and Pineapple with Salsa), broccoli maneul bokkeum (Stir-fried Broccoli and Garlic), yangbaechu kkaennip saengchae (Cabbage and Sesame Leaves Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu9	yangbaechu ssambap (Cabbage Wraps and Steamed Rice), musun wae doenjang guk (Japanese Miso soup with radish sprouts), putgochu doenjang muchim (Seasoned Young Green Chili Pepper with Soybean Paste), sagwa dressing gyeran salad (Egg Salad with a Apple Dressing), gaji tangsu (Sweet and Sour Eggplants), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu10	dubu hyeonmi bibimbap (Brown Rice Bibimbap with Tofu), maeun kongnamul guk (Spicy Bean Sprout Soup), daksal gyeoja naengchae (Chilled Chicken Salad with Mustard Sauce), yeongeun deulkkae muchim (Seasoned Lotus Root with Perilla Seeds), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), jjin guguma (Steamed Sweet Potato)

<Table 4> Composition of One-dish Menus (continued)

Menu	Item
Menu11	mukchae bibimbap (Shredded Acorn Jelly Bibimbap), gun mandu (Fried Dumplings), samsaek gyeoja naengchae (Three-colored Chilled Mustard Salad), baechu geotjeori (Fresh Napa Cabbage Kimchi), apple, jasmine tea
Menu12	soegogi dubu bokkeumbap (Beef and Tofu Fried Rice), gogi kkaennip jeon (Sesame Leaf and Meat Pancake), green salad (Green Salad), oriental dressing (Oriental Dressing), chamnamul yujacho saengchae (Japanese Hornwort Salad with Citron Venegar), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), maesil cha (Green Plum Tea)
Menu13	bap (Steamed Rice), udon (Udon), yachae twigim (Deep-fried Vegetables), hamburger steak & garlic sauce (Hamburger Steak and Garlic Sauce), green salad (Green Salad), oriental dressing (Oriental Dressing), oi chojeorim (Pickled Cucumber), broccoli butter bokkeum (Stir-fried Broccoli with Butter), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), sujeonggwa (Cinnamon Punch)
Menu14	bap (Steamed Rice), naeng kongguksu (Noodles in Cold Soybean Soup), gogi kkaennip jeon (Sesame Leaf and Meat Pancake), chamnamul yujacho saengchae (Japanese Hornwort Salad with Citron Venegar), green salad (Green Salad), oriental dressing (Oriental Dressing), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), maesil cha (Green Plum Tea)
Menu15	bap (Steamed Rice), bajirak buchu kal-guksu (Noodle Soup with Leek and Clams), wang mandu jjim (Steamed King-sized Dumplings), samsaek gyeoja naengchae (Three-colored Chilled Mustard Salad), baechu geotjeori (Fresh Napa Cabbage Kimchi), apple, jasmine tea
Menu16	ssalbak (Steamed Rice), jeoyeom memil guksu (Low-sodium Buckwheat Noodles), dubu steak (Tofu Steak), yangsangchu salad (Lettuce Salad), jeoyeom ganjang yangpa mu sugchae (Low-sodium Seasoned Onions and Radish with Soy Sauce), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu17	jeoyeom omurice (Low-sodium Omelette with Fried Rice), jeoyeom oi miyeok naengguk (Low-sodium Chilled Cucumber and Seaweed Soup), kkanso saeu maunsoseu bokkeum (Fried Shrimp in Hot Pepper and Chili Sauce), sigeumchi namul (Seasoned Spinach), tomato salad (Tomato Salad), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu18	haemul bokkeumbap (Seafood Fried Rice), ssalguksu (Rice Noodles), wollam ssam (Vietnamese Spring Rolls), pa dak (Fried Chicken with Shredded Green Onion and Sweet Soy Sauce), mu saengchae (Julienne Korean Radish Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu19	jeoyeom yachae bokkeumbap (Low-sodium Vegetable Fried Rice), spaghetti (Spaghetti), jeoyeom ugeoji doenjang guk (Low-sodium Soybean Paste Soup with Outer Leaves of Napa Cabbage), yeoneo salad (Salmon Salad), oi chojeorim (Pickled Cucumber), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu20	kong bap (Steamed Rice and Beans), hamburger (Hamburger), danhobak soup (Sweet Pumpkin Soup), gamja twigim (French Fries), yangsangchu salad (Lettuce Salad), orange musuk chojeorim (Pickled Orange and Radish), oi chojeorim (Pickled Cucumber), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu21	saessak chamchi bibimbap (Canned Tuna Bibimbap), malgeun udon gukmul (Clear Udon Soup), dongaseu kimchi sauce (Pork Cutlet with Kimchi Sauce), sagwa goguma salad (Apple and Sweet Potato Salad), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu22	ssalbak (Steamed Rice), dak kalguksu (Noodle Soup with Chicken), dongaseu roll (Pork Cutlet Rolls), baby chaeso salad (Baby Vegetable Salad), oi chojeorim (Pickled Cucumber), jeukseok baechu geotjeori (Fresh Napa Cabbage Kimchi)
Menu23	jeoyeom ssalbak & gyeongwa ssamjang (Low-sodium Leaf Wraps and Rice with Seasoned Nuts and Soybean Paste), jeoyeom gaji naengguk (Low-sodium Chilled Eggplant Soup), jeoyeom dubu so bulgogi (Low-sodium Bulgogi with Tofu), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu24	jeoyeom chaeso bibimbap (Low-sodium Vegetable Bibimbap), jeoyeom jogaetsal baechu guk (Low-sodium Clam Meat and Napa Cabbage Soup), jeoyeom jungguksik dubu (Low-sodium Deep-fried Tofu in Hot Pepper Sauce), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi)
Menu25	jeoyeom chwinamul bap (Low-sodium Steamed Rice and Wild Aster), jeoyeom paengi beoseot bugeo guk (Low-sodium Dried Pollack Soup with Enokitake), jeoyeom gamjachae bokkeum (Low-sodium Stir-fried Shredded Potatoes), jeoyeom oi kimchi (Low-sodium Cucumber Kimchi)
Menu26	jeoyeom dubu kimchi deopbak (Low-sodium Steamed Rice with Tofu and Kimchi), jeoyeom geonsaeu auk guk (Low-sodium Dried Shrimp and Curled Mallow Soup), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi), jeoyeom oi saengchae (Low-sodium Cucumber Salad), apple
Menu27	jeoyeom modum beoseot bap (Low-sodium Steamed Rice and Assorted Mushrooms), jeoyeom paengi beoseot bugeo guk (Low-sodium Dried Pollack Soup with Enokitake), jeoyeom kkaennip dubu muchim (Low-sodium Seasoned Tofu and Sesame Leaves), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi), grape

