

## THE INFLUENCE OF SNAKEHEAD (*CHANNA STRIATA*) EXTRACT TREATMENT TO THE MDA LEVEL IN PANCREAS OF HYPERGLYCEMIC RAT (*RATTUS NOVERGICUS*)

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### ABSTRACT

The influence of snakehead (*Channa striata*) extract (SHE) on the MDA level in hyperglycemic rat (*Rattus novergicus*) had investigated. Injection of alloxan monohydrate was conducted to induced the hyperglycemic prior to treatment with SHE by oral methods for two weeks. The oxidant capacity of SHE in pancreas were evaluated based on the level of Malondialdehyde (MDA). Pancreatic MDA concentration in the group of hyperglycemic rat that was not treated by SHE was in level of 93.96 nmol/ml which significantly higher ( $p < 0.05$ ) than groups of hyperglycemic rat that were treated by SHE in the highest and median dosage i.e. MDA=23.98 nmol/ml and 33.43 nmol/ml, respectively. The lower MDA concentration in the SHE treatment group indicates that SHE therapy can improve the antioxidant capacity resulting the lower levels of free radicals or oxidative stress in pancreas

**Keywords:** Snakehead; oxidant capacity; MDA; pancreas; hyperglycemic

### INTRODUCTION

Diabetes mellitus is a metabolic disease characterized by hyperglycemia (high blood sugar) metabolism disturbances accompanied carbohydrates, fats and proteins due to failure of insulin secretion, insulin capacity or both (Alberti and Zimmet, 2011). Riskedas (2007) reported that the diabetes mellitus prevalence of Indonesian people aged > 15 years in urban areas is 5.7%. The coastal area of East Java has a high potential of fisheries, included snake head (*Channa striata*) i.e. 16.23% of a total of 15 species of fish catches (National Fisheries Data, 2007). Moreover, in popular society, traditional and scientifically has known that snakehead has the medicine potential. The extract of fish snakehead contains rich of albumin (Suprayitno et al., 2009; Santoso, 2009). A group (-SH) in albumin serves as a binder radical that plays a role in the cleaning process and inhibit activities of Reactive Oxygen Species. It capable to makes multiple-binding sites and has free radical-trapping properties ( (Roche et al., 2008 ; Santoso, 2009)

Previous study by Abdul Gani et al. (2013) found that the snakehead extracts (abbreviation: SHE) can repair the damage of pancreatic tissue in hyperglycemic mice. The founding reveals the hypothesize that this repairing capacity is influenced by the antioxidants in the SHE, however the further testing should be conducted. MDA (malondialdehida) is the one of commonly indicator that used to assess the presence of lipid peroxide. Lipid peroxide is a free radical that can be a biomarker for oxidative stress and closely related to the severity of a disease in the body. The higher levels of MDA increased severity of a disease, while the decreased MDA levels indicates the health improvement (Sultana et al, 2013; Nielsen et. al., 1997). The aim of this study is detemining the antioxidant capacity in the pancreas of diabetic rats after treatment with SHE based on the concentration of MDA.

## MATERIALS AND METHODS

The white rats (*Rattus norvegicus*) that fed with pellets and frequently weighted were acclimatized in the laboratory for two weeks. The rats were fasted for 18 hours prior to checking the blood sugar levels on days 15, 19 and 34. The groups of rat that expected to be hyperglycemic were induced with alloxan monohydrate injection based on a reference dose of 190 mg/kg body weight. Meanwhile, rats in Negative group (C-) injected with distilled water only. Then, the blood glucose level on the day of 16<sup>th</sup> were measured to determined the hyperglycemic status (blood glucose levels > 200 mg / dL). Furthermore, the hyperglycemic rats were orally treated with SHE in four groups, included 0 ml/day for Positive Control (C+), and 0.074 ml/day; 0.125 ml/day; 0.149 ml/day for Low Dose (LD), MD (Middle dose) and High Dose (HD) respectively. After two weeks of daily treatment of SHE, the rats were prepared to pancreatic MDA analysis.

