한국인의 식품첨가물 섭취량 조사

이철원·이달수·문범수*
국립보건원 위생부
*원광대학교 가정대학

A Study on Intakes of Some Food Additives by Korean

Chul-Won Lee, Tal-Soo Lee, and Bom-Soo Moon*
Department of Hygiene, National Institute of Health, Seoul, Korea. 122-010
**College of Home Economics, Wonkwang University, Chonbuk-Do, Korea.*

ABSTRACT-A survey for BHA (butyl hydroxy anisol), BHT(dibutyl hydroxy toluene), DHA (dehydroxy acetic acid), BA (benzoic acid), Sor. A. (Sorbic acid), POBA-Esters (P-hydroxy benzoic acid esters of ethyl, propyl, isopropyl, butyl and isobutyl), propionic acid, nitrite (as NO_2) and sulfites (as SO_2) of food additives which have much interesting to food consumers was carried out to assess the intake amount by Korean through the years of 1985-1987. Additive intakes were estimated by applying the determined additive contents in the specific food to the specific daily food-intake amount obtained from the report of Korean national nutrition survey, and the level in cities were compared higher in general to that in rural communities, and the average level of the nation showed as follows; the estimated value of butyl hydroxy anisol and dibutyl hydroxy toluene in total was 0.017 mg, and 0.030 mg for dehydroxy acetic acid 0.064 mg for benzoic acid, 6.011 mg for sorbic acid, 0.247 mg for p-hydroxy benzoic acid eaters in total, 0.1438 mg for propionic acid 0.016 mg for nitrite (NO_2) and 0.022 mg for sulfite (SO_2) respectively, and those values were far below to that of FAO/WHO's ADIs.

Keywords □ **ADI (Acceptable daily intake), Food additive.**

오늘날 산업화에 따른 사회구조는 식품소비에 있어 영양가치는 물론 기호성 및 간편성의 요구증대에 따라 식품산업이 날로 발전하고 있으며 이들 식품의 대부분은 제조·가공 또는 보존함에 있어 여러가지 목적으로 식품첨가물이 사용되고 있다. 이제 소비자는 원하든 또는 원치않든간에 하루의 섭취하는 식품중에서 다소간에 식품첨가물의 섭취를 피할 수 없게 되었으며, 따라서 사용된 첨가물에 대하여 관심도가 날로 증가하고 있다.

이웃 일본과 선진 외국의 경우 여러 종류의 식품첨가물에 대하여 자국민의 일인당 일일섭취량을 조사하여 식품첨가물 사용에 대한 식품위생상의 평가를 한 바 있어[4-6] 우리나라에서도 조사의 필요성이 인정되어 소비자의 주된 관심의 대상이 되는 첨가물중 9성분, 즉 보존료 중 데히드로초산, 안식향상, 소르빈산, 파라옥시안식향산 에스테르 및 프로피온산, 산화방지제중 부틸히드록시 아니솔 및 디부틸히드록시 톨루엔, 발색제인 아질산염 및 보존료·표백제로 쓰이는 아황산염류(SO_2로서)에 대하여 1985년부터 1987년간의 3년간에 걸쳐 조사한 바 있어 그 결과를 보고하고자 한다.

재료 및 방법

연구기간—1985. 2~1987. 11(3년)

Received for publication 15 January, 1989.
Reprint request; Dr. T.S. Lee at the above address

조사대상 첨가물—1) 항산화제중 BHA, BHT, 2) 보존료중 (1) 데히드로초산 및 데히드로초산나트륨은 데히드로초산으로 (2) 안식향산 및 안식향산나트륨은 안식향산으로 (3) 소르빈산 및 소르빈산칼륨은 소르빈산으로 (4) 파라옥시 안식향산의 에틸, 부틸, 이소부틸, 프로필 및 이소프로필에스테르는 이들의 총량으로 (5) 프로피온산칼슘 및 프로피온산나트륨은 프로피온산으로 3) 발색제중 아질산나트륨은 아질산근(NO_2)으로 4) 보존 및 표백제중 메타중아황산칼륨, 산성아황산나트륨, 아황산나트륨(무수, 결정) 및 무수아황산은 이산화유황(SO_2)로서.

검체구입—앞의 조사대상 첨가물은 각각의 사용기준이 설정되어 있어 이들 대상식품을 전국을 대도시, 중소도시 및 농촌으로 구분하여, 대도시지역은 서울, 부산, 대구, 광주, 인천, 중소도시지역은 마산, 수원, 경주, 전주, 청주, 부천, 춘천 그리고 농촌지역은 서울근교의 경기도 일원에서 백화점, 슈퍼점, 시장 및 소매점에서 제품별 판매빈도를 고려하여 4~6월 그리고 9~10월 사이에 구입하였으며 연도별 검체구입은 Table 1과 같으며 조사대상 첨가물의 사용기준은 Table 2와 같다.

Table 1. Purchased samples.

Year	Additives on Survey	Sample Size
1985	BHA, BHT	92
	DHA	33
1986	BA	96
	Sor. A.	301
	POBA-Esters	135
1987	Propionic A	102
	Nitrite (NO_2)	103
	Sulfites (SO_2)	115
Total		977

대상식품별 섭취량조사—대상식품별 섭취량은 보건사회부에서 매년 실시하는 국민영양 조사자료중 전산처리에 의해서 얻어진 농촌, 도시(대도시, 중

Table 2. Regulatory status of food additives on survey

Classification of use	Additives	Allowed foods	Limitations (as not more than)
Antioxidant	BHA, BHT	Butter, Oils, Fish and shellfish(dry), Fish and Shellfish(Salted and fermented)	0.2g / kg(single or in combination)
		Socking solution for fish and Shellfish	1.0g / kg
		Chewing gum	0.75g / kg
Preservatives	DHA	Cheese, Butter, Margarin	0.5g / kg
	BA	Beverage, Soybean sauce	0.6g / kg
		Aloe extract	0.5g / kg
	Sor. A.	Meat products, Whale meat, Fermented sea urchin, Peanut butter, Fish fillet products, Actificial cheese, Fermented seafoods containing salt not more than 8%	2.0g / kg
		Saybean paste, Chunjang, Hot pepper paste, Fish and Shellfish(dry), Red bean precipitate, Vegetables or Fruits pickled with soybean sauce, soybean paste or salt, Aloe extract	10g / kg.
		Jam, Ketchup, Pickles	0.5g / kg
		Drink of lattic acid bacteria (excluding pasteurized product)	0.05g / kg
		Fruit juice	0.2g / kg