<Table 4> Composition of One-dish Menus (continued)

Menu	Item
Menu28	jeoyeom soegogi kongnamul bap (Low-sodium Steamed Rice and Bean Sprouts with Beef), jeoyeom kong biji jjigae (Low-sodium Pureed Soybean Stew), jeoyeom gaji muchim (Low-sodium Seasoned Eggplant), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu29	pyogo beoseot kongnamul bap (Steamed Rice and Bean Sprouts with Shiitake Mushrooms), jeoyeom dasima mu guk (Low-sodium Kelp and Radish Soup), dubu chicory salad (Tofu and Chicory Salad), Italian salad dressing (Italian dressing), donyuk goguma gochujang gangjeong (Fried Pork and Sweet Potatoes in Sweet and Sour Red Chili Paste Sauce), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu30	jeoyeom dotorimuk bibimbap (Low-sodium Acorn Jelly Bibimbap), jeoyeom deulkkae miyeok guk (Low-sodium Seaweed and Perilla Seed Soup), jeoyeom gajami yeotjang gui (Low-sodium Grilled Sole with Sweet Soy Sauce), jeoyeom mu saengchae (Low-sodium Julienne Korean Radish Salad), banana
Menu31	jeoyeom cheonggukjang deopbap (Low-sodium Steamed Rice with Rich Soybean Paste), jeoyeom geonsaeu auk guk (Low-sodium Dried Shrimp and Curled Mallow Soup), jeoyeom baechu mari (Low-sodium Napa Cabbage Rolls), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi), water melon
Menu32	jeoyeom maesaengi gul tteokguk (Low-sodium Sliced Rice Cake Soup with Seaweed Fulvescens and Oysters), jeoyeom beoseot bokkeum (Low-sodium Assorted Stir-fried Mushrooms), jeoyeom haemul pa jeon (Low-sodium Seafood and Green Onion Pancake), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)
Menu33	susu bap (Steamed Rice and Millet), jeoyeom miyeok oi naengguk (Low-sodium Cold Seaweed and Cucumber Soup), jeoyeom dubu so bulgogi (Low-sodium Bulgogi with Tofu), jeoyeom beoseot bokkeum (Low-sodium Assorted Stir-fried Mushrooms), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu34	jeoyeom yogurt curry rice (Low-sodium Yogurt Curry over Steamed Rice), jeoyeom buchu jeon (Low-sodium Leek Pancake), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi), jeoyeom oi saengchae (Low-sodium Cucumber Salad)
Menu35	jeoyeom mapa dubu deopbap (Low-sodium Steamed Rice with Mapa Tofu), jeoyeom kimchi jeon (Low-sodium Kimchi Pancake), jeoyeom doraji yujacheong muchim (Low-sodium Seasoned Bellflower Roots with Citron Marmalade), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)
Menu36	jeoyeom jjajang myeon (Low-sodium Noodles with Black Soybean Sauce), jeoyeom jungguksik dubu (Low-sodium Deep-fried Tofu in Hot Pepper Sauce), jeoyeom dongnamasig sukju bokkeum (Low-sodium Southeast Asian-style Stir-fried Mung Bean Sprouts), jeoyeom yangbaechu kkaennip pickle (Low-sodium Cabbage and Sesame Leaf Pickle)
Menu37	jeoyeom deulkkae miyeok guk (Low-sodium Seaweed and Perilla Seed Soup), jeoyeom dubu so bulgogi (Low-sodium Bulgogi with Tofu), jeoyeom yeongeun beoseot bokkeum (Low-sodium Stir-fried Lotus Root and Mushrooms), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)

식소에서 적용 가능한 모델을 제시하였다<Table 4, 5>. DASH diet란 나트륨, 포화지방산과 지방이 낮고, 과일과 채소가 풍부하며, 칼륨, 칼슘 및 마그네슘이 풍부한 식이를 말하며 고혈압 환자들을 위한 식사섭취방법으로 미국에서 고안되었다(Appel et.al. 1997). 단체급식의 염분섭취가 높은 상황에서 저나트륨 식단의 보급을 위해서 나트륨 저감화를 위한 영양교육 프로그램의 지원이 함께 이루어져야 할 것이다.

