



**Analysis of Monosodium Glutamat Level on Meatballs
Snacks (BAKSO) Sold in the Makassar and Parepare City
of South Sulawesi Province with Visible
Spectrophotometer**

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Abstract

Monosodium Glutamate (MSG) is an ingredient used to make food taste more delicious. MSG is also known as *vetsin* or *micin* in Indonesia. In some cases, MSG can trigger allergic reactions such as itching, red spots on the skin, nausea, vomiting, headache and migraine complaints. In addition, there is the term "Chinese Restaurant Syndrome" is a symptom dizziness and shortness when taking Monosodium Glutamate (MSG) is excessive. Monosodium Glutamate (MSG) is also very influential on long-term health such as hypertension, obesity, cancer, Alzheimer's, spermatogenesis disorders, Parkinson's, and stroke. This study was aimed to determine the levels of MSG in the test sample. The type of study was laboratory observation and sample was determined by purposive sampling technique. Processing and data analysis used microsoft word and presented in the form of tables and narration. From the results of the analysis, MSG was obtained in 8 test samples, ie A 0,0038 g sample, B sample 0.0023 g, C sample 0.0024 g, sample D 0.0025 g, sample E 0,0091 g, sample F 0,0078 g, sample G 0,0092 g and sample H 0,0093 g. Based on these results Monosodium Glutamate (MSG) level on the eight test samples can be said to be safe, because it does not exceed the maximum limit of consumption per day is 120 mg / kg body weight.

Keywords: Monosodium Glutamate; Visible Spectrophotometer; Meatballs.

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1. Introduction

Meatballs are very popular food products in Indonesia made from meat choices and various spices so as to provide tasty tastes even tend to make people addicted, no wonder if many people who like it [1] . As effort to make it more flavor, producers often add flavoring ingredients increase consumer's appetite [2].

The flavor and aroma are widely known in Indonesia are *vetsin* or *micin* and there are many brands in the market such as sasa, ajinomoto, miwon, royco, etc. These flavorings contain compounds called MSG. The role of glutamic acid is very important, including to stimulate and deliver signals between brain cells and can provide flavor to food [3].

The addition of MSG will make the taste of food more delicious even if it is allowed as a flavoring dish, but the amount consumed should be limited. Excessive use of MSG can have a negative effect on the body such as the increase level of salt in blood and the accumulation of glutamic acid in brain cell tissues that could result in paralysis. Because of many reports regard adverse effects due to excessive use of MSG so United States Food and Drug Administration (FDA) and World Health Organization (WHO) set maximum recommended of MSG is 120 mg / body weight and especially Indonesia and other developing countries, used 50 kg body weight as a standart [4,5].

Since 1963, Japan with Korea pioneered mass production of MSG which then expanded to all over the world, not to mention Indonesia. At least until 1997 before the crisis, every year the production of MSG Indonesia reached 254,900 tons / year with consumption experiencing an average increase of about 24.1% per year [4,5].

Makassar and Parepare are the two major capitals in South Sulawesi Province, where this area is found mostly by the main meatball stalls on the beach side which is often visited by the people to be consumed. Based on this the studyer is interested to analyse of monosodium glutamat level on meatballs snacks (bakso) sold in the makassar and parepare city of south sulawesi province with visible spectrophotometer.

2. Materials and Methods

2.1 Location and time of study

The place of study was conducted at Food and Beverage Analysis Laboratory of Health Analyst of Health Polytechnic of Kemenkes Makassar and Health Laboratory of Makassar. Time The study was conducted from August to October 2017.

2.2 Study Design

This study was a type of laboratory observation study, which is to investigate the presence of MSG (Monosodium Glutamate) content as well as levels of meatball snacks and samples selected by Accidental sampling technique.

2.3 Population and sample

- a. The population in this study is the meatball stalls in Makassar City and in Pare-Pare City.
- b. The sample used for this study is the meatball frontman and gravy in the bowl.
- c. The sample size in this study is 20 meatball stalls including 10 stall meatballs in Makassar and 10 meatball stalls in Pare-Pare City.
- d. Sampling technique in this study is Accidental Sampling by taking 5 points both in Makassar City and Pare-Pare City by way of; each of 2 samples in the center of Makassar City, the North, East, South and West, as well as in the city of Pare-Pare.

2.4 Data Analysis

Data is presented descriptively by calculating the mean \pm SD. Statistical analysis between two groups of samples was determined by descriptive, normalization, T test of total MSG level of meatballs and soup at $\alpha = 0.05$.

3. Results

Based on the results of the examination that has been done from 20 samples of meatballs sold in Makassar and Parepare city of South Sulawesi Province by visible spectrophotometric can be seen in the table below.

