

ABSTRAK

Angka prevalensi obesitas yang cenderung terus meningkat pada usia anak dan remaja sungguh mengkhawatirkan, sebab mereka adalah calon penerus generasi masa depan. Tanpa intervensi, anak yang mengalami overweight dan obesitas akan terus berlanjut hingga dewasa, sehingga resiko terkena penyakit degeneratif terkait obesitas semakin besar, terjadi lebih dini dan memperpendek usia harapan hidupnya.

Salah satu upaya pencegahan obesitas adalah dengan membatasi asupan energi dengan meningkatkan konsumsi pangan yang memiliki kadar *resistant starch* (RS) tinggi dan rendah kalori. Kadar RS suatu bahan antara lain dipengaruhi oleh kadar amilosa, banyaknya siklus autoklaf dan pendinginan, serta hidrolisis asam sitrat. Salah satu bahan pangan yang potensial dikembangkan sebagai sumber RS tinggi adalah kacang hijau. Penelitian bertujuan untuk mengkaji sifat pati dan RS kacang hijau serta pengaruhnya terhadap indeks obesitas. Ada tiga tahapan penelitian yang dilakukan.

Penelitian tahap pertama bertujuan untuk menentukan varietas kacang hijau yang memiliki kadar amilosa paling tinggi dan menentukan karakteristik sifat patinya. Dari empat varietas kacang hijau yang diteliti (Walet, Sriti, Murai, Vima-1), kacang hijau varietas Walet memiliki kadar amilosa paling tinggi (55,39 %) sehingga sangat potensial sebagai bahan dasar RS-3. Kadar amilosa tinggi ini terlihat pada sifat *swelling power* yang paling tinggi (17,11 g/g), *blue value* paling tinggi (8,92 %), dan intensitas difraksi sinar X yang paling rendah.

Penelitian tahap kedua bertujuan untuk menentukan metode preparasi yang menghasilkan RS-3 paling tinggi dan bagaimana karakteristik RS-3 yang dihasilkan. Hasil penelitian menunjukkan bahwa metode kombinasi 2 siklus autoklaf-pendinginan dan hidrolisis asam sitrat menghasilkan RS-3 tertinggi (15,58 %), *swelling power* paling rendah (9,99 g/g), *WHC* tinggi (220 %), *OHC* paling tinggi (64,89 %), mempunyai kurva amilografi tipe D, suhu gelatinisasi paling rendah (77°C), viskositas pati yang paling cepat teretrogradasi (710 Cp), bentuk granula tidak beraturan dan ukuran 3-4 kali lebih besar, pola difraksi sinar X tetap namun intensitas sinar X nya menurun, dan mempunyai derajat putih paling rendah (L= 85,83).

Penelitian tahap ketiga bertujuan untuk menentukan atau membuktikan efek fisiologis RS-3 pati kacang hijau terhadap indeks obesitas tikus *Sprague Dawley*. Selama 6 minggu pemeliharaan, diet FMF (*Fructose Medium Fat*) mampu meningkatkan indeks obesitas secara signifikan dan sebaliknya penambahan RS-3 mampu menurunkan indeks obesitasnya (berat badan, panjang badan dan jaringan adiposa). Penurunan indeks obesitas oleh diet FMF-RS3-1 berlangsung secara gradual dan lebih lama dibandingkan diet FMF-RS3-2 yang berlangsung lebih cepat. Diet FMF-RS3-1 lebih sesuai untuk tindakan pencegahan obesitas, sedangkan diet FMF-RS3-2 lebih sesuai untuk tindakan penurunan berat badan penderita obesitas.

Kata kunci : pati, amilosa, kacang hijau, RS-3, indeks-obesitas, FMF

ABSTRACT

The prevalence of obesity in children and adolescents is continuously increasing up to an alarming level. Awareness of this condition should be carefully taken as they are, in fact, the future generation of a nation. Without any intervention, children who are overweight and obese will take these burdens into their adulthood. They carry a high risk of obesity-related degenerative diseases. Even worst, these diseases may occur earlier and, thus, they have a shorter life expectancy.

A common known effort to prevent obesity is to limit energy intake by increasing consumption of food that have high concentration of resistant starch (RS) and low in calories. The concentration of RS in food is influenced by some factors, for example, the amylose content, the number of cycles of both autoclaving and cooling, as well as citric acid hydrolysis. As Mung beans contains a significant amount of amylose, this foodstuff has a good potency to be developed as a source of high RS. This study was conducted to evaluate the properties of mung bean starch, RS and its influence on obesity index. This research was performed in three parts.

The first part of the research aimed to determine the varieties of Mung beans that have the highest amylose content. In addition, the properties of its starch was also examined. Of the four Mung beans varieties were investigated (Walet, Sriti, Murai and Vima-1), the Walet variety has the highest amylose content (55.39 %) making it as the most potential source for RS3. High amylose content is seen on the properties of the highest swelling power (17.11 g / g), the highest blue value (8.92%), and the lowest of X-ray diffraction intensity.

The second part of the research aimed to determine the preparation procedure which is capable of producing the highest concentration of RS and to characterize the resulted RS. The data showed that the combination method of 2 cycles of autoclaving-cooling and citric acid hydrolysis resulted the highest concentration of RS (15.58 %), the lowest swelling power (9.99 g/g), higher WHC (220 %), the highest OHC (64.89 %), type D of amilograf curve, the lowest gelatinization temperature at 77 °C, the viscosity of the fastest retrograded starch at 710 Cp and the lowest whiteness level (L = 85.83). That method also produced RS having irregular granular form with larger dimension (3-4 times larger than the initial size of the starch granules). Meanwhile, the X-ray diffraction pattern was not changed (type C) but the intensity of X-rays was declined.

The third part of the research aimed to study the physiological effects of RS3 Mung bean starch to the obesity index of *Sprague-Dawley* rats. During the six week of maintenance, the FMF diet increase the obesity index significantly but addition of RS3 decrease it (body weight, body length and adipose tissue profile). The decline in the obesity index by diet FMF-RS3-1 take place gradually and longer than FMF-RS3-2 diet that is faster. Diet FMF-RS3-1 more appropriate for obesity prevention, while the FMF-RS3-2 diet is more appropriate for weight loss obese treatment.

Keywords: starch, amylose, Mung-beans, RS3, index-obesity, FMF.