구성된 저나트륨 식단에서 나트륨을 비롯한 영양성분을 분석하여 평가하고, 일품과 반상차림 여부와 국의 유무에 따라 영양성분을 비교하였다<Table 6, 7>. 일품요리란 ‘주식과 부식에 해당하는 음식을 한 그릇에 조화 있게 담아 한 끼의 식사로 만든 요리’ 또는 ‘한 끼의 식사를 해결할 수 있는 한 그릇 음식’으로 정의하며, 한 그릇 음식으로도 지칭한다. 대표 음식으로 비빔밥, 덮밥, 카레라이스를 제시하였다(Doopedia 2017; The Korean Home Economics Association 1960). 일품요리 식단은 다른 식단에 비해 상차림이 간편하여 식기

나 조리인력을 절감할 수 있고 잔반을 줄일 수 있다는 장점이 있으며 영양이나 기호도 등에 따른 연구가 잇따르고 있다(Kim et al. 2006).

일품식단과 반상차림식단과의 비교<Table 6>에서는 에너지, 탄수화물, 지질, 나트륨의 함량에는 통계적으로 유의한 차이가 없었으나, 단백질의 함량은 반상차림식단 30.27 g에 비하여 일품식단 33.97 g으로 경우에 통계적으로 유의하게 높았다(p<0.05). 에너지, 탄수화물의 함량은 일품식단에서 높은 경향을 보이고 지질, 나트륨 함량은 반상차림식단에서 높은 경향을 보이나 제시한 저염 식단의 경우 통계적으로 유의적인 차이는 아니었다. 우리나라 사람들은 서구와는 달리 가공식품보다는 조리에 사용되는 소금으로부터 더 많은 양의 나트륨을 섭취하고 있으며(Paik 1987), 특히 김치, 국, 찌개 등을 통한 과잉섭취가 문제시 되고 있다(Son & Huh 2010).