Classification of use	Additives	Allowed foods	Limitations (as not more than)
	POBA-Esters	Soybean sauce, Fruit sauce	0.25g / kg(as POBA)
		Vinega, Beverage (excluding larbonated drinks)	0.1g / kg(as POBA)
		Surface of Furit and Vegetable	0.012g / kg(as POBA)
		Sake and Synthesized sake Wines, Yakju and Takju(Korean cloud liquor)	0.05g / kg(as POBA -Butyl ester)
	Propionic A.	Bread, Pastry, Cheese	3.0g / kg(as total when in combination with Sor. A.)
Pigment fixing agent	Sod. nitrite	Meat products and Whale meat product	0.07g / kg(as NO_2)
		Fish fillet sausage and Ham	0.05g / kg(as NO_2)
Preservative or bleaching agent	Sulfites (Sod. salt)	Dry fruits(except raisin)	2.0g / kg(as SO_2)
		Devil's tongue powder	0.9g / kg(as SO_2)
		Malt sugar candy	0.4g / kg(as SO_2)
		Molasses Malt sugar syrup	0.3g / kg(as SO_2)
		Wines	0.35g / kg(as SO_2)
		Shrimp fillet	0.1g / kg(as SO_2)
		Other foods(excluding sesame, beans, potato and fruits and their simple products)	0.03g / kg(as SO_2)

*Cited from Korea Food Additive Codex[1].

Table 3. The sizes on households population on national nutrition survey.

	Whole Country	Total in City	Big City	City Med	Rural Communities
Households	1,000	640	360	280	360
Population	4,768	3,025	1,617	1,408	1,743

* Cited from the report of national nutrition survey, Ministry of Health and Social Welfare, 1984.[3]

소도시) 및 전국으로 구분된 일일섭취량(g/일)을 인용하였으며, 인용된 자료는 본 연구의 매 조사연도 한해 앞서의 것을 사용하였다. 참고로 국민영양조사의 대상지역, 가구수 및 인구규모를 인용하면 Table 3과 같으며 조사된 대상식품별 섭취량은 Table 4, 5, 6, 7, 8과 같다.

식품중 첨가물의 조사방법—조사대상 첨가물의 식품중 정량법은 다음과 같다.

1) BHA, BHT는 식품공전[2]의 일반시험법, 산화방지제 시험법중 부틸히드록시 아니솔(BHA), 디부틸히드록시 톨루엔(BHT)에 따라 시험용액을 조제하여 HPLC를 사용하여 다음의 조건하에 정량하였으며 회수율은 BHA가 89.1% BHT가 87.2%였다.

Col. μ-Bondapak
Solv. MeOH : 10% Acatic Acid(80 : 20)
F.R. 1.0m*l*/min
W.L. 280nm
A.U.F.S. 0.1
Chart. Speed 5cm/min

2) DHA, BA, Sor.A., POBA-Esters 및 Propionic Acid는 식품공전[2]의 일반시험방법의 보존료시험방법중 가스크로마토그래피에 따라 시험하였다.

Table 4. Daily intake amount of food for BHA, BHT and DHA. (Unit : g)

Foods \ District		Whole Country	Average of Cities	Big Cities	Cities Med.	Rural Communities
Butter		0.023	0.035	0.066	–	–
Cheese		0.571	0.900	1.672	0.018	–
Margarine		0.086	0.132	0.247	–	0.007
Edible Oil	Sesame Oil	1.085	1.423	1.445	0.796	0.985
	Vegetable Oil	4.139	4.607	5.211	3.913	3.325
Dry Fish & Shellfish	Anchovy	3.936	3.633	3.177	4.157	4.461
	File Fish(Dried Fillet)	1.777	1.831	1.206	2.549	1.682
	Squid	0.470	0.635	0.771	0.479	0.184
	Alaskan Pollack	1.035	1.279	1.940	0.520	0.610
	Shrimp	0.049	–	–	0.106	0.047
	Yellow Tail, Dried	0.257	–	–	–	0.703
	Other	0.170	0.153	0.200	0.998	0.200
	Shrimp, Sauced	0.132	0.048	0.016	0.084	0.277
	Small Sardine	0.035	0.038	0.054	0.020	0.028
Salted Fish Shellfish	Sauced Intestines of Alaskan Pollack	0.031	0.049	0.085	0.007	–
	Pollack's Roe	0.100	0.149	0.279	–	0.014
	Sauced Clam	0.096	0.076	0.139	0.075	0.130
	Squid, Sauced	0.076	0.040	0.051	0.027	0.138
	Other Sauced Sea Food	0.342	0.193	0.100	0.300	0.599
Other Food Products	Instant Noodle	7.438	8.703	10.226	9.954	5.243
	Bread and Bakery	2.155	3.245	4.497	1.805	0.264
	Biscuits	0.718	1.000	1.396	0.547	0.252
	Fish Paste	0.853	0.785	1.137	0.380	0.971
	Doughnut	0.105	0.165	0.309	–	–

Table 5. Daily intake amount of foods on study for BA, sorbic acid and para hydroxy benzoic acids

(Unit : g)

Foods \ District		Whole Country	Average of Cities	Big Cities	Cities Med.	Rural Communities
Soft Drinks, Non-Carbonated		2.04	3.25	4.73	1.51	0.11
Soya Sauce		7.63	7.44	8.24	6.49	7.94
Aloe Juice		–	–	–	–	–
Meat Products	Sausages	5.19	6.44	7.95	4.67	3.16
	Hams	1.00	1.56	2.84	0.06	0.10
	Bacon	0.03	0.05	0.09	–	–

Foods \ District		Whole Country	Average of Cities	Big Cities	Cities Med.	Rural Communities
Whale meat products		–	–	–	–	–
Sea Urchin, Fermented		–	–	–	–	–
Peanut Butter		–	–	–	–	–
Fish Fillet	Sausages	–	–	–	–	–
Products	Fish Paste	3.31	3.85	4.28	3.37	2.42
Soya Paste		7.25	5.58	4.65	6.66	9.95
Red Pepper Paste		3.74	2.50	3.09	1.81	5.76
Chun-jang		0.02	0.02	0.04	0.00	0.00
Fish & Shellfish, Dried		8.63	8.2	8.84	7.46	9.32
Pickles in Vinega		2.67	1.04	0.32	1.87	5.32
Pickles in Soya Paste		–	–	–	–	–
Pickles in Soya Sauce		1.3	1.41	2.17	0.5	1.15
Pickles in Salts		–	–	–	–	–
Red bean Powder, Precipitated		1.92	0.92	0.52	1.38	3.55
Jams		0.31	0.44	0.65	0.17	0.13
Drink of Lactic Acid Bacteria		3.90	5.79	6.93	4.46	0.83
Ketchup		0.21	0.33	0.58	0.04	0.01
Cheese & Imitated cheese		0.29	0.45	0.80	0.04	0.04
Sea Foods, Fermented (Salt : not more than 8%)		1.02	0.90	1.04	0.72	1.97
Vinega		0.19	0.22	0.29	0.14	0.13
Fruit Sauces		–	–	–	–	–
Surface of Fruits & Vegetables		–	–	–	–	–
Sake & Fabricated Sake		0.12	–	0.01	–	0.31
Wines		–	–	–	–	–
Rice Wine		–	–	–	–	–
Radish, Salted		–	–	–	–	–

