

Compariosn of Taste Component of Korean and Japanese Soybean Paste (Doenjang & Miso) - Free Amino Acids Comparison -

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한국과 일본 된장의 맛성분 비교

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요 약

한국과 일본에 있어서 된장은 극히 보편화된 전통식품이다. 최근에 양국에서는 된장의 가공과정에서 영양상 문제가 되고 있는 감염과 맛의 향상을 위한 연구가 활발하다. 그 중의 일환으로 저자는 앞서 김치중의 Na과 K에 관한 보고를 했으며 금번 보고에서는 된장중의 유리아미노산 조성에 관한 분석을 시도하므로서 양국의 된장의 차이를 비교 해보고자 한다.

그 결과 유리아미노산 조성에 있어서 한국의 시판 된장과 가정에서의 재래식 재료된장이 유사했고 한편 일본도 시판 된장과 가정 제조 된장에서 같은 경향을 보였다. 유리아미노산 중에서는 glutamic acid의 수치가 가장 높은 점에서도 한국과 일본 된장에서 유사하여 한국시판 된장 22.7%, 한국가정 제조된장 17.5%, 한국시판청국장 11.5%, 일본 시판 10.4, 일본 가정 12.5% 등으로 분석 되었다. 즉, 이들의 글루타민산의 높은 함량이 양국의 된장의 맛에 크게 영향을 준다는 것을 알게 되었다.

Introduction

Soybean paste have been common traditional and an indispensable food for the people in Korea and Japan. Recently, however along with other processed food stuffs, the effort to reduce the salt content of salted food like soybean paste is being made owing to the changes in the tastes of people and on the viewpoint prevention of chronic disease¹⁾. So, in the previous paper²⁾, we made a report on the sodium and potassium contents of soybean paste from the viewpoint of above mentioned reason. In order, to find out what causes of the difference in taste between Korean and Japanese soybean pastes, we attempted to

analyze the free amino acids compositions in soybean pastes from two countries in this paper.

Materials and Methods

1. Materials

1) Soybeanpaste of Korea used for measurement

24 pieces in total, 12 pieces of commercial soybean paste, which were bought at the department store the markets in Seoul and 12 pieces of homemade soybean paste were collected from farm houses near Seoul, in March 1994.

2) Soybean paste of Japan used for measurement

24 pieces in total, 12 pieces of commercial soybean paste, which were bought at the department store near Koriyama, in November, 1994.

They were all kept in the refrigerator for accurate measurement.

2. Analysis of free amino acids

The soybean pastes were emulsified by the cell-crusher(Hiscotron from Nichion). Then just 2.0g of the emulsified soybean paste were used, and 20.0 ml of a 1.0 % picric acid solution was added to the samples. The mixture was homogenized with cell-crusher (hiscotoron from Nichion).

The homogenized mixture was then centrifuged at a speed of 3,000 r.p.m. for 30 minutes. From the supernatant picric acid was removed with a Dowex 50 column of ion-exchange resin, then was buffered with a pH2.2 citric acid buffer solution constant volume.

A sample for the analysis was taken from the buffered fluid. Then it was analyzed with the bio-column of a high-speed amino acid analyzer(Type L-8500 Hitachi).

Results

1. Amino acids composition in Korean soybean paste.

Free amino acid content in commercial and homemade soybean pastes made in Korea are shown in Table 1.

The mean total free amino acid content in commercial Doenjang was 6940mg/100g. Among the free amino acids, the following five amino acids ranked highest in content.

Glutamic acid	1572mg/100g
Leucine	495mg/100g
Asparatic acid	405mg/100g
Lysine	377mg/100g
Alanine	371mg/100g

The mean total free amino acid content in commercial Chunggukjang was 3484mg/100g. Among the free amino acids, the following five amino acids ranked highest in content.

Glutamic acid	402mg/100g
Alanine	283mg/100g
Phenylalanine	260mg/100g
Lysine	241mg/100g
Leucine	231mg/100g

The mean total free amino acid of homemade Doenjang was 5609mg/100g. Among the free amino acids, the following five amino acids ranked highest in content.

Glutamic acid	984mg/100g
Alanine	647mg/100g
Leucine	542mg/100g
Valine	343mg/100g
Phenylalanine	333mg/100g

2. Amino acids composition in Japanese soybean paste.

Free amino acid composition in commercial and homemade soybean paste made in Japan are shown in Table 2.

The mean total free amino acid content in commercial soybean paste was 2894mg/100g. Among the free amino acids, the following five amino acids ranked highest in content.

Glutamic acid	300mg/100g
Asparatic acid	249mg/100g
Leucine	226mg/100g
Lysine	188mg/100g
AspNH ₂	154mg/100g

The mean total free amino acid content in homemade soybean paste was 2136mg/100g. Among the free amino acids, the following five amino acids ranked highest in content.