국 또는 찌개를 포함한 식단과 포함하지 않은 식단 간에

<Table 5> Composition of Korean dining table-setting Menus

Menu	Item
Menu38	hyeonmi bap (Steamed Brown Rice), jeoyeom ganjang dubu guk (Low-sodium Tofu Soup with Soy Sauce), daksal teriyaki bokkeum (Stir-fried Chicken Teriyaki), vitamin green salad (Tatsoi Salad), ueong chamkkae sauce muchim (Seasoned Burdock with Sesame Sauce), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu39	hyeonmi bap (Steamed Brown Rice), jeoyeom bugeo guk (Low-sodium Dried Pollack Soup), donyuk tongmaneul jangjorim (Soy Sauce Braised Pork and Garlic Cloves), shabu-shabu salad (Shabu-shabu Salad), minari mu saengchae (Water Parsley and Julienne Korean Radish Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu40	hyeonmi bap (Steamed Brown Rice), kongnamul guk (Bean Sprout Soup), dak gaseumsal beoseot gui (Grilled Chicken Breast and Mushrooms), saessak yeondubu (Silken Tofu with Sprouts), kkotmatsal salad (Crabmeat Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu41	hyeonmi gamja bap (Steamed Brown Rice and Potato), soegogi dubu guk (Tofu and Beef Soup), jeoyeom chaeso palbochae (Low-sodium Stir-fried Vegetables), hyeonmi salad (Brown Rice Salad), yangbaechu jeon (Cabbage Pancake), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu42	heungmi bap (Steamed Black Rice), jeoyeom miyeok guk (Low-sodium Seaweed Soup), dwaejigogi buchu bokkeum (Stir-fried Leek and Bellflower Roots), beoseot pa sanjeok (Mushroom and Green Onion Brochette), saeng minari muchim (Seasoned Fresh Water Parsley), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu43	heungmi bap (Steamed Black Rice), miyeok guk (Seaweed Soup), daksal maneuljong bokkeu (Stir-fried Chicken and Garlic Stems), kkaennip baechu ssamjang (Sesame Leaves and Napa Cabbage with Seasoned Soybean Paste), sangchu muchim (Seasoned Lettuce), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu44	hyeonmi chapssal bap (Steamed Brown Rice and Sweet Rice), yeolmu doenjang guk (Soybean Paste Soup with Young Summer Radish), dwaejigogi broccoli bokkeum (Stir-fried Broccoli and Bellflower Roots), myeolchi gyeongwa ryu jorim (Braised Nuts and Dried Anchovies), eorinnip green salad (Baby Leaf Green Salad), baechu geotjeori (Fresh Napa Cabbage Kimchi)
Menu45	heungmi bap (Steamed Black Rice), miyeok guk (Seaweed Soup), dwaejigogi doraji bokkeum (Stir-fried Pork and Bellflower Roots), jeoyeom beoseot gangjeong (Low-sodium Fried Mushrooms in Sweet and Sour Sauce), sukju minari muchim (Seasoned Mung Bean Sprouts and Water Parsley), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu46	chajo bap (Low-sodium Steamed Rice and Glutinous millet), jeoyeom oi naengguk (Low-sodium Chilled Cucumber Soup), imyeonsueo gui (Grilled Atka Mackerel), chamnamul deulkkae muchim (Seasoned Japanese Hornwort with Perilla Seeds), cheongpomuk muchim (Seasoned Mung Bean Jelly Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu47	bori bap (Low-sodium Steamed Rice and Barley), jeoyeom sigeumchi doenjang guk (Low-sodium Soybean Paste Soup with Spinach), daksal beoseot gui (Grilled Chicken and Mushrooms), cauliflower pimang bokkeum (Stir-fried Cauliflower and Bell Pepper), jeoyeom japchae (Low-sodium Stir-fried Glass Noodles and Vegetables), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu48	ssalbab (Steamed Rice), seolleongtang (Ox Bone Soup), gamjachae ham bokkeum (Stir-fried Ham and Shredded Potatoes), joraengitteok jangjorim (Braised Rice Cake Balls with Soy Sauce), chamnamul yujacho saengchae (Japanese Hornwort Salad with Citron Venegar), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi), soegogi baechu malgeun guk (Clear Soup with Beef and Napa Cabbage), apple
Menu49	bori bap (Steamed Rice and Barley), soegogi baechu malgeun guk (Clear Soup with Beef and Napa Cabbage), samchi mu jorim (Braised Cero with Radish), dottorimuk yachae muchim (Seasoned Acorn Jelly and Vegetable Salad), sukju namul muchim (Seasoned Mung Bean Sprouts), green salad (Green Salad), oriental dressing (Oriental Dressing), broccoli butter bokkeum (Stir-fried Broccoli with Butter), yeolmu kimchi (Young Summer Radish Kimchi), sujeonggwa (Cinnamon Punch)
Menu50	ssalbab (Steamed Rice), galchi hobak jorim (Braised Cutlassfish and Pumpkin), joraengitteok jangjorim (Braised Rice Cake Balls with Soy Sauce), chamnamul yujacho saengchae (Japanese Hornwort Salad with Citron Venegar), gamjachae ham bokkeum (Stir-fried Ham and Shredded Potatoes), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi), apple, jasmine tea
Menu51	bori bap (Steamed Rice and Barley), kongnamul guk (Bean Sprout Soup), donyuk suyuk (Boiled Pork Slices), kkaennip baechu & ssamjang (Sesame Leaves and Napa Cabbage with Seasoned Soybean Paste), jeoyeom gamja jorim (Low-sodium Braised Potatoes), green salad (Green Salad), oriental dressing (Oriental Dressing), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), saenggang cha (Ginger Tea)
Menu52	bori bap (Steamed Rice and Barley), kongnamul guk (Bean Sprout Soup), jeoyeom daegu jjim (Low-sodium Braised Codfish), modum ssam & ssamjang (Assorted Leaf Wraps with Seasoned Soybean Paste), jeoyeom gamja jorim (Low-sodium Braised Potatoes), green salad (Green Salad), oriental dressing (Oriental Dressing), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi), maesil cha (Green Plum Tea)

<Table 5> Composition of Korean dining table-setting Menus (continued)