Table 6. Daily intake amount of foods for propionic acid (Unit : g)

Foods \ District	Whole Country	Average of Cities	Big Cities	Cities, Med.	Rural Communities
Pastry	1.01	1.25	1.50	0.95	0.61
Bread	3.23	4.91	6.28	3.23	0.52
Sponge Cake	0.73	1.01	0.99	1.02	0.29
Cheese	0.06	0.09	0.17	0.00	0.00

Table 7. Daily intake amount of foods for nitrite (Unit : g)

Foods \ District	Whole Country	Average of Cities	Big Cities	Cities, Med.	Rural Communities
Bacon	0.07	0.11	0.20	0.00	0.00
Sausages	2.36	3.11	3.70	2.39	1.16
Hams	0.98	1.58	2.02	1.04	0.00

Table 8. Daily intake amount of foods for sulfite (Unit : g)

Foods \ District	Whole Country	Average of Cities	Big Cities	Cities, Med.	Rural Communities
Malt syrup	0.06	0.08	0.06	0.09	0.03
Malt sugar candy	0.12	0.00	0.00	0.00	0.31
Peanut	0.08	0.14	0.22	0.05	0.00
Gingkonut	0.01	0.02	0.03	0.00	0.00
Chestnut	13.26	14.22	17.76	10.08	11.71
Pinenut	0.01	0.01	0.02	0.00	0.00
Resin	0.01	0.02	0.04	0.00	0.00
Orange juice	0.17	0.27	0.49	0.00	0.00
Apple nectar	0.22	0.35	0.64	0.00	0.00
Shrimp, dried	0.08	0.06	0.03	0.09	0.13
Taro	0.36	0.32	0.39	0.22	0.44
Dudut	0.07	0.11	0.09	0.13	0.02
Root of Bellflower	1.04	0.97	1.54	0.28	1.15
Cabbage, red	0.06	0.10	0.17	6.00	0.00
Lotus root	0.09	0.14	0.26	0.00	0.00
Anchovy, dried	6.46	6.49	5.55	7.66	5.32
White bai, dried, pressed	0.09	0.11	0.00	0.25	0.05
Squid, dried	0.78	0.84	1.30	0.29	0.69
Squid, smoked	0.05	0.09	0.10	0.07	0.00
Dried clam	0.34	0.41	0.50	0.29	0.22
File fist, dried fillet	1.51	1.32	0.88	1.88	1.80

3) 아질산나트륨(NO_2로서)은 식품공전[2]의 제4 식품별 기준 및 규격, 5. 식육제품 5-1. 식육가공품의 시험방법중 (1)① 디아조화법에 따라 시험하였다.

4) 아황산염류(SO_2로서)는 위생시험법주해[7]의 식품중 첨가물 분석법에 따라 질소가스기류하에 증류하여 과산화수소용액에 포집하여 농도가 높은 경우 알칼리적정법으로, 농도가 낮은 경우 파라로잘린발색에 의한 비색법으로 정량하였다.

조사대상 첨가물에 대한 식품별 대상첨가물의 검출량은 Table 9, 10, 11, 12, 13, 14, 15, 16과 같다.

첨가물섭취량의 산출—각 식품별 검출량을 개별 식품섭취량에 적용하여 각 조사대상 첨가물의 식품별 섭취량을 구하여 이를 합하여 첨가물별 섭취량을 산출하였으며 Table 17, 18, 19, 20, 21, 22,

Table 9. BHA & BHT contents in foods. (Unit : μg/g)

Foods		Sample Sizes	Detected Amount	Min.	Max.	Ave.
Butter		6	ND×6	–	–	–
Margarine		23	ND×9, 10×3, 20, 40×2, 50, 60×2, 70, 80×2, 90, 170	ND	170	24
Vegetable Oil	Sesame Oil	4	ND×4	–	–	–
	Edible Oil(Perilla Oil, Soybean Oil, Rape Seed Oil)	8	ND×2, 10 2×2 3×3	ND	3	1.8
Dry Fish & Shellfish	Anchovy	3	1×2, 2	1	2	1.5
	Fie Fish(Dried Fillet)	5	ND×2, 0.5×2, 0.7	ND	0.7	0.3
	Squild, Dried	5	ND×5	–	–	–
	Allaskan Pollack, Dried	2	ND×2	–	–	–
	Shrimp, Dried	5	ND×4	–	–	–
	Octopus	1	0.5	0.5	0.5	0.5
Salted Fish & Shellfish	Shrimp, Sauced	4	ND, 0.3, 0.4, 0.5	ND	0.5	0.3
	Small Sardine, Sauced	5	0.2×5	0.2	0.2	0.2
	Sauced Intestines of Alaskan Pollack	5	0.1, 1, 2, 4, 30	0.1	30	7.4
	Pollack's Roe, Sauced	5	ND×2, 0.3×2, 0.9	ND	0.9	0.3
	Squid, Sauced	2	1, 2	1	2	1.5
	Sea-Urchin Sauced	2	ND×2	–	–	–
	Sauced Clam	1	4	4	4	4
	Oyster Sauced with Red Red Pepper Powder	2	1, 2	1	2	15

*ND : Not-detected

Table 10. DHA contents in foods (Unit : μg/g)

Foods	Sample Sizes	Detected Amount	Min.	Max.	Ave.
Butter	6	ND× 6	–	–	–
Cheese	4	ND×2, 50×2	ND	50	25
Margarine	23	ND×7, 10×2, 20×2, 50×2, 60, 80, 90, 110, 12×2, 150, 190, 250, 310	ND	310	150

Table 11. Benzoic acid contents in foods (Unit : μg/g)

Foods	Sample size	Detected Amount	Min.	Max.	Ave.
Soft Drinks, non-carbonated	43	ND×38, 68.49, 68.66, 92.55, 94.76, 440	ND	440	17.7781
Soya sauce	56	ND×50, 6.88, 24.46, 25.37, 34.33, 39.91, 72.59	ND	72.59	3.6346

Table 12. Sorbic acid contents in foods (Unit : μg/g)

