Oral Presentation (PCS-8)

# Oyster Shell Powder as Alternatives Macromineral for Synthetic Testosterone

Pudji Astuti[1*], Claude Mona Airin[1], Alfarisa Nururrozi[2], Harimurti[3]

[1]Department of Physiology, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Indonesia
[2]Department of Internal Medicine, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Indonesia
[3]Faculty of Animal Science, Universitas Gadjah Mada, Indonesia

**Keywords**: Oyster shell, testosterone, Zn, Mg.

## INTRODUCTION

Oyster is one of seafood produced in waters, especially in eastern Indonesia. During this time, oyster is known as aphrodisiac agents, an agent that can increase sexual appetite because it can remind testosterone levels and very high nutrient content of zinc, vitamin A iron, calcium, and selenium are also Vitamins A and Vitamin B12. Therefore, the oyster is known as the mineral's potent testosterone-boosting abilities (Matsuda et al., 2003). Zinc is also very important, it can be used as a stimulant of enzymes, hormones and the immune system.

Due to the abundance of oysters in Indonesia, only meat of oyster is consumed, while the existing shells are never used to consume and just thrown away. Therefore, a research plan will be made on the use of oyster shell waste, as a precursor of testosterone in Rat (*Rattus norvegicus*). Since many kinds of oyster, it would be compared among three kinds of oyster shell namely Kerang darah (*Anadara granosa*), Kerang hijau (*Perna viridis*) and Kerang keong (*Telescopium telescopium)*.

Based on function, Zn inhibits aromatase enzyme which convert estradiol to testosterone as a consequence, testosterone levels will increase (Michell et al. 2012).

The purpose of this study were to determine the highest content of Zn among the three types of oyster shell; 2. To measure testosterone levels in rat after given shell powder containing highest Zn.

## MATERIAL AND METHODS

### Identification of Oyster Shells.

Oyster which derived from Lombok Island and Samas beach were identified at the Faculty of Biology Universitas Gadjah Mada (UGM). To simplify the process, all shells will be made in powder, and tested on levels of Zn, Ferro, Calcium, Magnesium using ICP. All procedures are carried out at the Integrated Research and Testing Laboratory UGM.

**Laboratory Animal**. Male rats, age 1.5 months were used in the study. Animals were divided into 4 groups, and each of animal were given by 0.18 mg/200 g of oyster shell of *Anadara granosa*, 0.09 mg/200 g of oyster shell, 1 mL of Na-CMC solvent and 1 mL of pure Zn. To determine the beginning of changes the testosterone levels, whole blood sampling were obtained through the vein of infraorbital then animals sacrificed serially on the day-9, -30 and -50. All the research procedures have been approved by the LPPT Research Ethics Committee with No 00023/04/LPPT/IV/2018

**Hormone Assay**. Whole blood were made serum by centrifugation with a speed of 3000 rpm for 15 minutes. The obtained serum was frozen at -8°C until hormone assay was performed. Assay hormone prosedure was done at Laboratory of Physiology, Faculty of Veterinary Medicine UGM.

## RESULT AND DISCUSSION

### Content of Zn, Mg, Ca, Na, Fe and K in Shell of Three Types of Oyster.

Table 1 showed that *Anadara granusa* has the highest content of micromineral especially for Zn, Mg, Fe and K levels compared to the other two types. Zinc and Mg are microminerals that serve to increase testosterone. Sir (2016) stated that Zinc and Magnesium are two minerals that have been studied for their potential role in boosting free testosterone levels. Mg to be positively associated with testosterone by increasing of Sex Hormone Binding Globulin (SHBG) blocking. It is uncompetitive inhibition of Mg on T-SHBG bonds, testosterone affinity to SHBG is altered, resulting in *more* bioactive Testosterone into bloodstream. Chang et al (2016) Testosterone chelates $Mg^{2+}$, but not $Ca^{2+}$ or $Zn^{2+}$ and also explored the cation-induced signal shift effects of Tes in the presence of $Mg^{2+}$, $Ca^{2+}$, or $Zn^{2+}$.

Many kinds mechanism of Zinc to stimulate Testosterone. Michell et al. (2012) reported mechanism of zinc protection can be through an increase of SH concentration. Kumar et al. (2012); Sedigh et al. (2014) stated that zinc can affect level of FSH and LH so that level of testosterone will increase, and it would be predicted Zinc has a blocker effect on aromatese enzyme which convert Testosterone to Estrogen.