Menu	Item
Menu53	hyeonmi bap (Steamed Brown Rice), eolgari doenjang guk (Soybean Paste Soup with Spring Napa Cabbage), donyuk chaeso jjim (Braised Pork and Vegetables), oven gamja frittata (Frittata with Oven Roasted Potatoes), deodeok saengchae (Deodeok Salad), buchu japchae (Stir-fried Glass Noodles and Leek), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu54	ssalbak (Steamed Rice), jeoyeom ugeoji doenjang guk (Low-sodium Soybean Paste Soup with Outer Leaves of Napa Cabbage), don satae tteok jjim (Braised Pork Hock and Rice Cake), tong doraji gui (Grilled Bellflower Roots), chamnamul oi saengchae (Japanese Hornwort and Cucumber Salad)
Menu55	susu bap (Steamed Rice and Millet), broccoli soup (Broccoli Soup), hamburger steak (Hamburger Steak), jinmichae gochujang yachae muchim (Seasoned Dried Squid and Vegetables with Red Chili Paste), crouton salad (Crouton Salad), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi), jeoyeom dwaejigogi sukju bokkeum (Low-sodium Stir-fried Pork and Mung Bean Sprouts)
Menu56	hyeonmi susu bap (Steamed Brown Rice and Millet), jeoyeom sigeumchi doenjang guk (Low-sodium Soybean Paste Soup with Spinach), jeoyeom godeungeo jorim (Low-sodium Braised Mackerel), jeoyeom mu namul (Low-sodium Seasoned Julienne Radish), cheongpomuk minari oriental muchim (Seasoned Mung Bean Jelly and Water Parsley Salad with Oriental Sauce), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu57	hyeonmi bori bap (Steamed Brown Rice and Barley), jeoyeom dubu saeujeot guk (Low-sodium Tofu Soup with Salted Shrimp), jeoyeom donyuk maesilcheong bulgogi (Low-sodium Green-plum Seasoned Pork Bulgogi), buchu yangpa gyeoja muchim (Seasoned Leek and Onions with Mustard), jeoyeom sangchu ssam (Low-sodium Lettuce Wraps), yangbaechu ssam (Cabbage Wraps), jeoyeom ssamjang (Low-sodium Seasoned Soybean Paste), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu58	hyeonmi susu bap (Steamed Brown Rice and Millet), jeoyeom yukgaejang (Low-sodium Spicy Beef Soup), gyeran dubu gui (Tofu Pancake), dolnamul (Seasoned Sedum), gematsal tteok salad (Crabmeat and Rice Cake Salad), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu59	chwinamul gamja bap (Steamed Rice, Wild Aster and Potato), dwaejigogi chop steak (Pork Chop Steak), danhobak salad (Sweet Pumpkin Salad), sigeumchi saeng muchim (Seasoned Fresh Spinach), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu60	jeoyeom mu hyeonmi bap (Low-sodium Steamed Brown Rice and Radish), jeoyeom paengi beoseot bugeo guk (Low-sodium Dried Pollack Soup with Enokitake), jeoyeom yuja jeyuk jorim (Low-sodium Braised Pork with Citron), jeoyeom beoseot bokkeum (Low-sodium Assorted Stir-fried Mushrooms), jeoyeom oi saengchae (Low-sodium Cucumber Salad)
Menu61	hyeonmi gijang bap (Steamed Brown Rice and Hog Millet), jeoyeom oi naengguk (Low-sodium Chilled Cucumber Soup), jeoyeom ojingeo bokkeum (Low-sodium Stir-fried Squid), yeongeun curry twigim (Deep-fried Lotus Root with Curry), chamnamul deulkkiae geotjeori (Fresh Japanese Hornwort Kimchi with Perilla Seeds), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu62	hyeonmi chajo bap (Steamed Brown Rice and Glutinous millet), cheongyang kongnamul guk (Bean Sprout Soup with Hot Pepper), soegogi dangmyeon bokkeum (Stir-fried Beef and Glass Noodles), buchu konggaru muchim (Seasoned Leek with Roasted Soybean Powder), yangsangchu yangbaechu salad (Lettuce and Cabbage Salad), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu63	hyeonmi bori bap (Steamed Brown Rice and Barley), miyeok naengguk (Cold Seaweed Soup), donyuk cheolpan kkaennip bokkeum (Pan-fried Pork and Sesame Leaf), sangchu ssam (Lettuce Wraps), pa chae chamnamul geotjeori (Shredded Green Onion and Fresh Japanese Hornwort Kimchi), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu64	hyeonmi bap (Steamed Brown Rice), malgeun baechu guk (Clear Soup with Napa Cabbage), gematsal paengi beoseot jeon (Crabmeat and Enokitake Pancake), chicory sagwa yujacheong muchim (Seasoned Chicory and Apple with Citron Marmalade), jeoyeom kodari kongnamul jjim (Low-sodium Braised Pollack and Bean Sprouts), jeoyeom baechu kimchi (Low-sodium Napa Cabbage Kimchi)
Menu65	hyeonmi wandukong bap (Steamed Rice and Peas), jeoyeom dak gaejang (Low-sodium Spicy Chicken Soup), pyogo beoseot geomeunkkae dubu tangsu (Sweet and Sour Shiitake Mushrooms and Black Sesame Tofu), orange eoggeundae salad (Orange and Beet Leaf Salad), jeoyeom manuljong myeolchi bokkeum (Low-sodium Stir-fried Garlic Stems and Dried Anchovies), jeoyeom kkakdugi (Low-sodium Diced Radish Kimchi)
Menu66	ssalbak (Steamed Rice), jeoyeom konggaru baechu doenjang guk (Low-sodium Soybean Paste Soup with Napa Cabbage and Roasted Soybean Powder), jeoyeom gajami yeotjang gui (Low-sodium Grilled Sole with Sweet Soy Sauce), jeoyeom gamjachaek bokkeum (Low-sodium Stir-fried Shredded Potatoes), jeoyeom kongnamul samsaek chae (Low-sodium Three-colored Chilled Salad with Bean Sprouts), jeoyeom mu saengchae (Low-sodium Julienne Korean Radish Salad)

<Table 5> Composition of Korean dining table-setting Menus (continued)