Foods		Sample size	Detected Amount	Min.	Max.	Ave.
Meat Products	Sausages	18	ND×4, 64, 100, 118, 129, 243.13, 260.19, 271.62, 288.9, 373, 574.74, 600.83, 847.6, 900.53, 1459.3	ND	1459.3	349.4911
	Hams	23	ND×7, 14.17, 26.7, 100, 218.64, 236, 249.73, 256.17, 439, 496, 519.77, 632.81, 634.43, 639.77, 768, 876.51, 1345.29	ND	1345.29	324.043
	Bacon	4	ND×2, 300.43, 1454.49	ND	1454.49	438.73
Sea urchin, fermented		2	ND×1, 430	ND	430	215
Fish fillet Products		36	ND×9, 25, 114, 118, 137, 152, 206, 272, 352.13, 390, 410, 436, 452, 518, 583.03, 611, 689, 791, 997.86, 1021.59, 1096.65, 1097.97, 1144.27, 1223.33, 1467.70, 1506.04, 1624.50, 1708.13	ND	1708.13	531.7833
Soya Paste		26	ND×14, 6.01, 38.93, 113.24, 126.13, 144.29, 154.83, 204.57, 266.79, 323.43, 337.33, 367.59, 379.26	ND	379.26	94.7077
Red Pepper Paste		47	ND×17, 36.05, 71.81, 101.34, 103.76, 123.82, 132.9, 133.94, 149.94, 153.99, 168.45, 180.9, 241.69, 246.85×2, 249.51, 283, 288.7, 308.44, 386.6, 398.81, 408.39, 426.86, 430.76, 431.16, 525, 531.87, 656.47, 699.5, 701.66, 708.37	ND	708.37	202.7104
Chun-jang		15	ND×2, 30.09, 77.03, 116.64, 126.66, 164.27, 168.61, 175, 242.68, 378.8, 413.74, 544.41,	ND	629.18	244.964

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
		607.35, 629.18			
Fish & Shellfish dried	29	ND×18, 9.44, 9.63, 11.69, 17.6, 22.19, 70×2, 155.76, 328.62, 324.79, 490.23	ND	490.23	52.6879
Pickles in Vinega	7	ND×4, 31.83, 44.5, 196.2	ND	196.2	38.9329
Pickles in Soya Sauce	6	ND×3, 33.4, 45.29, 246	ND	246	54.115
Red bean powder, Precipitated	11	ND×11	ND	ND	ND
Jams	14	ND×14	ND	ND	ND
Drink of Lactic Acid Bacteria	21	ND×15, 8.36, 9.1, 15.42, 15.54, 16.99, 18.18	ND	18.18	3.9805
Ketchup	5	ND×3, 8.76, 10.28	ND	10.26	3.804
Sea foods, fermented	37	ND×36, 140	ND	140	3.7838

Table 13. *p*-hydroxy benzoic acid esters contents in foods (Unit : μg/g)

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
Soft Drinks, non-carbonated	43	ND×43	–	–	–
Soya Sauce	56	ND×5, 5.4, 5.54, 10.12, 11.59, 12.3, 12.45, 13.35, 4.83, 15.37, 15.78, 16.79, 17.81, 19.05, 20.35, 20.97, 21.41, 21.51, 21.7×2, 22.2, 22.26, 22.86, 22.98, 23.32, 23.35, 24.02, 25.14, 25.64, 26.39, 27.7, 29.68, 30.4, 31.15, 31.38, 32.83, 33.6, 34.47, 36.9, 37.11, 37.43, 38.3, 39.1, 39.84, 43.99, 46.89, 48.74, 48.81, 53.03, 62, 241.54, 249.7	ND	249.7	32.34
Vinega	8	ND×8	–	–	–
Fruit Sauce	6	ND×6	–	–	–
Sake & Fabricated sake	5	ND×5	–	–	–
Wines	11	ND×11	–	–	–
Rice wine, cleared	5	ND×5	–	–	–
Rice wine, turbid	1	ND×1	–	–	–

Table 14. Propionic acid contents in foods (Unit : μg/g)

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
Pastry	62	ND×50, 13.29, 21.97, 22.71, 23.57, 23.63, 26.34, 29.77, 32.58, 52.91, 57.54,	ND	392.96	12.66

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
		87.31, 392.96			
Bread	20	ND×7, 11.71, 20.25, 21.05, 22.45, 24.15, 26.82, 27.63, 31.94, 37.70, 42.53, 43.34, 67.99, 1369.96	ND	1369.96	87.33
Sponge cake	13	ND×6, 17.76, 25.39, 30.91, 76.42, 118.06, 1110.65, 1160.60	ND	1160.60	195.37
Cheese	7	ND× 7	ND	ND	ND

ND : Non-detected

Table 15. Nitrite contents in foods (Unit : μg/g)

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
Sausages	49	0.103, 0.113, 0.248, 0.323, 0.557, 0.568, 0.570, 0.584, 0.629, 0.696, 0.758, 0.997, 1.020, 1.097, 1.181, 1.191, 1.402, 1.403, 1.558, 1.601, 1.673, 1.780, 1.802, 1.808, 1.856, 1.932, 2.439, 2.461, 2.666, 2.937, 2.972, 3.132, 3.384, 3.401, 3.952, 4.156, 4.438, 5.253, 5.259, 5.980, 6.085, 6.235, 6.566, 7.807, 8.802, 17.885, 17.951, 23.737, 28.579	0.103	28.579	4.153
Hams	42	0.145, 0.436, 1.154, 1.524, 1.536, 1.579, 1.920, 1.943, 1.973, 2.230, 2.295, 2.532, 2.768, 2.853, 2.902, 2.940, 3.495, 3.577, 3.583, 3.907, 3.955, 4.388, 4.455, 4.812, 4.929, 5.653, 6.037, 6.639, 7.416, 8.812, 8.999, 9.520, 10.994, 13.273, 16.754, 18.122, 18.494, 23.518	0.145	23.518	5.604
Bacon	12	0.047, 0.243, 0.298, 1.000, 2.139, 3.434, 4.107, 11.743, 13.273, 15.187, 35.843, 43.773	0.047	43.773	10.924

Table 16. Sulfite contents in foods (Unit : μg/g)

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
Peanut	3	0.360×2, 1.170	0.360	1.170	0.510
Chestnut	3	0.066, 0.083, 0.100	0.066	0.100	0.083
Pine nut	2	ND, 0.270	ND	0.270	0.135
Taro	9	ND×4, 0.020×2, 0.030, 15.300, 274.000	ND	274.000	32.150
Root of bellflower, drid	5	ND×3, 0.010, 0.200	ND	0.200	0.042
Cabbage, red	6	ND×4, 0.500, 1.060	ND	1.060	0.260
Lotus root	6	ND×2, 0.010, 0.050, 0.300, 450.000	ND	450.000	75.060
Orange juice	8	ND×7, 0.010,	ND	0.010	0.001

