CHAPTER 1

INTRODUCTION

1.1 Epidemiology of HIV infection

In 2005, UNAIDS/WHO reported that in 2005 approximately 40.3 million people worldwide were infected with HIV/AIDS and 3 million died due to AIDS. Newly infected with HIV were approximately 4.9 million in the same year. Sub-Saharan Africa had the highest HIV/AIDS infection in the world, with an estimated of 25.8 million people. The second highest of HIV/AIDS infection is in Asia Pacific, which estimated of 7.4 million people were infected and 480,000 people died from AIDS [(1)]. In Thailand, the Thai working group on HIV/AIDS Projection estimated that 1,109,000 people were infected with HIV and numbers of AIDS-related deaths were approximately 600,600[(2)] by the end of 2006. In Chiang Mai, from 1988 to September 2006 about 28,850 people were infected with HIV and 5,693 people died from AIDS [(3)].

The period of time for people infected with HIV to develop AIDS is varied. Forty eight percent of HIV-infected men in San Francisco developed AIDS within 8-10 years [(4)]. The CASCADE study of HIV-infected individuals from 15 countries in Europe, North America and Australia before widespread use of highly active antiretroviral therapy (HAART) revealed that the median time for changing from HIV infection to be AIDS were dependent upon age groups. It was 11 years and 7.7 years

for subjects' age between 15-24 years old and 45-54 years old, respectively [5]. In Thailand, a study in young Thai conscripts infected with HIV at age 21 years reported that the median time from HIV infected to be AIDS was only 7.4 years [6]. It seemed that the progression to AIDS and death after HIV infection was more rapid in young men in Thailand than that reported in developed countries. Several factors might contribute to the more rapid progression, including host immune responses, viral characteristics, infrequent use of prophylaxis for opportunistic infections and lifestyle factors such as nutritional factors, stress.

1.2 Nutritional status and HIV infection

The nutritional status of HIV/AIDS patients is very important and it can influence on the maintenance and optimal function of the immune system. Several studies showed that low level of micronutrient such as serum vitamin A, E, B12, zinc and selenium in HIV infected patients associated with disease progression [7, 8, 9, 10]. Micronutrient supplement can extend and improve the quality of life in HIV/AIDS patients. Several studies supported these hypothesis, such as a recent study in Tanzania demonstrated that multivitamin supplements including vitamin B, C and E, delay the progression of the disease and provide an effective, low-cost means of delaying initiation of antiretroviral therapy in HIV infected pregnant women [11]. In addition, a study in Canada showed that a supplement of 800 IU daily of vitamin E and 1000 mg daily of vitamin C for 3 months reduced oxidative stress and viral load in HIV infected patients [12]. A study in Thailand demonstrated that multivitamin supplementation in HIV-infected patients who did not take either micronutrients or

antiretroviral drug, associated with a significant reduction in mortality among patients with baseline CD4+ T cell counts below100 cells/mm^3 [13].

1.3 The role of micronutrients on HIV infection

The role of micronutrients deficiency in pathogenesis of HIV infection is associated with two theories, the free radical theory and the nutritional immunological theory. HIV infection can induce oxidative stress because the virus, after entry to the cell will disturb the normal physiological and biochemical functions of immune cells. Increased oxidative stress can activate viral replication and can damage immune system [14, 15].

1.4 The effect of HAART on micronutrients status

At present, HAART is the standard of caring in the treatment of HIV infection. It can delay the replication of HIV virus. Results from treatment also reduce the rate of opportunistic infection and the mortality rate. However, adverse of treatment can inhibit the human DNA polymerase γ. These lead to depletion of mitochondrial DNA and drug toxicity [16]. Effect of mitochondrial dysfunction is an increase generation of free radical and oxidative damage [17]. The relationship between viral suppression and immune recovery is complex and involves multiple factors and it is believed that nutrition plays as an important role [18]. Currently, some studies investigated the effects of HAART on micronutrients status. A study in France found that HIV/AIDS patients with CD4+ T cell count < 250/mm^3 who treated with HAART for 3 years,

could recover selenium and zinc status [19]. In Italy, HIV-infected adults who were treated with HAART showed a significantly recover plasma zinc concentrations without zinc supplementation[20]. A study in Spain found that the prevalence of vitamin B12 deficiency was significantly lower in patients receiving HAART than patients who did not receive HAART [21]. In San Francisco, CD4+ T cell count increased significantly in the micronutrients supplement group more than the placebo group at 12 weeks [18].

In Thailand, approximately 84,162 AIDS patients have received HAART in National Access to Antiretroviral Programs for PHA (NAPHA) [22]. At present, there are limited results about the micronutrient status in HIV/AIDS patients, especially the effect of HAART treatment on micronutrient in HIV/AIDS Thai patients. Therefore, this study will conduct the evaluation of micronutrients status in HIV infected adults who receiving HAART compared to the healthy population.

1.5 The objectives of this study

1) To determine the status of vitamins A, E, B12, zinc and selenium of HIV-infected adult patients receiving HAART.
2) To compare the status of vitamins A, E, B12, zinc and selenium between HIV/AIDS patients receiving HAART and healthy subjects.
3) To compare the status of vitamins A, E, B12, zinc and selenium between the patients with CD4+ T cell count < 200/mm^3 and those with CD4+ T cell count ≥ 200/mm^3.