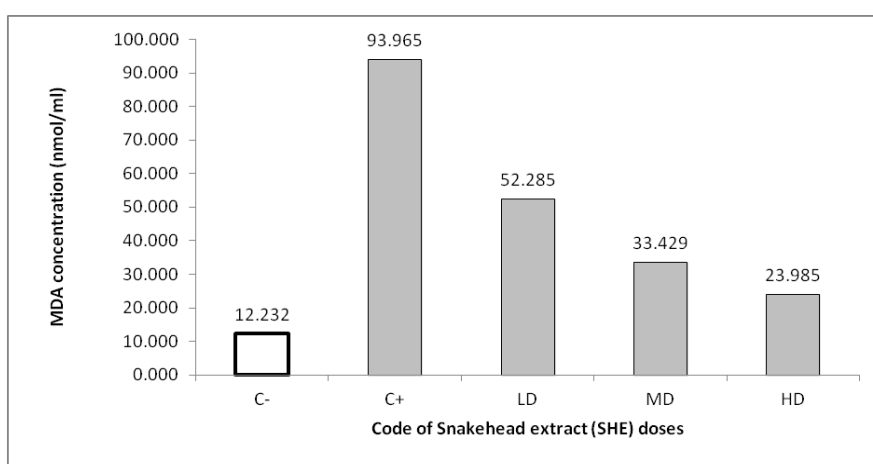
Levels of lipid peroxidation (MDA) were analyzed using methods Capeyron et al. (2002 ) with the following procedures : A total of 0.5 g pancreas was crushed in cold conditions and added 1 cc of physiological saline. Homogenates were centrifuged at 4000 rpm for 10 minutes. Then 0.5 ml homogenate or standard was added with the mixture of 2 ml of HCl 0.25 N; 15 % TCA (tricholoro acetic acid), 0.38 % TBA (thiobarbituric acid), and 0.5 BHT. Standard solution and the mixture was centrifuged 3500 rpm for 10 minutes. Absorbance of the supernatant was measured at 532 nm. As a standard solution used TEP (1,1,3,3-tetraeoksipropana). The statistical analysis of ANOVA and Tukey test were used to determined the effect of SHE on the hyperglycemic rats and its differences effect among the groups.

## RESULTS AND DISCUSSION

The average concentration of pancreatic MDA (Fig. 1) in the rat of control group (C-) showed the lowest of pancreatic MDA (12.23 nmol/ml). Contrary, in hyperglycemic rats that were not treated with SHE or 0 mg/day (Group C+) showed the highest concentration of MDA i.e. 93.96 nmol/ml. This founding indicates that the hyperglycemic rats that not treated with SHE showed highest level of oxidative stress. Tang et al (2012) reported that the diabetes generated oxidative species (ROS) through the polyol pathway. Oxidative stress itself is

known to closely related to the severity of a disease, where the more severe a disease also increase the state of oxidative stress. Similar trend had observed in preliminary study (Abdulgani et.al, 2014) which the hyperglycemic mice that not treated with SHE showed highest tissue disturbances.

Moreover, according to the Tukey test, the control positive rats (C+) is significantly higher ( $p < 0.05$ ) of pancreatic MDA than the hyperglycemic rats that treated with SHE ( HD = 23.98 nmol/ml; MD = 33.43 nmol/ml; LD= 52.29 nmol/ml. The highest levels of pancreatic MDA that found in group of hyperglycemic rats C+ indicated that without SHE treatment, the pancreatic tissue was maintained in unhealthy status. The high of pancreatic MDA indicates the disturbances of physiological and structures (Nielsen et al., 1997 and Sultana et al. 2013) of pancreas tissue as found in preliminary study (Abdulgani et al, 2014)



**Figure 1.** Concentration of pancreatic MDA. Non-hyperglycemic rats (light bars) and hyperglycemic rats (dark bars) after treatment with SHE: 0 mg/day (C+); 0.074 ml/day (low dose =LD); 0.125 ml/day (middle dose= MD); 0.149 ml/day (High dose=HD).

Meanwhile, the hyperglycemic rats that treated with the high and median dose of SHE (HD,MD and LD) showed the lower of MDA concentration which reflects the lowering of oxidative stress. Moreover, pancreatic MDA of HD and MD group are found not significantly different ( $p > 0.05$ ) to normal or non-hyperglycemic rat (C- = 12.23) indicates that the SHE also has the potential recovery of pancreatic function and tissue structure.

The lowering MDA in hyperglycemic rats that treated with SHE (LD, MD and HD) could be related with the richness of albumin in SHE. Refer to references of Roche et al. (2008) and Santoso, (2009), the group (-SH) in albumin of inhibit activities of Reactive Oxygen Species, hence the recovery of pancreas tissue disturbances were possibly occurred. The SH molecule capable to makes multiple-binding sites and trapped the free radical, hence the MDA level in the rats that treated by SHE were decreased. The lowering MDA indicates the lowering of oxidative stress which influenced antioxidant activities. The result proves the hypothesize that the content of antioxidants in the SHE has an important role in the repair of the pancreatic tissue.

## CONCLUSION

The treatment of snakehead fish extract (SHE) may increase the antioxidant capacity in pancreas and has potential to recover the disturbances in pancreas of hyperglycemic rats.

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