Table 1: Results of Qualitative Analysis MSG On Sample Meatballs and Sauce Of Meatballs In Makassar City.

No	Sample code	Colour			Explanation
		Ninhydrin Test	Biuret Test	Reference	
1	A	Blue	Blue	Blue	+
2	B	Blue	Blue	Blue	+
3	C	Blue	Blue	Blue	+
4	D	Blue	Blue	Blue	+
5	E	Blue	Blue	Blue	+
6	F	Blue	Blue	Blue	+
7	G	Blue	Blue	Blue	+
8	H	Blue	Blue	Blue	+
9	I	Blue	Blue	Blue	+
10	J	Blue	Blue	Blue	+

Data shows that all samples of meatball snacks traded in Makassar City and Parepare city contain MSG. This is

evidenced after the test sample was added with the ninhydrin solution and the biuret test will give a blue color change according to the literature used (Table 1).

Table 2: Results of Qualitative Analysis MSG On Sample Meatballs and Sauce Of Meatballs In Parepare City.

No	Kode Sampel	Colour			Explanation
		Ninhydrin Test	Biuret Test	Reference	
1	K	Blue	Blue	Blue	+
2	L	Blue	Blue	Blue	+
3	M	Blue	Blue	Blue	+
4	N	Blue	Blue	Blue	+
5	O	Blue	Blue	Blue	+
6	P	Blue	Blue	Blue	+
7	Q	Blue	Blue	Blue	+
8	R	Blue	Blue	Blue	+
9	S	Blue	Blue	Blue	+
10	T	Blue	Blue	Blue	+

Data shows that all samples of meatball snacks traded in Makassar City and Parepare City contain MSG. This is evidenced after the test sample is added with the ninhydrin solution and the biuret test will give a blue color change according to the literature used (table 2).

3.1 Quantitative Analysis

Determination of Wavelength Maximum MSG

Standard solution of MSG 50 bpj was added 4 ml of a 0.5% ninhydrin solution then heated into a water bath for several minutes to form a blue color. After cooling was measured uptake, a maximum absorption was obtained at a wavelength of 571.0 nm.

Table 3: Data Output Results of MSG Standard Absorption Measurement With Various Concentrations by Visible Spectrophotometric

Standart	Consentration (bpj)	Absorption(A)
1	0,00	0,0353
2	10,0	0,0519
3	20,0	0,0668
4	30,0	0,0841
5	40,0	0,1091
6	50,0	0,1187
7	80,0	0,1672
8	100,0	0,1976

Calibration Curve

The calibration curve is an empirical calculation that links the device's response to the concentration of a given analytes. The resulting absorbance will have a linear relationship with the concentration of analyte measured in accordance with Lambert-Beer's Law.

Equation of regression line: $y = a + bx$

$$y = 0.03638 + 0,00163x$$

$$r = 0.997$$

Determination of MSG Levels On Sample Meatballs and Sauce

Table 4: Data Result of Determination of MSG Level on Sample of Meatballs and Sauce by Visible Spectrophotometer at wavelength 571,0 nm in Makassar City

No	Sample Code	Meatball		Sauce		TOTAL MSG (%)
		Level (mg/Kg)	MSG (% b/b)	Level (mg/L)	MSG (% b/v)	
1	A	28859,14	2,89	15081,45	1,51	4,40
2	B	37549,90	3,75	18252,18	1,83	5,59
3	C	32484,83	3,25	13027,93	1,30	4,55
4	D	35096,17	3,51	14652,13	1,47	4,98
5	E	41182,80	4,12	16512,58	1,65	5,77
6	F	38984,66	3,90	17000,38	1,70	5,60
7	G	29718,45	2,97	17500,53	1,75	4,72
8	H	43126,90	4,31	15332,70	1,53	5,84
9	I	37377,73	3,74	17388,83	1,74	5,48
10	J	45994,16	4,60	16001,68	1,60	6,20

Table 5: Data Result of Determination of MSG Level on Sample of Meatballs and Sauce by Visible Spectrophotometer at wavelength 571,0 nm in Parepare City

No	Sample Code	Meatballs		Sauce		TOTAL MSG (%)
		Level (mg/Kg)	MSG (% b/b)	Level (mg/L)	MSG (% b/v)	
1	K	38895,67	3,89	14217,70	1,42	5,31
2	L	43256,89	4,33	14881,33	1,49	5,82
3	M	36241,04	3,62	18086,23	1,81	5,43
4	N	43562,59	4,36	12608,70	1,26	5,62
5	O	32846,35	3,28	18492,45	1,85	5,13
6	P	37310,22	3,73	14615,98	1,46	5,19
7	Q	36551,54	3,66	15978,68	1,60	5,26
8	R	38688,74	3,87	17174,73	1,72	5,59