Menu	Item
Menu67	hyeonmi bap (Steamed Brown Rice), jeoyeom deulkkae siraegi doenjang guk (Low-sodium Soybean Paste Soup with Dried Radish Leaves and Perilla Seeds), jeoyeom samchi lemon sauce gui (Low-sodium Grilled Cero with Lemon Sauce), jeoyeom gaji muchim (Low-sodium Seasoned Eggplant), jeoyeom ueong japchae (Low-sodium Stir-fried Burdock with Vegetables), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu68	kong bap (Steamed Rice and Beans), jeoyeom jogaetsal baechu guk (Low-sodium Clam Meat and Napa Cabbage Soup), jeoyeom godeungeo gochujang gui (Low-sodium Spicy-grilled Mackerel with Red Chili Paste), jeoyeom kkaennip dubu muchim (Low-sodium Seasoned Tofu and Sesame Leaves), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi)
Menu69	susu bap (Steamed Rice and Millet), geonsaeu auk guk (Curled Mallow and Dried Shrimp Soup), jeoyeom dakgogi gyeongwa jorim (Low-sodium Braised Chicken and Nuts), jeoyeom kongnamul samsaek chae (Low-sodium Three-colored Chilled Salad with Bean Sprouts), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi), jeoyeom oi saengchae (Low-sodium Cucumber Salad)
Menu70	pat bap (Steamed Rice and Adzuki Beans), jeoyeom sigeumchi duyu doenjang guk (Low-sodium Soybean Paste Soup with Spinach and Soya Milk), jeoyeom samchi curry gui (Low-sodium Grilled Cero with Curry), jeoyeom beoseot bokkeum (Low-sodium Assorted Stir-fried Mushrooms), jeoyeom oi kimchi (Low-sodium Cucumber Kimchi), jeoyeom geundae yubu muchim (Low-sodium Seasoned Swiss Chard and Fried Tofu)
Menu71	ssalbab (Steamed Rice), jeoyeom deulkkae miyeok guk (Low-sodium Seaweed and Perilla Seed Soup), jeoyeom osam bulgogi (Low-sodium Squid and Pork Belly Bulgogi), jeoyeom gyeoja chae (Low-sodium Assorted Meats and Vegetables with Mustard Sauce), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi), jeoyeom oi saengchae (Low-sodium Cucumber Salad)
Menu72	bori bap (Steamed Rice and Barley), jeoyeom konggaru baechu doenjang guk (Low-sodium Soybean Paste Soup with Napa Cabbage and Roasted Soybean Powder), jeoyeom osam bulgogi (Low-sodium Squid and Pork Belly Bulgogi), jeoyeom sukju namul ttangkong muchim (Low-sodium Seasoned Mung Bean Sprouts with Peanuts), jeoyeom gaji muchim (Low-sodium Seasoned Eggplant), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)
Menu73	ssalbab (Steamed Rice), jeoyeom deulkkae siraegi doenjang guk (Low-sodium Soybean Paste Soup with Dried Radish Leaves and Perilla Seeds), jeoyeom yuja jeyuk jorim (Low-sodium Braised Pork with Citron), jeoyeom kongnamul samsaek chae (Low-sodium Three-colored Chilled Salad with Bean Sprouts), jeoyeom gamjachae bokkeum (Low-sodium Stir-fried Shredded Potatoes), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu74	hyeonmibap (Steamed Brown Rice), jeoyeom jogaetsal baechuguk (Low-sodium Clam Meat and Napa Cabbage Soup), jeoyeomsamchicurrygui (Low-sodium Grilled Cerowith Curry), jeoyeomsigeumchidubumuchim (Low-sodium Seasoned Spinach with Tofu), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi)
Menu75	kong bap (Steamed Rice and Beans), jeoyeom geonsaeu auk guk (Low-sodium Dried Shrimp and Curled Mallow Soup), jeoyeom godeungeo gochujang gui (Low-sodium Spicy-grilled Mackerel with Red Chili Paste), jeoyeom kkwarigochu muchim (Low-sodium Seasoned Shishito Peppers), jeoyeom ueong japchae (Low-sodium Stir-fried Burdock with Vegetables), jeoyeom oi kimchi (Low-sodium Cucumber Kimchi)
Menu76	susu bap (Steamed Rice and Millet), jeoyeom deulkkae miyeok guk (Low-sodium Seaweed and Perilla Seed Soup), jeoyeom gajami yeotjang gui (Low-sodium Grilled Sole with Sweet Soy Sauce), jeoyeom sukju namul ttangkong muchim (Low-sodium Seasoned Mung Bean Sprouts with Peanuts), jeoyeom oi saengchae (Low-sodium Cucumber Salad), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu77	pat bap (Steamed Rice and Adzuki Beans), jeoyeom gul guk (Low-sodium Oyster Soup), jeoyeom maeun chwinamul muchim (Low-sodium Spicy-seasoned Wild Aster), jeoyeom kkaennip dubu muchim (Low-sodium Seasoned Tofu and Sesame Leaves), jeoyeom mu saengchae (Low-sodium Julienne Korean Radish Salad)
Menu78	ssalbab (Steamed Rice), jeoyeom sundubu saeujeot guk (Low-sodium Soft Tofu Soup with Salted Shrimp), jeoyeom jan myeolchi bokkeum (Low-sodium Stir-fried Baby Anchovies), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom aehobak jeon (Low-sodium Pan-fried Zucchini), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi)
Menu79	boribap (Steamed Rice and Barley), jeoyeompaengibeoseotbugeoguk (Low-sodium Dried Pollack Soup with Enokitake), jeoyeomsamchilemonsaucegui (Low-sodium Grilled Cero with Lemon Sauce), jeoyeombeoseotbokkeum (Low-sodium Assorted Stir-fried Mushrooms), jeoyeomsigeumchidubumuchim (Low-sodium Seasoned Spinach with Tofu), jeoyeom oi kimchi (Low-sodium Cucumber Kimchi)