Foods	Sample No.	Detected Amount	Min.	Max.	Ave.
Squid, dried	12	ND, 0.065×2, 0.112, 0.151, 0.177, 0.225, 0.259, 0.349, 0.394, 0.508, 1.669	ND	1.669	0.331
Squid, smoked	2	0.274, 0.374	0.274	0.374	0.324
Dried, Clam	2	0.100, 0.678	0.100	0.678	0.389
Shrimp, frozen	4	0.030, 0.114, 1.250, 1.500	0.030	1.500	0.723
Shrimp, dried	7	ND, 0.035, 0.145, 0.156.0.380, 15.187, 37.236	ND	37.236	7.591
File fish, dried, fillet	4	0.178, 0.272, 0.446, 0.565	0.178	0.565	0.365
Chinese date*	2	ND, 0.013	ND	0.013	0.007
Wine, rad*	4	11.927, 11.955, 12.469, 51.276	11.927	51.276	21.907
Wine, White*	2	51.733, 103.550	51.733	103.550	77.641
Apple, Wine*	3	14.010, 97.388, 123.875	14.010	123.875	78.425
White bait, dried pressed*	2	1.081, 1.132	1.081	1.132	1.106
Octopus, dried*	1	0.174	0.174	0.174	0.174
Sardine, dried*	5	0.018, 0.106, 0.113, 0.176, 0.443	0.018	0.443	0.171
Alaskan pollack, dried*	2	0.463, 1.479	0.463	1.479	0.971
Cod, dried*	3	0.638, 0.817, 0.988	0.638	0.988	0.814

Eighteen samples of ten foods products have been deleted from the table due to non-detection.
*Detected but no consumption.

Table 17. Estimated daily intake of BHA and BHT in total per capita per day. (Unit : mg)

Foods \ District / Bases for Estimation		Whole Country	Urban Communities			Rural Communities
			Ave. in Cities	Big Cities	Cit Med.	
Butter	Regulation	0.004	0.008	0.140	–	–
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Margarine	Regulation	0.020	0.026	0.050	–	0.001
	Max. Det.	0.014	0.021	0.043	–	0.001
	Average	0.002	0.003	0.006	–	0.001
Sesame Oil	Regulation	0.220	0.220	0.280	0.160	0.200
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Vegetable Oils	Regulation	0.840	0.940	1.040	0.800	0.660
	Max. Det.	0.014	0.014	0.015	0.014	0.010

Foods	District / Bases for Estimation	Whole Country	Urban Communities			Rural Communities
			Ave. in Cities	Big Cities	Cit Med.	
	Average	0. 008	0. 008	0. 009	0. 008	0. 006
File Fish	Regulation	0. 360	0. 400	0. 240	0. 520	0. 340
(Dried Fillet)	Max. Det.	0. 003	0. 003	UA	0. 003	0. 003
	Average	0. 001	0. 001	UA	0. 001	0. 001
Squid	Regulation	0. 100	0. 120	0. 160	0. 100	0. 040
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Alaskan	Regulation	0. 200	0. 260	0. 380	0. 100	0. 120
Pollack	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Shrimp	Regulation	–	–	–	0. 020	0. 001
	Max. Det.	–	–	–	UA	UA
	Average	–	–	–	UA	UA
Yellow Tail	Regulation	0. 100	–	–	–	0. 160
Runner, Dried	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Other	Regulation	0. 040	0. 040	0. 040	0. 020	0. 040
	Max. Det.	***UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Shrimp, Saused	Regulation	0. 020	0. 100	0. 004	0. 020	0. 060
	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Small Sardine,	Regulation	0. 006	0. 008	0. 010	0. 004	0. 006
Saused	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	–	–
Pollack's	Regulation	0. 100	0. 014	0. 020	–	0. 002
Roe, Saused	Max. Det.	UA	UA	UA	–	UA
	Average	UA	UA	UA	–	UA
Sqused Clam	Regulation	0. 020	0. 010	0. 004	0. 020	0. 060
	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Squid, Sqused	Regulation	0. 016	0. 008	0. 010	0. 006	0. 020
	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Other Sqused	Regulation	0. 060	0. 040	0. 020	0. 060	0. 120

Foods	District / Bases for Estimation	Whole Country	Urban communities			Rural Communities
			Ave. in Cities	Big Cities	Cit Med.	
Sea Foods	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Instant Noodle	Regulation	0. 253	0. 315	0. 370	0. 253	0. 192
	Max. Det.	0. 003	0. 005	0. 005	0. 003	0. 003
	Average	0. 002	0. 003	0. 003	0. 002	0. 002
Bread and Bakery	Regulation	0. 006	0. 009	0. 013	0. 005	0. 001
	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Biscuits	Regulation	0. 011	0. 016	0. 002	0. 009	0. 007
	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Fish Paste	Regulation	0. 009	0. 009	0. 010	0. 009	0. 007
	Max. Det.	UA	UA	UA	UA	UA
	Average	UA	UA	UA	UA	UA
Doughnut	Regulation	0. 005	–	0. 014	–	–
	Max. Det.	UA	–	UA	–	–
	Average	UA	–	UA	–	–
Total	Regulation	3. 086	3. 273	3. 487	2. 946	2. 941
	Max. Det.	0. 042	0. 051	0. 069	0. 028	0. 027
	Average	0. 017	0. 019	0. 021	0. 015	0. 015

Table 18. Estimated daily intake of DHA per capita per day by district. (Unit : mg)

Foods	District / Bases for Estimation	Whole Country	Urban communities			Rural Communities
			Ave. in Cities	Big Cities	Cit Med.	
Butter	Regulation	0. 010	0. 020	0. 035	–	–
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Cheese	Regulation	0. 300	0. 450	0. 800	0. 005	–
	Max. Det.	0. 030	0. 050	0. 080	–	–
	Average	0. 015	0. 025	0. 040	–	–
Margarine	Regulation	0. 050	0. 070	0. 125	–	0. 002
	Max. Det.	0. 032	0. 041	0. 080	–	–
	Average	0. 015	0. 020	0. 038	–	–
Total	Regulation	0. 360	0. 540	0. 960	–	–
	Max. Det.	0. 062	0. 091	0. 160	–	–
	Average	0. 030	0. 045	0. 078	–	–

Table 19. Estimated daily intake of benzoic acid per capita per day (Unit : mg)

Foods \ Base for Estimation \ District		Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big. Cities	Cities, Med.	
Soft Drinks, non-carbonated	Regulation	1. 224	1. 950	2. 838	0. 906	0. 066
	Max. Det	0. 897	1. 430	2. 081	0. 664	0. 484
	Average	0. 036	0. 057	0. 084	0. 026	0. 002
Soya Sauce	Regulation	4. 578	4. 464	4. 944	3. 894	4. 764
	Max. Det.	0. 554	0. 540	0. 598	0. 471	0. 576
	Average	0. 028	0. 027	0. 030	0. 024	0. 029
Total	Regulation	5. 802	6. 414	7. 782	4. 800	4. 830
	Max. Det.	1. 451	1. 970	2. 679	1. 135	1. 060
	Average	0. 064	0. 084	0. 114	0. 050	0. 031

