# The effects of soluble dietary fibre from the Thai herb, sweet basil seed, on human body composition

Preeya Leelahagul DSc, Supanee Putadechakum MS and Vichai Tanphaichitr MD, PhD, FACP, FRACP

*Division of Nutrition and Biochemical Medicine, Department of Medicine and Research Center, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Rama 6 Road, Bangkok 10400, Thailand.*

Twenty obese patients, two males and 18 females, with a mean(±SEM) age of 41.7±3.2 years and body mass index (BMI) of 31.8±3.8 kg/m$^2$, were enrolled in a 16-week study to evaluate the usefulness and limitations of treatment with a sweet basil seed (*Ocimum canum*, Sims) extract. For 16-week (wk0-wk16), they were instructed to reduce their usual energy intake. After baseline observations for 4 weeks, for 12 wk (wk4-wk16), patients were asked to ingest 2 g of sweet basil seed extract, swollen with 240 ml of water, before lunch and supper (4 g/day). Sixteen patients commenced extract use at wk4. On the basis of their ability to ingest more or less than 50% of the extract, they were categorized into high dose (n=10) and low dose (n=6) users.

In high dose users, there were a significant decrease in BMI by the 4th week of treatment which was maintained at the 8th and 12th weeks of treatment, but skinfold thickness measurements for fat did not decrease. There may, therefore, have been a reduction in total body water. Further support for this view was provided by an observed increase in serum total protein concentration at the 12th week of intervention. That the distribution of water may have changed was suggested by an increase in upper arm muscle circumference (UAMC). For low dose users, on the other hand, their body fat increased at wk8 as indicated by both BMI and skinfold thickness measurements, suggesting that supplement use gave a sense of false security. Apart from the change in serum total protein in the high dose group, no significant effect was observed on lipid, renal or electrolyte status, although fasting glucose rose within the normal range.

This investigation demonstrated the importance of direct measures of body fatness, as opposed to those implied from weight-height relationships in the evaluation of management strategies for obesity.

## Introduction

Obesity is a common nutritional disorder encountered not only in the developed countries, but also in developing countries as they urbanize. The prevalence of moderate and severe obesity based on the body mass index (BMI) of 25.0–29.9 and ≥30 kg/m$^2$, respectively, in 2703 urban Thai men was respectively 23.3% and 2.2%, whereas the corresponding figures in 792 urban Thai women were 18.4% and 3.0%[1]. According to western reports[2-5], obesity and abdominal distribution of adipose tissue are important risk factors for health and may also be in Thai adults. Thus appropriate nutritional means should be implemented to reduce the prevalence of obesity. There is general agreement that dietary fibre is part of a healthful diet[6] and enhancing dietary fibre intake has been employed to treat obesity[7]. It is the purpose of this study to assess the usefulness and limits of sweet basil seed (*Ocimum canum*, Sims) extract as a source of soluble fibre in the treatment of obesity.

## Patients and methods

### *Patients*

Twenty patients, two males and 18 females, with a diagnosis of moderate or severe obesity who attended the Nutrition Clinic, Department of Medicine, Ramathibodi Hospital, Bangkok, Thailand, participated in the study. Table 1 shows their age, height, body weight, BMI, and occupation. None of them took any drug during the study.

### *Study design*

Throughout the 16-week study (wk0-wk16), patients were instructed to reduce their usual total energy intake and to achieve an energy distribution 20%, 30%, and 50% of total energy intake as protein, fat, and carbohydrate, respectively. During the last 12 wk, (wk4-wk16), they were treated with sweet basil seed extract, Fitne (New Concept Product Co., Ltd, Bangkok, Thailand). The product was supplied in 2 g lots packed in aluminium foil and containing 99% sweet basil seed extract in powder form, 0.98% aspartame, and 0.02% jasmin-flavour. Patients were instructed to take one

Correspondence address: Dr Vichai Tanphaichitr, Division of Nutrition and Biochemical Medicine, Department of Medicine and Research Center, Faculty of Medicine, Ramathibodi Hospital, Mahidol University,
Rama 6 Road, Bangkok 10400, Thailand.

