CHAPTER I

PRELIMINARY

A. The Background of The Research

Cells continuously produce free radicals and reactive oxygen species (ROS) as part of metabolic processes. **(Urso, 2003)**. Free radical are molecules or fragments of molecules that possess an unpaired electron in their outer orbital. Because of this molecular instability , radicals are highly reactive and can promote damaging antioxidant reactions with cellular proteins, lipids or DNA, leading to oxidative stress and impaired cellular function **(Powers, 2004)**.These free radicals are neutralized by an elaborate antioxidant defense system consisting of enzymes such as catalase, superoxide dismutase, glutathione peroxidase and numerous non enxymatic antioxidants, including vitamin A, E, and C, glutathione, ubiquinone, and flavonoid **(Urso, 2003)**.

Many studies have reported that acute aerobic exercise contributes to oxidative stress, especially when performed at high intensity levels. Two mechanisms linking acute aerobic exercise and oxidative stress are **(Urso, 2003)** increased pro-oxidant activity via a mass action effect when VO2 is elevated 10- to 15- fold above rest **(Bloomer, 2005)**, and inadequate antioxidant activity relative to pro-oxidants **(Allesio, 2000)**. Exercise can produce an imbalance between ROS and antioxidants, which is referred to as antioxidative stress **(Urso, 2003)**.

Oxidative stress is a condition in which the cellular production of pro-oxidants exceeds the physiologic capacity of the system to render these inactive. This occurs by way of the body's endogenous antioxidant defense system, in conjunction with exogenous antioxidant consumed through dietary sources. **(Bloomer, 2005)**.

Physical activity results in an increased production of free radicals and reactive oxygen species (ROS) and it is well known to intense exercise **(Powers, 1994)**, as devidenced by directed measurement of free radicals with the electron paramagnetic resonance technique **(Davies, 1982)** and by indirect determinations of product of free radicals reactions **(Jackson, 1985)**.

Experimental studies have shown elevated metabolic rate by strenuous physical exercise induces oxidative stress and production of excessive amounts of free radicals. High intensity exercise produces oxygen free radicals that can cause damage lipid membranes, proteins, DNA and other cellular components **(Lovlin et al, 1987)**.

The mechanism of the damage of cell caused by free radical that studied early is lipid peroxidation.More of lipir peroxidation is found on cell membran, in particular the unsatured fatty acid as an important component of cell membrane. Cell membrane sontain the source of polyunsatured fatty acid (PUFA) that damaged by oxiding substance, related process that known as fatty peroxidation. This is very damage because it is a continuous process (Droge, 2002).

In the previous research, the decreasing of MDA content is an indication of the increasing of blood hemoglobin content that indicates that there is influence of

providing vitamin C to the increasing of human Hb after sub maximal practice (Nicolas, 2011).

Antioxidant supplementation terminates the chain of the reaction by removing free radicals and inhibits other oxidation reaction by oxidizing themselves **(Armani, 2010)**. Several studies have shown that antioxidant vitamin supplementation decreases oxidative damage in human subjects **(Joppi, 2006)**. Because antioxidant supplementation has been shown in some studies to have favourable effect against lipoperoxidative damage in highly trained **(Rokitzi et al, 1994)** or in overloaded subjects **(Itoh et al, 1999)**, it has been suggested that antioxidant recommendations for exogenous requirements should be increased for those with high energy expenditure **(Rosseau, 2004)**.

Most of the research conducted so far about the impact of various forms of physical activity on level oxidative stress is confirmed by changes in biomarkers that indicate lipid peroxidation and protein modification. Untrained person, as opposed to trained, are more susceptible to major changes in the body caused by oxidative stress during the physical activity. **(Stankovic, 2012)**.

B. The Problem of The Research

In accordance to the background of the research the problem of the study is : Is there any effect of high free radical on increase oxidative stress after phisycal activity ?

1. Is there any effect of vitamin C supplementation on blood haemoglobin levels in student after maximal physical exercise ?

2. Is there any effect of vitamin C Supplementation on reducing free radicals in blood ?
3. Is there any effect of vitamin C supplementation on improving student performance after doing physical exercise ?

C. The Limitation of The Research

Given the extent of the problem to be investigated as listed in the identification of problems , need to specify any restrictions on the problem , the researcher limit the problem be "the effect of vitamin C supplementation on blood hemoglobin levels in athletes after physical exercise".

D. The Objective of The Research

Based on limitations issues in this research defined the problem as follow is there any effect of vitamin C supplementation on blood haemoglobin levels in athlete after physical exercise ?

E. The Purpose of The Research

The objective of the research is to know the effect of vitamin C supplementation on blood haemoglobin levels in student after physical exercise.

F. The Implication of The Research

The result of the study are expected to be useful for :

1. For another researcher can be used as a reference to complete the research about antioxidant and haemoglobin in different problem.
2. For science of sport can be used as a reference to maintain the health status and prevent internal medicine caused by free radicals.
3. Providing scientific information about the sport, especially in benefits of vitamin C during exercise to increase the athletes performances.
4. Provide an overview of the coach and athletes about the importance of vitamin C during the course of high-intensity exercise program.