Table 20. Estimated daily intake of sorbic acid per capita per day. (Unit : mg)

Foods	Bases for Estimation \ Distric		Whole Country	Urban Communities			Rural Communities
				Ave. of Cities	Big. Cities	Cities, Med.	
Meat Products	Sausages	Regulation	10. 380	12. 880	15. 900	9. 340	6. 320
		Max. Det.	7. 574	9. 398	11. 601	6. 815	4. 611
		Ave.	1. 814	2. 251	2. 778	1. 632	1. 104
	Hams	Regulation	2. 000	3. 120	5. 680	0. 120	0. 200
		Max. Det.	1. 345	2. 099	3. 821	0. 081	0. 135
		Average	0. 324	0. 506	0. 920	0. 019	0. 032
	Bacon	Regulation	0. 060	0. 100	0. 180	–	–
		Max. Det.	0. 044	0. 073	0. 131	–	–
		Average	0. 013	0. 022	0. 039	–	–
Fish Fillet Products		Regulation	6. 620	7. 700	8. 560	6. 740	4. 840
		Max. Det.	5. 654	6. 576	7. 311	5. 756	4. 134
		Average	1. 760	2. 047	2. 276	1. 792	1. 287
Soya Paste		Regulation	7. 250	5. 580	4. 650	6. 660	9. 950
		Max. Det.	2. 750	2. 116	1. 764	2. 526	3. 774
		Average	0. 687	0. 528	0. 440	0. 631	0. 942
Red Pepper Paste		Regulation	3. 740	2. 500	3. 090	1. 810	5. 760
		Max. Det.	2. 649	1. 771	2. 189	1 282	4. 080
		Average	0. 758	0. 507	0. 626	0. 367	1. 168
Chun-Jang		Regulation	0. 020	0. 020	0. 040	–	–
		Max. Det.	0. 013	0. 013	0. 025	–	–
		Average	0. 005	0. 005	0. 010	–	–

Foods	Bases for Estimation / Distric	Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big. Cities	Cities, Med.	
Fish and Shellfish, Dried	Regulation	8.630	8.200	8.840	7.460	9.320
	Max. Det.	4.231	4.020	4.334	3.657	4.569
	Average	0.455	0.432	0.466	0.393	0.491
Pickles in Vinega	Regulation	2.670	1.040	0.320	1.870	5.320
	Max. Det.	0.524	0.204	0.063	0.367	1.044
	Average	0.104	0.040	0.012	0.073	0.207
Pickles in Soya Sauce	Regulation	1.300	1.410	2.170	0.500	1.150
	Max. Det.	0.320	0.347	0.534	0.123	0.283
	Average	0.070	0.076	0.117	0.027	0.062
Red bean Powder Precipitated	Regulation	1.920	0.920	0.520	1.380	3.550
	Max. Det.	0.000	0.000	0.000	0.000	0.000
	Average	0.000	0.000	0.000	0.000	0.000
Jams	Regulation	0.160	0.220	0.330	0.090	0.070
	Max. Det.	0.000	0.000	0.000	0.000	0.000
	Average	0.000	0.000	0.000	0.000	0.000
Drink of Lactic Acid Bacteria	Regulation	0.195	0.290	0.347	0.223	0.042
	Max. Det.	0.071	0.105	0.126	0.081	0.015
	Average	0.016	0.023	0.028	0.018	0.003
Ketchup	Regulation	0.105	0.165	0.290	0.020	0.005
	Max. Det.	0.002	0.003	0.006	0.000	0.000
	Average	0.001	0.001	0.002	0.000	0.000
Cheese & Imitated Cheese	Regulation	0.580	0.900	1.600	0.080	0.080
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Sea Foods, Fermented(Salt : not More than 8%)	Regulation	2.040	1.800	2.080	1.440	3.940
	Max. Det.	0.143	0.126	0.146	0.101	0.276
	Average	0.004	0.003	0.004	0.003	0.007
Total	Regulation	47.670	46.845	54.597	37.733	50.547
	Max. Det.	25.320	26.851	32.051	20.789	22.921
	Average	6.011	6.441	7.718	4.982	5.303

Table 21. Estimated daily intake of propionic acid per capita perday. (Unit : mg)

Foods	Bases for Estimation / District	Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big Cities	Cities, Med.	
Pastry	Regulation	2.525	3.125	3.750	2.375	1.525
	Max. Det.	0.397	0.491	0.589	0.373	0.240

Foods \ District / Bases for Estimation		Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big Cities	Cities, Med.	
	Average	0.013	0.016	0.019	0.012	0.008
Bread	Regulation	8.075	12.275	15.700	8.075	1.300
	Max. Det.	4.425	6.727	8.603	4.425	0.712
	Average	0.282	0.429	0.548	0.282	0.045
Sponge	Regulation	1.825	2.525	2.475	2.550	0.725
Cake	Max. Det.	0.847	1.172	1.149	1.183	0.337
	Average	0.143	0.197	0.193	0.199	0.057
Cheese	Regulation	0.180	0.270	0.510	0.000	0.000
	Max. Det.	0.000	0.000	0.000	0.000	0.000
	Average	0.000	0.000	0.000	0.000	0.000
Total	Regulation	12.605	18.195	22.435	13.310	3.550
	Max. Det.	5.669	9.562	9.752	6.008	1.288
	Average	0.438	0.705	0.760	0.493	0.167

Table 22. Estimated daily intake of nitrite per capita per day (Unit : mg)

Foods \ District / Bases for Estimation		Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big Cities	Cities, Med.	
Sausages	Regulation	165.200	217.700	259.000	167.300	81.200
	Max. Det.	67.447	88.881	105.743	68.304	33.152
	Average	9.803	12.918	15.369	99.275	4.818
Hams	Regulation	68.600	110.600	141.400	72.800	0.000
	Max. Det.	23.048	37.159	47.507	24.459	0.000
	Average	5.492	8.854	11.320	5.828	0.000
Bacons	Regulation	4.900	7.700	14.000	0.000	0.000
	Max. Det.	3.064	4.815	8.754	0.000	0.000
	Average	0.764	1.201	2.184	0.000	0.000
Total	Regulation	238.700	336.000	414.400	240.100	81.200
	Max. Det.	93.559	130.856	162.005	92.764	33.152
	Average	16.059	22.974	28.874	105.104	4.813

Table 33. Estimated daily intake of surfite per capita per day. (Unit : mg)