<Table 5> Composition of Korean dining table-setting Menus (continued)

Menu	Item
Menu80	ssalbak (Steamed Rice), jeoyeom gaji naengguk (Low-sodium Chilled Eggplant Soup), jeoyeom kimchi tteokgalbi (Low-sodium Grilled Short Rib and Kimchi Patties), jeoyeom maeun chwinamul muchim (Low-sodium Spicy-seasoned Wild Aster), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)
Menu81	hyeonmi bap (Steamed Brown Rice), jeoyeom daegu jiri (Low-sodium Codfish Stew), jeoyeom jan myeolchi bokkeum (Low-sodium Stir-fried Baby Anchovies), jeoyeom ueong japchae (Low-sodium Stir-fried Burdock with Vegetables), jeoyeom oi saengchae (Low-sodium Cucumber Salad), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu82	kong bap (Steamed Rice and Beans), jeoyeom sundubu saeujeot guk (Low-sodium Soft Tofu Soup with Salted Shrimp), jeoyeom kkwarigochu myeolchi bokkeum (Low-sodium Stir-fried Baby Anchovies with Shishito Peppers), jeoyeom doraji yujacheong muchim (Low-sodium Seasoned Bellflower Roots with Citron Marmalade), jeoyeom baechu mari (Low-sodium Napa Cabbage Rolls), jeoyeom oi kimchi (Low-sodium Cucumber Kimchi)
Menu33	susu bap (Steamed Rice and Millet), jeoyeom miyeok oi naengguk (Low-sodium Cold Seaweed and Cucumber Soup), jeoyeom dubu so bulgogi (Low-sodium Bulgogi with Tofu), jeoyeom beoseot bokkeum (Low-sodium Assorted Stir-fried Mushrooms), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu84	pat bap (Steamed Rice and Adzuki Beans), jeoyeom dak gaseumsa jat naengguk (Low-sodium Chilled Chicken Breast and Persimmon Soup), jeoyeom manuljong geonsaeu bokkeum (Low-sodium Stir-fried Garlic Stems and Dried Shrimps), jeoyeom kkaennip dubu muchim (Low-sodium Seasoned Tofu and Sesame Leaves), jeoyeom gamjachae bokkeum (Low-sodium Stir-fried Shredded Potatoes), jeoyeom mu saengchae (Low-sodium Julienne Korean Radish Salad)
Menu85	ssalbak (Steamed Rice), jeoyeom dongtae maeuntang (Low-sodium Spicy Pollack Stew), jeoyeom soegogi jangjorim (Low-sodium Soy Sauce Braised Beef), jeoyeom gaji muchim (Low-sodium Seasoned Eggplant), jeoyeom baechu mari (Low-sodium Napa Cabbage Rolls), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)
Menu86	ssalbak (Steamed Rice), jeoyeom jogaetsal baechu guk (Low-sodium Clam Meat and Napa Cabbage Soup), jeoyeom dubu so bulgogi (Low-sodium Bulgogi with Tofu), jeoyeom oi saengchae (Low-sodium Cucumber Salad), jeoyeom gamjachae bokkeum (Low-sodium Stir-fried Shredded Potatoes), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)
Menu87	hyeonmi bap (Steamed Brown Rice), jeoyeom geonsaeu auk guk (Low-sodium Dried Shrimp and Curled Mallow Soup), jeoyeom yuja jeyuk jorim (Low-sodium Braised Pork with Citron), jeoyeom maeun chwinamul muchim (Low-sodium Spicy-seasoned Wild Aster), jeoyeom ueong japchae (Low-sodium Stir-fried Burdock with Vegetables), jeoyeom baechu geotjeori (Low-sodium Fresh Napa Cabbage Kimchi)
Menu88	kong bap (Steamed Rice and Beans), jeoyeom gaji naengguk (Low-sodium Chilled Eggplant Soup), jeoyeom dakgogi gyeongwa jorim (Low-sodium Braised Chicken and Nuts), jeoyeom baechu mari (Low-sodium Napa Cabbage Rolls), jeoyeom oi saengchae (Low-sodium Cucumber Salad), jeoyeom yangbaechu kimchi (Low-sodium Cabbage Kimchi)
Menu89	susu bap (Steamed Rice and Millet), jeoyeom deulkkae siraegi doenjang guk (Low-sodium Soybean Paste Soup with Dried Radish Leaves and Perilla Seeds), jeoyeom gajami yeotjang gui (Low-sodium Grilled Sole with Sweet Soy Sauce), jeoyeom ueong japchae (Low-sodium Stir-fried Burdock with Vegetables), jeoyeom doraji yujacheong muchim (Low-sodium Seasoned Bellflower Roots with Citron Marmalade), jeoyeom mu saengchae (Low-sodium Julienne Korean Radish Salad)
Menu90	pat bap (Steamed Rice and Adzuki Beans), jeoyeom sigeumchi duyu doenjang guk (Low-sodium Soybean Paste Soup with Spinach and Soya Milk), jeoyeom kimchi tteokgalbi (Low-sodium Grilled Short Rib and Kimchi Patties), jeoyeom gamjachae bokkeum (Low-sodium Stir-fried Shredded Potatoes), jeoyeom beoseot japchae (Low-sodium Stir-fried Glass Noodles and Mushrooms), jeoyeom buchu geotjeori (Low-sodium Fresh Leak Kimchi)