Table 1. Initial characteristics in 20 obese patients.

| Subject | Sex | Age (yr) | Height (cm) | Weight (kg) | BMI (kg/m²) | Occupation |
|---|---|---|---|---|---|---|
| 1 | F | 40 | 158.0 | 76.2 | 30.52 | Housewife |
| 2 | F | 52 | 159.5 | 82.5 | 32.43 | Housewife |
| 3 | F | 66 | 143.0 | 73.7 | 36.04 | Housewife |
| 4 | F | 47 | 161.0 | 68.6 | 26.47 | Gardener |
| 5 | F | 43 | 159.0 | 100.6 | 37.79 | Tailor |
| 6 | F | 39 | 155.0 | 68.1 | 28.35 | Housewife |
| 7 | F | 57 | 161.0 | 80.0 | 30.86 | Merchant |
| 8 | F | 13 | 164.0 | 85.5 | 31.79 | Student |
| 9 | F | 41 | 157.0 | 65.4 | 26.53 | Merchant |
| 10 | F | 38 | 144.0 | 66.2 | 31.93 | Lecturer |
| 11 | F | 46 | 155.0 | 61.8 | 25.56 | Government official |
| 12 | F | 30 | 166.0 | 97.7 | 35.46 | Baker |
| 13 | F | 67 | 145.5 | 56.7 | 26.78 | Housewife |
| 14 | F | 46 | 144.0 | 73.2 | 35.30 | Housewife |
| 15 | F | 45 | 144.0 | 104.3 | 50.30 | Merchant |
| 16 | M | 49 | 174.0 | 92.3 | 30.49 | Businessman |
| 17 | F | 36 | 164.0 | 71.8 | 26.70 | Housewife |
| 18 | M | 26 | 189.0 | 121.0 | 33.87 | Salesman |
| 19 | F | 16 | 164.0 | 86.2 | 32.05 | Student |
| 20 | F | 37 | 154.0 | 61.1 | 25.76 | Lecturer |
| Mean±SEM | | 41.7 ±3.2 | 158.0 ±2.6 | 79.6 ±3.8 | 31.8 ±3.8 | |

packet of sweet basil seed extract before lunch and supper (4 g/day). The sweet basil seed extract was ingested after it was fully swollen with 240 ml of water. Adherence to the regimen was monitored by interviewing the patients and counting returned unopened packets at each clinic visit.

*Anthropometric measurement*

Height, body weight, triceps (TS), biceps, subscapular, and suprailiac skinfold thicknesses, and mid upper arm (UAC), waist and hip circumferences were measured in each patient at 4-wk intervals during the study. The mid upper arm muscle circumference (UAMC) was calculated from the following formula[8]: $UAMC = UAC - \pi TS$. Percentage of body fat was estimated by the sum of the four-skinfold thicknesses described by Durnin and Womersley[9]. BMI was calculated from body weight in kg/(height in m)$^2$. Waist/hip circumference ratio (WHR) was also computed[2,5,8].

*Biochemical assessment*

Venous blood was obtained from each patient after a 12-h fast at 4-wk intervals for the biochemical assessment. Serum total cholesterol (TC), triglyceride (TG), high-density-lipoprotein:cholesterol (HDL-C) and glucose levels were measured by enzymatic-colorimetric methods[8]. Serum low-density-lipoprotein:cholesterol (LDL-C) was calculated by Friedewald's formula[10]. These serum lipid and glucose levels were determined at 4-wk intervals. Other parameters described below were determined at wk0 and wk16. Haemoglobin (Hb), haematocrit (Hct), total lymphocyte count (TLC) were determined by Hemalog 8 and Hemalog D (Technicon Instruments Corp, Tarrytown, NJ USA), and serum total protein, albumin, creatinine, uric acid, sodium, potassium, and chloride levels, and carbon dioxide content by SMA-12[2,5,8].

*Statistical analysis*

Comparisons were made within each parameter between wk0 and wk4, as well as between other weeks and wk4 or wk0, using Student's paired $t$-test (2-tailed)[11].

*Results*

Out of 20 patients, 13 were severely obese by BMI criteria of ⩾30 kg/m$^2$ (Table 1). Four patients were excluded because they did not visit the Nutrition Clinic again at the fourth week of baseline observation. The remaining 16 patients were evaluated for their ability to ingest the extract and categorized into 'high dose users' ($n$=10) and 'low dose users' ($n$=6), according to their ability to use more or less than half of the extract. The high and low dose users consumed an average of 90% and 30% respectively of extract. Only five out of ten obese high dose users completed the study protocol.