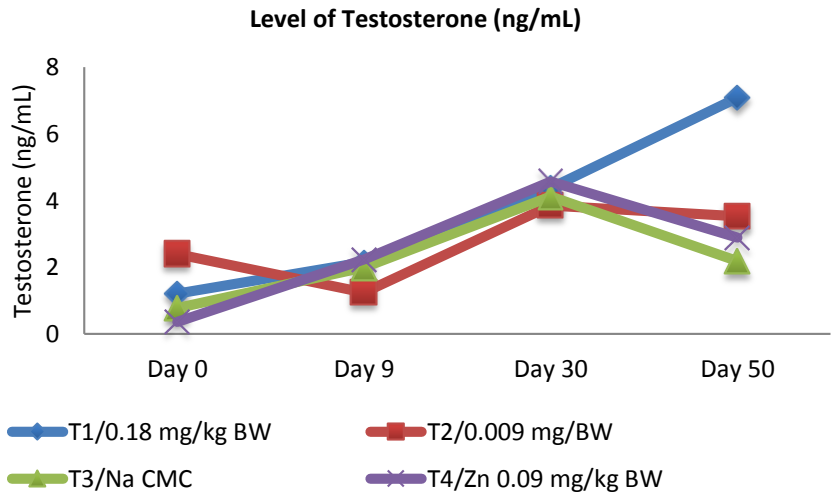
**Level of Blood Testosterone**

Testosterone is the most important hormone in causing libido. In this study it appears that *Anadara granusa* powder has a very good effect in increasing testosterone levels. Figure 1 shows that after giving *Anadara granusa*, testosterone levels was increased gradually especially on day 30. Furthermore, testosterone levels decreased on day 50, except in group 1 (0.18 mg / 200 g) which was consistent in elevated. Level testosterone on all of animals during 50 days were as follow: group I (0.18 mg/200 g BW) from day 0, day 9, day 30 and day 50 was 1.215, 2.153, 4.375, 7.094 ng/mL; group II (0.09 mg/200 g BW): 2.403, 1.248, 3.860, 3.541 ng/mL; group III (Na-CMC): 0.779, 1.992, 4.123, 2.186 ng/mL; group IV (Zinc): 0.367, 2.230, 4.577, 2.892 ng/mL.

Zinc (Zn) and magnesium (Mg) may enhance levels of Insulin-like Growth Factor-I (IGF-1) and zinc, in particular, may contribute to elevating serum testosterone. Zinc worked as an inhibitor aromatase, enzyme that convert estradiol to testosterone (Cinar et al. 2017)

Table 1. The Content Macromineral of Shell Oyster

| Shell of oyster | Zn mg/kg | Mg mg/kg | Ca mg/Dl | Na mg/kg | Fe mg/kg | K mg/Kg |
|---|---|---|---|---|---|---|
| *Anadara granusa* | 61.55 | 1666.09 | 41.4 | 9262.98 | 600.54 | 369.29 |
| *Perna viridis* | 2.78 | 141.37 | 55.58 | 8385.29 | 3.99 | 174.23 |
| *Telescopium telescopium* | 3.93 | 151.23 | 47.15 | 7793.41 | 8.5 | 164.91 |




In a study conducted on a similar previous issue, it is asserted that ZMA (a synthesis of zinc, magnesium And vitamin) which is thought to increase the testosterone levels (Cinar et al. 2017). It would be concluded that oyster shell of *Anadara granusa* has potential effect for increasing of Testeosterone.

**REFERENCES**


[1] Azadeh S, Mehrdad M, Akbar P. 2014. Effect of Organic and Mineral Zinc Supplement in Diet on Reproductive Hormones in Mice. *International Journal of Animal and Veterinary Advances* 6(2): 77-79

[2] Brilla LR, Victor C. 2000. Effects of A Novel Zinc-Magnesium Formulation On Hormones And Strength. *Journal of Exercise Physiology online.* 3(4): 29-36 ISSN 1097-9751

[3] Çinar V, Talaghir LG, Akbulut T, Turgut M, Sarkaya M. 2017. The Effects of The Zinc Supplementation And Weight Trainings On The Testosterone Levels. *Human Sport and Medicine*, 17: (4,): 58–63

[4] Kumar S, Pandey AK, Razzaque WAA, Dwivedi DK. 2011. Importance of micro minerals in reproductive performance of livestock. *Veterinary World*. 4(5): 230-233

[5] Michele KS, Patricia G, Renata CP, Bruna D, Débora CD, Oduvaldo CMP. 2012. Possible mechanism by which zinc protects the testicular function of rats exposed to cigarette smoke. *Pharmacological Reports*, 64, 15371546

[6] Yen-yu C, Kathleen DC, Su-Ching L, Ying-Yann W. 2016. NMR Investigation of Magnesium Chelation And Cation-Induced Signal Shift Effect of Testosterone. *Steroid*. 15: 18-25