9	S	35860,76	3,59	13582,75	1,36	4,95
10	T	43697,07	4,37	17367,63	1,74	6,11

Data shows the results of inspection of the level of MSG from each of 10 samples of snack meatballs traded in Makassar city obtained the highest level found in the J sample of 6.2% and the lowest MSG levels found in sample A of 4.40%, while the total MSG of the Parepare city was highest in the T samples of 6.11% and the lowest MSG levels were present in the S sample of 4.95% (Table 4.3 and 4.4).

Tabel 4.4: Total Level of MSG (%) On Snack Meatballs in Makassar City and Parepare City

Kota Makassar		Kota Pare-pare
4,40		5,31
5,59		5,82
4,55		5,43
4,98		5,62
5,77		5,13
5,60		5,19
4,72		5,26
5,84		5,59
5,48		4,95
6,20		6,11
X =	5,31	5,44
SD =	0,61	0,35

4. Discussion

Determination of levels of Monosodium Glutamate (MSG) on snack meatballs sold in several areas of Makassar City and Parepare city, was done by using visible spectrophotometer method. However, in this study, a qualitative analysis was conducted using several specific tests for monosodium glutamate, using a ninhydrin test and a biuret test.

In the ninhydrin test a solution of forty samples (20 samples of meatballs and 20 sauce samples) was added each 0.5% ninhydrin reagent and then heated into a water bath for several minutes to allow the ninhydrin to react with the free α -amino acids present in the monosodium glutamate characterized by a change of color from clear to blue and the results obtained from the forty samples are sample 1 (meatballs and gravy) up to sample 20, positively containing MSG). In the fifth biuret test the sample solution was packed with 10% NaOH solution and added with 0.1% CuSO₄ reactant reacting with Monosodium glutamate (MSG) in alkaline state characterized by a change of color from clear to blue and the results obtained all positive samples containing Monosodium glutamate (MSG). [6,7].

For the determination of the levels in the positive samples containing MSG, the sample was then analyzed by using the Visible Light Spectrophotometer. The results showed that the absorbance value and wavelength for monosodium glutamate standard solution at concentration 50 ppm, that is wavelength 571,0 nm with absorbance 0,091 [2,8].

Based on the results obtained, it can be seen that the total MSG content from each of 10 samples of snack meatballs traded in Makassar City obtained the highest level found in J samples of 6.2% and the lowest MSG levels found in sample A by 4.40%, while the total MSG level from Pare-Pare City was found to be the highest in T samples of 6.11% and the lowest MSG level was in S sample at 4.95%.

Comparison of MSG levels between samples of snack meatballs traded in Makassar and Pare-Pare City, from the results of statistical calculations showed no significant difference in levels ($p > 0.05$), whereas between the results of MSG content in each sample of snack meatballs in Kota Makassar and Kota Pare-Pare with the FDA and WHO provisions of 120 mg / kgBW / day or 6 g / 50 kgBW / day as a standard used 50 kg weight for the State of Indonesia showed a significant difference ($p < 0.05$), but the average MSG levels obtained from each sample are still considered to meet the standards under the usage standard by WHO / FDA. Thus, the total MSG content in the meatball snacks is still eligible for consumption by adults with standard BB 50 kg based on WHO / FDA usage dose of 120 mg / kg BW / day or 6 g / 50 kgBW / day [9,10].

In the United States 5% of the population is sick because of consuming MSG, and it is estimated that this number will continue to increase. Although the results obtained on meatball snacks are safe for consumption but still need to note the dosage of its use, especially for consumers who are sensitive to MSG should be more careful in choose foods containing MSG and if necessary not to consume MSG considering 0.5 g to 2.5 g MSG can provide reactions such as asthma attacks, headaches, hypertension, brain tumors, stroke, anemia, and other diseases. [11,12]

5. Conclusion

Conclusion of this study is food snacks meatball sold in the area of Makassar and Parepare city positively contain MSG. Results of quantitative analysis, where the MSG content contained in each sample of snack meatballs in Makassar and Parepare city showed no significant difference where the MSG content in meatball snacks are traded in Makassar and in Kota Pare-Pare is still below the standard for adults with standard BB 50 kg based on WHO / FDA usage dose of 120 mg / kg BW.

Acknowledgement

The authors would like to acknowledge to friends and family for supporting me during this study.

6. Competing Interest

The authors declare that they have no competing interests.

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