In ten obese high dose users, their body weight and BMI at wk4 and wk0 were not significantly different whereas these two anthropometric parameters at wk8 were significantly lower than those at wk0 and wk4. The mean net decreases in their body weight and BMI at wk8 from those at wk4 were 1.6 kg and 0.8 kg/m$^2$. There were no significant changes in their UAMC, body fat expressed as kg or percentage of body weight, WHR, serum TC, LDL-C, HDL-C and TG levels during the study (Table 2). Similar findings were also observed in five obese high dose users who completed the study at wk16 (Table 3). The mean net decreases in their body weight and BMI at wk8 from those at wk4 were 2.0 kg and 0.7 kg/m$^2$. However, there were no further decreases in their body weight and BMI at wk12 and wk16. Their haematological and other biochemical parameters (Table 4), before and after taking sweet basil seed extract, were within normal limits[12].

Table 2. Anthropometric measures and serum lipid levels (mean±SEM) in ten obese high dose users* who completed 4 weeks intervention.

| Parameter | Baseline | Intervention | |
|---|---|---|---|
| | Wk0 | Wk4 | Wk8 |
| Weight, kg | 84.5±5.4 | 84.1±5.3 | 82.5±5.1$^{a,b}$ |
| BMI, kg/m² | 32.2±1.2 | 32.0±1.2 | 31.4±1.2$^{aa,b}$ |
| UAMC, cm | 25.0±1.0 | 24.0±1.0 | 25.4±0.8 |
| Body fat, kg | 34.2±2.0 | 34.3±1.8 | 33.5±1.6 |
| Body fat, %bw | 41.9±2.1 | 42.5±1.2 | 43.2±2.1 |
| WHR | 0.88±0.02 | 0.86±0.02 | 0.87±0.02 |
| TC, mmol/l | 6.29±0.32 | 6.11±0.42 | 6.07±0.27 |
| LDL-C, mmol/l | 4.24±0.24 | 4.24±0.33 | 4.14±0.20 |
| HDL-C, mmol/l | 1.31±0.08 | 1.18±0.10 | 1.24±0.06 |
| TG, mmol/l | 1.65±0.31 | 1.51±0.20 | 1.39±0.24 |

BMI is body mass index.

UAMC is upper arm muscle circumference calcuated from the formula shown in the text.

WHR is waist-over-hip circumference ratio with waist measured at the narrowest area above the umbilicus and hip measured at the maximal gluteal protrusion.

TC, LDL-C, HDL-C and TG are total cholesterol, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, and triglyceride, respectively.

*Seven females and 2 males were severely obese.

Significant difference from wk0: $^{a}P<0.001$, $^{aa}P<0.0005$

Significant difference from wk4: $^{b}P<0.0005$

Table 3. Anthropometric measures, serum lipid and glucose levels (mean±SEM) in five obese high dose users* who completed 12 weeks of intervention.

| Parameter | Baseline | | Intervention | | |
|---|---|---|---|---|---|
| | Wk0 | Wk4 | Wk8 | Wk12 | Wk16 |
| Weight, kg | 83.5±6.3 | 83.9±6.2 | 81.9±6.1[b] | 82.0±6.4[bbb] | 82.0±6.4[bb] |
| BMI, kg/m$^2$ | 32.9±2.3 | 33.1±2.2 | 32.4±2.2[bb] | 32.4±2.1 | 32.3±2.2[bb] |
| UAMC, cm | 25.5±1.8 | 24.2±1.6 | 26.1±1.1 | 25.8±1.4 | 26.1±1.4[bb] |
| Body fat, kg | 34.6±3.2 | 34.7±3.1 | 34.3±2.8 | 33.9±2.8 | 33.6±2.8 |
| Body fat, %bw | 41.4±3.8 | 41.4±3.7 | 41.9±3.4 | 41.3±3.4 | 41.0±3.4 |
| WHR | 0.90±0.04 | 0.87±0.03 | 0.88±0.04 | 0.87±0.04 | 0.89±0.03 |
| TC, mmol/l | 6.45±0.33 | 6.88±0.49 | 6.24±0.26 | 6.32±0.08 | 6.51±0.56 |
| LDL-C, mmol/l | 4.36±0.25 | 4.97±0.26 | 4.14±0.27 | 4.31±0.16 | 4.27±0.48 |
| HDL-C, mmol/l | 1.46±0.06 | 1.24±0.18 | 1.34±0.05 | 1.31±0.04 | 1.43±0.12 |
| TG, mol/l | 1.39±0.14 | 1.47±0.18 | 1.43±0.34 | 1.54±0.30 | 1.75±0.22 |
| Glucose, mmol/l | 4.28±0.15 | 4.80±0.14 | 4.64±0.15 | 4.53±0.09 | 4.92±0.13 |