Glutamic acid	268mg/100g
AspNH ₂	234mg/100g
Asparatic acid	170mg/100g
Leucine	162mg/100g
Lysine	140mg/100g

Discussion

Soybean paste is a traditional food as well as popular food in Korea and Japan. The per capita daily intake of soybean paste in Korea is 30g³⁾, and that of Japan is 15.2g⁴⁾. In the previous paper, we compared

<Table 2> Free Amino Acid Contents of Commercial and Home Products Soybean Paste (Miso) in Japan (mg/100g)

Amino acids	Commercial (n=12)		Home products (n=12)		Mean \pm S.D.
	Min	Max.	Min.	Max.	
p-Ser	24	46	35 \pm 7	52	30 \pm 10
Tau	13	29	21 \pm 5	26	17 \pm 5
PEA	100	192	134 \pm 28	148	70 \pm 40
Asp	215	294	249 \pm 25	243	170 \pm 50
Thr	82	103	96 \pm 7	90	76 \pm 14
Ser	119	149	137 \pm 9	127	107 \pm 21
AspNH ₂	0	318	154 \pm 111	483	234 \pm 105
Glu	255	389	300 \pm 38	326	268 \pm 54
Sar	10	26	18 \pm 5	15	9 \pm 3
α -AAA	19	42	28 \pm 7	25	16 \pm 5
Pro	94	128	117 \pm 9	112	92 \pm 17
Gly	61	75	70 \pm 6	73	59 \pm 12
Ala	125	149	141 \pm 7	121	95 \pm 19
Cit	0	9	2 \pm 3	10	2 \pm 4
α -ABA	9	14	11 \pm 2	14	7 \pm 3
Val	106	138	123 \pm 11	121	95 \pm 19
Cys	0	0	0	10	6 \pm 2
Met	35	51	42 \pm 5	28	18 \pm 7
Cysthi	0	15	3 \pm 6	13	2 \pm 4
Ile	110	145	130 \pm 12	135	103 \pm 21
Leu	187	260	226 \pm 24	209	162 \pm 31
Tyr	96	133	119 \pm 12	178	102 \pm 31
Phe	125	171	145 \pm 18	151	108 \pm 23
β -Ala	73	101	83 \pm 10	65	51 \pm 8
β -AIBA	11	23	14 \pm 3	28	12 \pm 7
γ -ABA	34	54	42 \pm 5	32	28 \pm 4
EA	6	9	8 \pm 1	7	6 \pm 1
Om	3	39	8 \pm 9	124	28 \pm 38
Lys	158	229	188 \pm 27	186	140 \pm 30
His	21	48	34 \pm 9	29	19 \pm 8
Ans	0	0	0	0	0
Car	4	14	9 \pm 3	7	5 \pm 2
Arg	157	291	231 \pm 41	204	134 \pm 42
Total	2513	3201	2894 \pm 207	2725	2136 \pm 408

the sodium and potassium content of soybean paste made in both countries²⁾). For the purpose of clarifying their taste components, the authors compared the composition of free amino acids in soybean paste made in Korea with of made in Japan were compared. It was found that the free amino acid composition of commercial soybean paste made in Korea was analogous to home made soybean paste, and the commercial soybean paste made in Japan, was analogous to homemade soybean paste.

And also, it was found that there was a similarity on the point that the Glutamic acid content was the highest of all free amino acids content in Korean and Japanese soybean paste. However, there was a difference in the mean total free amino acids content between Korean and Japanese soybean paste. Soybean paste were ranked as follows according to their mean total free amino acids contents are as follows:

- Korean commercial Doenjang
- Korean homemade Doenjang
- Korean homemade Chunggukjang
- Japanese commercial soybean paste.
- Japanese homemade soybean paste.

It was also found that there were much differences to ratio of free amino acid between Korean and Japanese soybean paste. Paticularly, the mean rate of the glutamic acid content to the total free amino acids content of soybean paste are as foliows:

- Korean commercial Doenjang soybean paste : 22.7%.
- Korea homemade Doenjang soybean paste : 17.5%.
- Japanese homemade soybean paste : 12.5%.
- Korean commercial Chunggukjang soybean paste : 11.5%
- Japanese commercial soybean paste : 10.4%.

It was found that glutamic acid content of Korean soybean paste was the highest of all free amino acids content. It was considered that glutamic acid might be produced by the action of microorganisms, but, in case of commercial soybean paste, it was expected that glutamic acid might be added as a seasoning for food additive, which is considered to be glutamic acid itself or glutamic acid sodium. Main free amino acid composition of Japanese commercial soybean paste were glutamic acid, asparatic acid and leucine, and homemade soybean paste were glutamic acid,

asparatic acid, AspNH₂, leucine and lysine. These free amino acids have something to do with flavor and sweetness.

Mizutani⁶⁾ reported about free amino acid of fermented fish product in South east Asia, and recently, authors^{7,8)} reported about free amino acid of salted preserves made in Thailand and Philippines, these reports pointed out that the main free amino acids of these foods were Glutamic acid. In 1993, Sumino⁹⁾ reported about free amino acids of Kimch in both countries, in this reports it was pointed out that the main free amino acids of salted preserves were glutamic acid. The results of soybean paste have in common on various points with these reports. We will make a comparative study on microflora of soybean paste in both countries.

Summary

In order to find causes of the difference in taste between Korean and Japanese soybean paste, comparian was made on the free amino acids composition in soybean paste in those two countries. It was found that the free amino acid composition of commercial soybean paste made in Korea was analogous to homemade soybean paste, and the commercial soybean paste made in Japan, was analogous to homemade soybean paste.

And there was a similarity on the point that the glutamic acid content was the highest of all free amino acids content in both Korean and Japanese soybean pastes. There was a difference in the mean total free amino acids content between Korean and Japanese soybean paste. The mean ratio of the glutamic acid content to total free amino acid content in Korean and Japanese soybean paste was on the range of 11.5% ~ 22.7% and 10.4% ~ 12.5%, respectively. These results suggest that glutamic acid determines taste in Korean and Japanese soybean paste.

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