는 영양소 함량에 있어 유의한 차이가 없었다<Table 7>. 국 또는 찌개를 포함한 식단에서 탄수화물, 단백질, 나트륨 함량이 높은 경향을 보이고 국 또는 찌개를 포함하지 않는 식단에서는 에너지, 지질이 높은 경향을 보이거나 통계적으로 유의한 차이는 아니었다. 국과 찌개의 필요도를 5점 리커트 척도로 분석한 연구에서 결과 아침은 3.46, 점심은 3.86, 저녁은 3.52로 세 끼 식사에 ‘보통’ 이상의 필요도가 보임을 알 수 있었던 연구결과를 보면 국이 식사할 때 중요한 음식으로 답변하였으나(Oh 2015), 저나트륨 식단에서는 국을 포함하지 않는 식단의 기호도도 연구되어야 할 것이다.

단체급식에 저나트륨 식단을 실제 적용하기 위해 나트륨 저감화 식단 보급 매뉴얼, 영양교육자료 등의 개발이 병행되어야 하며, 정부, 단체급식사업체, 연구자간의 상호네트워크가 잘 구축되어야 할 것이다. 나트륨 섭취 함량이 특히 높은 단체급식소의 나트륨 섭취감소를 위한 영양교육 프로그램 개발 및 효과평가에 관한 연구(Shin EK. 2008)나 단체급식을 통해 제공되는 식단의 나트륨 함량 분석 및 실태조사 연구(Park MJ. 2007)는 일부 선행되었지만 이를 근거로 한 실천 가능한 저염식단을 개발하여 사람들에게 적용한 연구 사례는 미흡한 편이므로 향후 발전적인 연구가 진행되어야 하겠다.

<Table 6> Comparison of nutrient contents of One-dish between Korean dining table-setting menus

	One-dish Menus (n=37)	Korean dining table-setting Menus (n=53)
Energy (kcal)	778.77±99.89 ¹⁾	745.63±157.89
Carbohydrate (g)	119.16±17.53	112.46±27.20
Protein (g)	33.97±6.63*	30.27±7.44
Lipid (g)	20.47±5.61	22.11±7.94
Na (mg)	1215.66±85.79	1234.42±49.03

¹⁾Values are Mean±SD.

*Significantly different by Student's t-test at p<0.05

<Table 7> Comparison of nutrient contents in developed menus according to Guk or Jjigae (soups or pot stews) containing or not-containing

	Containing Guk (soups or pot stews) (n=75)	Not-containing Guk (soups or pot stews) (n=15)
Energy (kcal)	763.56±127.23 ¹⁾	774.10±129.55
Carbohydrate (g)	117.13±22.00	112.95±22.96
Protein (g)	32.84±6.90	30.57±8.40
Lipid (g)	20.58±6.49	23.97±7.04
Na (mg)	1223.94±77.19	1219.97±51.58

¹⁾Values are Mean±SD.

No statistically significant difference between two groups by Student's t-test at p<0.05

IV. 요약 및 결론

단체급식소에서 활용 가능한 나트륨 저감화 식단의 보급을 위하여 본 연구에서는 영양과 맛을 유지하는 저나트륨 음식의 조리법을 개발하고 이들을 이용하여 우선적으로 1식 1,300 mg 나트륨의 저나트륨 식단을 구성하였다. 개발된 조리법은 일품요리 39가지, 국찌개류 43가지, 채소반찬류 94가지, 육류 및 생선 반찬류 59가지, 김치 및 절임류 14가지 등 총 258가지 음식이었다. 90가지 식단은 단체급식소에서 적용하기 쉽도록 일품메뉴로 구성하거나 국의 유무에 따라 1식 5찬 반상차림으로 구성함으로써 단체급식소에서 적용 가능한 모델을 제시하였다. 일품요리로 구성된 식단의 경우 반상차림식단에 비해 단백질 함량이 유의적으로 높았고(p<0.05) 에너지, 탄수화물, 지질, 나트륨의 함량이 유의적인 차이를 보이지 않았으며, 국 또는 찌개가 포함된 식단은 국 또는 찌개가 없는 식단보다 에너지, 탄수화물, 단백질, 지방 및 나트륨의 함량이 유의적인 차이가 없었다(p<0.05). 단체급식에 저나트륨식단을 실제 적용하기 위해 나트륨 저감화 식단 보급 매뉴얼, 영양교육자료 등의 개발이 병행되어야 하며, 정부, 단체급식사업체, 연구자간의 상호네트워크가 잘 구축되어야 할 것이다.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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