

THE EFFECT OF BIVALVE *Semele* sp. MEAT CONSUMPTION ON ESTROGEN LEVEL AMONG THE PEOPLE OF MUNA REGENCY, SOUTHEAST SULAWESI

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ABSTRACT

A study on the influence of bivalve *Semele* sp meat consumption on estrogen level among the people of Muna Regency, Southeast Sulawesi, was conducted in Lasalepa Village, Bonea Subdistrict, Muna Regency, Southeast Sulawesi. This study was aimed to: (1) determine the nutritional content of bivalve *Semele* sp meat, (2) compare the estrogen levels between women that consume *Semele* sp meat and those that do not. This study was an experimental study with one group pre-test and post-test. Subjects consisted of 20 women in the age range of 40-55 years old. Subjects consumed raw *Semele* sp meat in the amount of 400-500 g three times in a week for one month. Blood samples were collected through cubital median vein, before and after bivalve consumption. Protein content was measured by Kjeldhal method, carbohydrate by Anthron method, fat by gravimetry, mineral by AAS, and estrogen by ELISA technique. Study findings indicated that (1) the protein content was 7.182%, carbohydrate 66.87%, fat 6.82%, cholesterol 10mg/dL, calcium 263.385 ppm, cuprum 9.107 ppm, magnesium 28.467 ppm, ferum 1,859 ppm, zinc was undetectable, (2) there was a significant difference in estradiol and estron levels before and after bivalve consumption in the three age groups, 17,022 pg/mL and 51.018 pg/mL, (3) there was no significant difference in estriol level before and after bivalve consumption in the three age groups.

Keywords: Bivalve *Semele* sp., estradiol, estron, estriol.

INTRODUCTION

Muna regency lies in Southeast Sulawesi Province, with various marine products including bivalves that contain important nutrients for reproduction: fats, vitamins, and minerals (Kellog and Fautin, 2004). Fats contained in bivalves and crustaceans are dominated by non-cholesterol groups. Some people consume bivalves to increase libido. Most of the women that frequently consume bivalve *Semele* sp meat have later menopause period onset than those that do not consume *Semele* sp. According to empirical experience of local people, women that frequently consume *Semele* sp meat have a shorter menopause period, that is above the age of 50 years old (Sjafaraenan and Ruslan, 2009). It could be possible that there is a compound in the bivalve that can stimulate the formation of estrogen hormone, that the menstrual cycle in bivalve *Semele* sp consumers is kept normal.

METHODS

Pre-experimental one group pre-test and post-test design was used in this study. Subjects and bivalves *Semele* sp were derived from Lasalepa Subdistrict, Muna Regency, Southeast Sulawesi. Total subjects were 20 women that were not in menopause period. Blood samples were collected through cubital median vein (2 cc) before and after consuming 400-500 g of bivalve *Semele* sp. meat, three times per week for 1 month.

Subjects were divided into three groups:

Group I : 40-43 years old

Group II : 44-47 years old

Group III : 48-55 years old

The measurement of estrogen level followed the DRG International USA method (Anonym, 2008).

1. Estradiol

25 µl of serum was put into eppendorf tube, added with 200 µl enzyme conjugate and the put on shaker. Specimens were incubated for 120 minutes in room temperature, washed with 400 µl wash solution then put on shaker for 120 minutes at room temperature. then the sample were washed with wash solution 400 µl three times, added with 100 µl substrate solution, reincubated at room temperature for 15 minutes, and

added with 50 µl stock solution. Reading was performed on spectrophotometer lambda: 450 nm.

2. Estron

50 µl of standard solution, control, and serum were put into eppendorf tubes, each was added with 100 µl enzyme conjugate and put on shaker for 10 seconds, incubated for 60 minutes at room temperature, washed four times with wash solution, reincubated for 30 minutes at room temperature, and added with 50 µl substrate solution. Reading was performed on spectrophotometer lambda 450 nm.

3. Estriol

20 µl of sample standard solution and control were put into eppendorf tube, added with 200 µl diluted conjugated, incubated for 1 hour at 37°C, washed with aquadest. 300 µl of the specimen was reincubated at room temperature for 15 minutes, added with 100 µl stock solution and read on spectrophotometer lambda 450 nm.

The protein content was measured by Kjeldhal method, carbohydrate by Anthron method, fat by gravimetry, and mineral by AAS.

RESULTS

1. Nutritional Content of Bivalve *Semele* sp. Meat

Analysis result of nutritional content of bivalve *Semele* sp. meat can be seen from Tabel 1.

Table 1. Nutritional content of *Semele* sp. meat.

Component	Value
Protein	7.182 %
Carbohydrate	66.887 %
Fat	6.820 %
Cholesterol	10.000 mg/dl
HDL	6.000 mg/dl
LDL	Undetectable
Ca	263.385 ppm
Cu	9.107 ppm
Mg	28.467 ppm
Fe	1.859 ppm
Zn	Undetectable

2. Estrogen Level Before and After Consuming *Semele* sp.

Estradiol, estron and estriol level were measured by ELISA for all age groups and can be seen from Table 2-7.