Foods \ District / Bases for Estimation		Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big Cities	Cities, Med.	
Malt Syrup	Regulation	18.000	24.000	18.000	27.000	9.000
	Max. Det.	–	–	–	–	–

Foods \ District / Bases for Estimation		Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big Cities	Cities, Med.	
	Average	–	–	–	–	–
Malt Sugar	Regulation	48.000	–	–	–	124.000
Candy	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Peanut	Regulation	160.000	280.000	440.000	100.000	–
	Max. Det.	0.093	0.163	0.257	0.058	–
	Average	0.040	0.071	0.112	0.025	–
Chestnut	Regulation	26.520	28.440	35.520	20.160	23.420
	Max. Det.	1.326	1.422	1.776	1.008	1.171
	Average	1.100	1.180	1.474	0.836	0.971
Pinenut	Regulation	20.000	20.000	40.000	–	–
	Max. Det.	0.002	0.002	0.005	–	–
	Average	0.001	0.001	0.002	–	–
Raisin	Regulation	0.300	0.600	1.200	–	–
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Orange	Regulation	25.500	40.500	73.500	–	–
Juice	Max. Det.	0.001	0.002	0.004	–	–
	Average	–	–	–	–	–
Apple	Regulation	33.000	52.500	96.000	–	–
Nectar	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Shrimp,	Regulation	8.000	6.000	3.000	9.000	13.000
Dried	Max. Det.	2.979	2.234	1.117	3.351	4.840
	Average	11.574	10.288	12.538	7.073	14.146
Duduk	Regulation	2.100	3.300	2 .700	3.900	0.600
	Max. Det.	–	–	–	–	–
	Average	–	–	–	–	–
Root of	Regulation	31.200	29.100	46.200	8.400	34.500
Bellfllower,	Max. Det.	0.208	0.194	0.308	0.056	0.230
Dried	Average	0.043	0.040	0.064	0.011	0.048
Cabbage, Red	Regulation	1.800	3.000	5.100	–	–
	Max. Det.	0.063	0.106	0.180	–	–
	Average	0.015	0.026	0.044	–	–
Lotus root	Regulation	2.700	4.200	7.800	–	–
	Max. Det.	40.500	63.000	117.000	–	–

Foods \ District / Bases for Estimation		Whole Country	Urban Communities			Rural Communities
			Ave. of Cities	Big Cities	Cities, Med.	
	Average	6.755	10.508	19.515	–	–
Small Anchovy, dried	Regulation	193.800	194.700	166.500	229.800	159.600
	Max. Det.	2.865	2.879	2.462	3.398	2.360
	Average	1.109	1.109	0.953	1.315	0.913
White bait, dried, pressed	Regulation	2.700	3.300	–	7.500	1.500
	Max. Det.	0.101	0.124	–	0.283	0.056
	Average	0.090	0.121	–	0.276	0.055
Squid, Dried	Regulation	23.400	25.200	39.000	8.700	20.700
	Max. Det.	1.301	1.402	2.169	0.484	1.151
	Average	0.258	0.278	0.431	0.096	0.228
Squid, Smoked	Regulation	1.500	2.700	3.000	2.100	–
	Max. Det.	0.018	0.033	0.037	0.026	–
	Average	0.016	0.029	0.032	0.022	–
Dried clam	Regulation	10.200	12.300	15.000	8.700	6.600
	Max. Det.	0.230	0.277	0.339	0.057	0.149
	Average	0.132	0.159	0.190	0.112	0.085
Filefish, dried, fillet	Regulation	45.300	39.600	26.400	56.400	54.000
	Max. Det.	0.853	0.745	0.497	1.062	1.017
	Average	0.552	0.483	0.322	0.687	0.658
Total	Regulation	27148.580	29190.600	36515.100	20628.100	23856.700
	Max. Det.	149.186	160.268	233.014	70.064	131.536
	Average	22.307	24.753	35.909	11.142	18.095

23와 같다.

결과 및 고찰

조사대상 첨가물의 평균섭취량, 검출치의 최고치 적용 및 법적 허용치를 적용시 섭취가능 추정량은 Table 24와 같다.

항산화제인 BHA와 BHT는 총합으로의 섭취량이 농촌 0.015mg, 도시평균 0.019mg 및 전국평균이 0.017mg이며 최대 검출치 적용시 0.042mg 그리고 허용치 적용이 3.086mg으로 산출되었다. FAO/WHO에서 평가된 일일허용 섭취량(ADI)은 종전에는 BHA 또는 BHT 단독 또는 두 성분의 합으로 0.0~0.5mg/kg(b.w.)이었으나[8,9] 1987년에 BHA는 0.0~0.3mg/kg(b.w.), 잠정기준으로 개정 강화되었으며,[10] 체중 50kg에 적용할 경우 BHA는 15mg, BHT는 6.25mg으로 실제 섭취량이 아직은 이에 미치지 못함을 나타냈다. 일본의 경우는 BHT가 0.023 BHA가 0.001mg 이었다.[5]

보존료중 DHA의 섭취량은 농촌 및 중소도시에서는 산출되지 않았으며 도시평균 0.045mg 및 전국평균이 0.030mg이었으며, 최대 검출치 적용시 0.062mg, 허용치 적용이 0.360mg으로 농촌보다 도시가 높았으며 FAO/WHO에서 ADI는 평가되어 있지 않다. 일본의 경우 0.191mg이었다.[5]

BA의 섭취량은 농촌이 0.031mg, 도시평균이 0.084mg 및 전국평균이 0.064mg으로 최대 검출

Table 24. Estimated daily intake a additives (Unit : mg/capita/day)

Additiyes	Estimation Bases	Intake Amount Whole Country	Ave. of Cities	Big Cities	Med Cities	Rural Communities
BHA+BHT	Regulation	3.086	3.273	3.487	2.946	2.941
	Max. Det.	0.042	0.051	0.069	0.028	0.027
	Average	0.017	0.019	0.021	0.015	0.015
DHA	Regulation	0.360	0.540	0.960	–	–
	Max. Det.	0.062	0.091	0.160	–	–
	Average	0.030	0.045	0.078	–	–
BA	Regulation	5.802	6.414	7.782	4.800	4.830
	Max. Det.	1.451	1.971	2.679	1.135	1.060
	Average	0.064	0.084	0.114	0.050	0.031
Sor. A.	Regulation	47.670	46.845	54.597	37.733	50.547
	Max. Det.	25.320	26.851	32.051	20.789	22.921
	Average	6.011	6.441	7.718	4.982	5.303
POBA-Esters	Regulation	2.137	2.207	2.563	1.788	2.025
	Max. Det.	1.905	1.858	2.058	1.621	1.983
	Average	0.247	0.241	0.266	0.210	0.257
Propionic A.	Regulation	12.605	18.195	22.435	13.310	3.550
	Max. Det.	5.669	9.562	9.752	6.008	1.288
	Average	0.438	0.705	0.760	0.493	0.167
Nitrite(NO_2)	Regulation	0.239	0.336	0.414	0.240	0.081
	Max. Det.	0.094	0.131	0.162	0.093	0.033
	Average	0.016	0.023	0.029	0.105	0.004
Sulfites (SO_2)	Regulation	27.149	29.190	36.515	20.628	23.856
	Max. Det.	0.149	0.160	0.233	0.070	0.132
	Average	0.022	0.024	0.036	0.011	0.018

