CHAPTER I

INTRODUCTION

The obesity epidemic globally has put a tremendous strain on conventional methods of treatment. It is indeed a fast growing epidemic that has captured Malaysia as well. According to the World Health Organisation (WHO, 2003), there are over 300 million obese adults globally. Low levels of physical activity and sedentary lifestyles have generally been implicated in the worldwide trend of weight gain (Popkin et al., 1995). Obesity, resulting from an imbalance between energy intake and expenditure, is the second leading cause of premature death in America. Other potential risks of obesity include cardiovascular diseases, diabetes, cancer and hormonal imbalances in women, leading to sterility (Sullivan et al., 1983). Obesity is defined as an increase of adipose mass resulting from a chronic imbalance between energy intake and expenditure, and is known to be a strong risk factor for type II diabetes associated with insulin resistance and many other chronic diseases. It seems that approximately 200 000 individuals around the world die every year in consequence of death associated to obesity (WHO 2003). Successful obesity treatment plans incorporate diet, exercise and behavior modification with or without pharmacologic therapy and/or surgery. Many therapeutic agents are available for the management of obesity, but adverse effects have been reported with almost all of them (Wells et al., 2003)

In the US, herbal and food supplements are also employed to promote weight loss. The Food and Drug Administration does not strictly regulate these products, so the ingredients may not be active and safe (Wells et al., 2003). However, in many developing countries certain traditional or complementary and alternative medicines are becoming more and more popular. These approaches include pharmacological

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therapies such as herbal medicines. The world market of herbal medicines based on traditional knowledge is estimated at USD 60 billion (WHO, 2003). Furthermore, the role of medicinal plants and traditional medicine for developing new drug is incontestable (Rates, 2001). So there can be seen the importance of herbal based products to combat obesity compared to modern pharmacologic therapies available.

Among the most popular compounds that play role to prevent obesity is hydroxycitric acid (HCA). Extensive studies have been conducted on HCA as a body weight loss agent. Some researches state that HCA can inhibit the body ability to store fat resulting in the excess fat to be exerted out from the body. HCA has been shown to be a potent inhibitor of ATP-citrate lyase, which is a citrate cleavage enzyme that plays an essential role in *de novo* lipogenesis inhibition. The inhibition of this reaction limits the availability of acetyl-CoA required for fatty acid synthesis and lipogenesis. Hypothesis suggests that HCA may help in weight reduction through suppression of *de novo* fatty acid synthesis, inhibition of ATP-citrate lyase and reduction food intake through appetite suppressant. As a result, it lowers body weight and reduces body fat mass (Hamilton et al. 1977; Heymsfield & Allison, 1998; Sullivan & Triscari, 1977). Therefore, HCA has a potential for use as a body weight controlling agent (Jena et al. 2002). Pau-Ling et al. (2002) studied the effect of roselle extract on serum lipids of Sprague Dawley rats, and suggested that roselle plays an important role in the prevention of obesity.

HCA is now widely known as the principal acid of fruit rinds of some *Garcinia* species (Lewis & Neelakantan, 1965). It is a major compound found in dried rinds of *Garcinia cambogia*, a plant native to Southeast Asia belonging to Guttiferae family. Predominantly planted in India and Sri Lanka, the plant produces pumpkin-shaped fruits similar to those of *Garcinia atroviridis* (Asam gelugor). The fruits of Asam gelugor are used to produce 'asam keping' which is used in local cooking, while the fruits of *Garcinia cambogia* (also called Malabar tamarind) are used as a condiment in dishes such as curry. *Garcinia cambogia* is not known to be found in Malaysia, although it had been introduced in the past (Mohamad & Abdul Rahman, 2006). The extract contains 50-60% of HCA and is now being widely used

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mutations for its improvement was initiated in 1999 in cooperation with MINT (Mohamad et al.., 2002 & 2007). Mutation breeding conducted on a few of roselle accessions in UKM have resulted in the development of a few promising mutant lines of roselle. In April 2009, UKM has launched three new roselle varieties namely UKMR-1, UKMR-2 and UKMR-3.

Research in UKM has found that roselle also produces HCA. Hydroxycitric acid was previously extracted by Grieble (1942) who showed that a roselle sample taken from India contained 28% (dry weight basis) of HCA (Lewis, 1969). This added characteristic would further add value apart from being rich in anthocyanins and vitamin C. Isolation of HCA in a stable and biologically active form has been difficult. There are two forms of HCA existed which is the free acid form which is biologically active but is not stable and gets converted to its lactone form, which is stable but inactive. Roselle is a annual species. In this regard, roselle has the better potential compared to *Garcinia* spesies which are perennial species making roselle as a more convenient candidate as an alternate source of HCA. Therefore, this holds a great promise for roselle to be further promoted as the next important source of HCA thus building more prospect for future HCA-based products. But the drawbacks of HCA use as a weight loss compound stem from the problems in the poor extraction technology of HCA from the fruits which would often provides HCA in the lactone form which is inactive or less active in inhibiting the citrate lyase. Then, the HCA if not stabilised chemically, has natural propensity to be converted to the lactone form in aqueous solutions and in the gastrointestinal tract which is without absorption of HCA in the pure acid form, the HCA can not inhibit the citrate lyase. The findings on HCA in roselle in UKM are still new and the information on HCA is considered scarce. Therefore this research aims to:

1) To extract HCA in the form of potassium hydroxycitrate.
2) To compare the yield and properties of roselle extracts obtained from original method versus modified method.
3) To determine the content of HCA in eleven roselle accessions based on the content of potassium hydroxycitrate

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