Table 2. The measurement of estradiol level in each group, before and after consuming raw *Semele* sp. meat

No	Age group (year)	Average Estradiol Level		Difference
		Before	After	
1	40-43	25.515	45.634	20.118
2	44-47	32.263	46.951	14.689
3	48-55	28.707	45.729	17.022

Table 3. Paired t test of estradiol level before and after consuming bivalve *Semele* sp. meat

No	Age group (year)	t value	Sig (p)
1	40-43	-2.783	0.027
2	44-47	-3.533	0.008
3	48-55	-8.098	0.015

Table 4. The measurement result of estron level in each group, before and after consuming bivalve *Semele* sp. meat

No	Age Group (year)	Average Estron Level		Difference
		Before	After	
1	40-43	92.916	120.264	27.348
2	44-47	85.138	110.446	25.308
3	48-55	69.959	120.977	51.018

Table 5. The results of paired t test on estron level before and after the consumption of *Semele* sp. meat in each age group

No	Age group (year)	t value	Sig (p)
1	40-43	-2.659	0.033
2	44-47	-2.402	0.043
3	48-55	-4.759	0.041

Table 6. Estradiol level in each group, before and after the consumption of raw bivalve *Semele* sp. meat

No	Age Group (year)	Average Estradiol Level		Difference
		Before	After	
1	40-43	3.225	3.971	0.746
2	44-47	2.903	2.020	-0.883
3	48-55	5.234	5.880	0.646

Table 7. Paired t test on estradiol level before and after the consumption of *Semele* sp. for each age group

No	Age Group (year)	t value	Sig (p)
1	40-43	-1.417	0.199
2	44-47	0.927	0.381
3	48-55	-1.519	0.268

Table 2 shows that the average estradiol level in each age group increases after consuming *Semele* sp. meat, and the increase was in normal range. The age group of 40-43 years old had an increase in estradiol level by 20.118 pg/mL, age group of 44-47 years old by 14.689 pg/mL and age group of 48-55 years old by 17.022 pg/mL.

The similar increases for all age groups indicated that the estradiol level increase in all subjects tended to be high.

Differences were showed by t paired test for samples in Table 3. Test results indicated that the consumption of bivalve *Semele* sp. meat had a significant influence on estradiol level increase among women in all age groups.

The measurement of estron level in each age group is shown in Table 4. Estron level increase after the consumption of bivalve *Semele* sp. meat can be observed in all age groups. The estron level increase in the age group of 40-43 and 44-47 was 27.348 pg/mL and 25.308 pg/mL, respectively. The age group of >47 years old had a very high estron level increase that reached 51.018 pg/mL. The results of paired t test for sample also indicated that the consumption of bivalve *Semele* sp. meat had a significant influence as can be seen from Table 5.

The measurement of estradiol level produced by estradiol is shown in Table 6. Table 6 shows that the estradiol level among subjects did not increase significantly. This can be seen from the difference of the level before and after the consumption of bivalve *Semele* sp. meat, in which the first group showed an

increase of 0.746 pg/mL and the third group showed an increase of 0.646 pg/mL. This was observable from paired t test that indicated no significant effect in all age groups, as shown in Table 7.

DISCUSSION

The effect of bivalve *Semele* sp. meat consumption on the increase in estradiol and estron level among women aged more than 40 years old included the later onset of menopause. It could be possible that the meat of the bivalve *Semele* sp. contains a compound that could stimulate the sexual hormonal activity to continue to produce estrogen hormone, that keep normal menstrual cycle in women that frequently consume *Semele* sp. and influences their menopause onset.

Table 1 indicates that the meat of *Semele* sp. contains calcium in fairly high level 263.385 ppm, iron 1,859 ppm and HDL 6 mg/dL. HDL is known to be good for women health, because it keeps the bones health and blood viscosity. In addition, HDL is the part of cholesterol and as steroid hormone precursor (Pigott and Barbee, 1990). The meat of *Semele* sp. also contains cholesterol in the amount of 10 mg/dL and fat 6.82%. Cholesterol has been established as steroid hormones precursor, through biogenic pathway biosynthetic of mevalonic acid with the help of aromatase that produce an aromatic compound 17-β-estradiol (E2), an estrogen with 18 carbons and 2 OH functional groups, progestin and androgen (Usman, 2002; Hinson *et al.*, 2010). Another minerals contained in *Semele* sp. meat were magnesium and calcium in fairly high level. These minerals are important in reproductive hormone metabolism. According to study on the effect of aluminium, magnesium and boron on postmenopausal women by Forrest *et al.* (1987), magnesium can increase estradiol and testosterone concentration. These minerals play an active role in enzymatic processes and act as antioxidant (Sembiring, 2008).

Overall, it can be said that estrogens level in each age group before and after the consumption of *Semele* sp. meat increased significantly by 17.022 pg/mL and 51.018 pg/mL for estradiol and estron, respectively. This could be possible by the presence of fats and cholesterol, these components are the precursors of steroid products including sexual hormone: estrogen, progesterone, and testosterone (Lehninger, 1990; Hefner and Danny, 2008). This is in accordance to Jacobson *et. al.* (2003) study that found that frequently consuming foods containing fats could increase the circulating estradiol level in serum and contributed to the prolonged reproductive functions. Other minerals such as calcium and magnesium also play important roles and present in high level in bivalve *Semele* sp. meat, whereas estradiol level had no significant effect before and after the consumption of bivalve *Semele* sp. meat. This was suggested caused by the subjects during study were not pregnant, and it was found that estradiol hormones were produced by estradiol and placental peripheral tissue.

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