치 적용시 1.451mg, 허용치 적용이 5.802mg으로 도시의 경우가 농촌보다 훨씬 높았으나 허용치에는 크게 미달하였다. FAO/WHO에서 권장하는 BA의 ADI는 0.0~5mg/kg(b.w.)로[9] 체중 50kg인 경우 250mg에 이른다. 일본의 경우는 1.437mg이었다.[5]

Sor. A.의 섭취량은 농촌이 5.303mg, 도시평균이 6.441mg이었으며 전국의 평균은 6.011mg 그리고 최대 검출치 적용시 25.320mg, 허용치 적용이 47.670mg으로 전체적으로 비교적 높은 수치를 보였으나 FAO/WHO에서 평가된 Sor. A.의 ADI는 0.0~25mg/kg (b.w.)로[9] 체중 50kg인 경우 1250mg에 달하여 일일허용 섭취량에 비해서는 아직 많은 낮은 수치를 보였다. 일본의 경우 36.3mg이었다.[5]

POBA-Esters의 섭취량은 농촌이 0.257mg, 도시평균이 0.266mg이었으며 전국의 평균은 0.247mg, 그리고 최대 검출치 적용시 1.905mg, 허용치 적용이 2.137mg으로 FAO/WHO에서 평가된 POBA의 메틸, 에틸, 프로필에스테르의 총합으로서 0.0~10mg/kg(b.w.)[9]으로 체중 50kg인 경우 500mg에 이른다. 일본의 경우는 0.228

mg이었다.[5]

Propionic A.의 섭취량은 농촌이 0.167mg, 도시평균이 0.705mg 그리고 전국평균이 0.438 mg 최대 검출치 적용시 5.669mg, 허용치 적용이 12.605mg이었으며 FAO/WHO에서 평가된 Propionic A.의 ADI치는 제한을 두고 있지 않다. 일본의 경우는 0.674mg이었다.[5]

아질산염의 섭취량은 아질산근(NO_2)으로서 농촌이 0.004mg, 도시평균이 0.023mg 그리고 전국평균이 0.016mg, 최대 검출치 적용시 0.094 mg, 허용치 적용이 0.239mg, FAO/WHO에서 평가된 ADI는 0.0~0.2mg/kg(b.w.)이며[9] 체중 50kg인 경우 10mg에 비해 전반적으로 낮은 수치를 보였다. 일본의 경우는 0.018mg이었다.[5]

아황산염류의 섭취량은 이산화황(SO_2)으로서 농촌이 0.018mg, 도시평균이 0.024mg, 그리고 전국평균이 0.022mg, 최대 검출치 적용시 0.149 mg, 허용치 적용시 27.149mg으로 실제 섭취량이 허용치보다는 매우 낮으며 FAO/WHO에서 평가된 SO_2의 ADI는 0.0~0.7mg/kg(b.w.)로[9] 체중 50kg인 경우 35mg에 이르므로 실섭취량은 이에 훨씬 못미침을 보였다. 일본의 경우는 0.073mg이었다.[5]

이상의 결과에 의하면 가공식품을 통한 조사대상 식품첨가물의 한국인의 일일섭취량은 일반적으로 가공식품의 섭취량이 많은 도시가 농촌보다 높았고 허용된 최대 섭취가능량에는 아직 훨씬 미달하고 있으며 또한 허용된 최대 섭취가능량도 FAO/WHO에서 평가된 일일허용 섭취량(ADI)에 미치지 않았으며 외국 일본의 경우와 비교시도 낮은 수준을 보이므로 아직은 첨가물 섭취로 인한 큰 문제점은 없다하겠다. 그러나 성별, 연령, 직업 등 식품섭취에 영향을 주는 인자를 고려한 특수인구군에 대한 식품첨가물의 섭취량을 추정할 수 없어 이들 인구군에 대하여는 별도의 추구조사를 하여야 할 것이다.

국문 요약

허용된 식품첨가물중 소비자 및 일반의 관심의 대상이 되는 첨가물중 9개 성분에 대하여 1985년부터 1987년까지 3년간에 걸쳐 섭취량 조사를 실시하였다. 식품의 섭취량은 매년 보건사회부에서 실시하는 국민영양 조사자료에서 발췌하였으며 조사대상 식품 977산을 구입하여 첨가물 함량(평균)을 구하여 이를 식품 섭취량에 적용 첨가물 섭취량을 농촌, 도시, 전국으로 구분하여 산출하였다.

한국인의 일일 일인섭취량은 도시가 농촌보다 높은 수준을 보였으며 전국평균은 BHA 및 BHT가 합으로 0.017mg, DHA가 0.030mg, BA가 0.064mg, Sor. A.가 6.011mg, POBA-Esters가 합으로 0.247mg, Propionic A.가 0.1438mg, Nitroite (NO_2)가 0.016mg, Sulfite (SO_2)가 0.022mg으로 FAO/WHO에서 평가된 이들 첨가물의 일일허용 섭취량(ADI)에 훨씬 못미치는 양이었다.

참고문헌

1. 보건사회부 : 식품첨가물공전(1985).
2. 보건사회부 : 식품공전(1988).
3. 보건사회부 : 국민영양조사보고서(1984, 1985, 1986).
4. 일본후생성 식품화학과 : 식품첨가물의 일일섭취량 조사에 관한 연구, 후생성 식품화학 Report Series No. 31, 일본 식품첨가물협회(1983).
5. 일본후생성 식품화학과 : 식품첨가물의 일일섭취량 조사에 관한 연구, 후생성 식품화학 Report Series No. 31, 일본 식품첨가물협회(1984).
6. 伊藤譽志男 : 日本의 각종 식품첨가물 일일섭취량에 관하여, 食品衛生研究, **33**(11), 55~74(1983).
7. 일본약학회 : 衛生試驗法注解, 제3판, (1980).
8. FAO/WHO JECFA: Toxicological evaluation of same food additives including anticaking agents, antimicrobials, WHO Food Additives Series N.5, WHO (1974).
9. FAO: FAO/WHO Food additives data system 30/Rev. **1**, (1985).
10. FAO/WHO JECFA: Evaluation of certain food additives and contaminants, Technical report series **751**, 12-15, WHO (1987).