*Three females and 1 male were severely obese.
Significant difference from wk4: [b]$P<0.01$, [bb]$P<0.02$, [bbb]$P<0.05$

Table 4. Haematological and other biochemical parameters (mean±SEM) in five obese high dose users who completed 12 weeks of intervention.

| Parameter | Baseline | Intervention |
|---|---|---|
| | Wk0 | Wk16 |
| Hb (g/l) | 140±7 | 135±8 |
| Hct | 0.42±0.2 | 0.41±0.2 |
| TLC (×10$^9$/l) | 2.73±0.31 | 3.11±0.25 |
| Total protein (g/l) | 75±2 | 79±2[aa] |
| Albumin (g/l) | 43±1 | 43±0.8 |
| Creatinine (μmol/l) | 71±4 | 77±3 |
| Glucose (mmol/l) | 4.28±0.15 | 4.92±0.13[a] |
| Uric acid (μmol/l) | 423±51 | 410±43 |
| Sodium (mmol/l) | 140±2 | 140±4 |
| Potassium (mmol/l) | 4.34±0.09 | 4.44±0.13 |
| Chloride (mmol/l) | 106±0.08 | 106±2.1 |
| $CO_2$ content (mmol/l) | 25.6±1.5 | 26.2±1.2 |

Significant difference from wk0: [a]$P<0.01$, [aa]$P<0.02$.

In six obese low dose users, their anthropometric parameters and serum lipid levels at wk4 and wk0 were not significantly different (Table 5). However, their body weight, BMI, and body fat in kg at wk8 increased significantly. Only three out of six obese low dose users continued to ingest the extract until wk16 but their body weight, BMI, and body fat at wk16 were not significantly different from those at wk4.

Table 5. Anthropometric measures and serum lipid levels (mean±SEM) in six obese low dose users*.

| Parameter | Baseline | Intervention | |
|---|---|---|---|
| | Wk0 | Wk4 | Wk8 |
| Weight, kg | 70.9±7.1 | 70.5±6.7 | 71.9±7.1[a,b] |
| BMI, kg/m$^2$ | 32.0±3.9 | 31.8±3.7 | 32.5±3.9[a,b] |
| UAMC, cm | 22.7±1.2 | 22.7±0.9 | 22.5±1.0 |
| Body fat, kg | 30.9±4.8 | 31.9±4.8 | 32.2±4.8[a] |
| Body fat, %bw | 42.7±2.2 | 44.4±2.6 | 44.0±2.1[a] |
| WHR | 0.90±0.03 | 0.90±0.02 | 0.89±0.02 |
| TC, mmol/l | 6.28±0.21 | 6.15±0.38 | 6.24±0.31 |
| LDL-C, mmol/l | 4.24±0.25 | 4.02±0.33 | 4.02±0.25 |
| HDL-C, mmol/l | 1.40±0.09 | 1.42±0.05 | 1.53±0.12 |
| TG, mmol/l | 1.33±0.28 | 1.48±0.24 | 1.50±0.36 |

*Two were severely obese.
Significant difference from wk0: [a]$P<0.05$
Significant difference from wk4: [b]$P<0.05$

Dietary assessment showed that the mean daily total energy intakes in ten obese high dose users at wks 0, 4 and 8 were 6.86, 6.34, and 5.49 MJ, respectively, whereas the corresponding figures in six obese low dose users were 7.66, 7.45, and 7.81 MJ. The mean dietary protein, fat, and carbohydrate energy distributions in obese high dose users at wk0 were 15%, 38%, and 47%, respectively, whereas the corresponding figures at wk4 were 16%, 36%, and 48%, and at wk8 were 16%, 35%, and 49%. The mean dietary protein, fat, and carbohydrate energy distributions in six obese low dose users at wk0 were 16%, 39%, and 45%, respectively, at wk4 16%, 35%, and 49%, and at wk8 17%, 38%, and 45%. Thus there were no changes in dietary intake in either group and targets set were not achieved.

## Discussion

Sweet basil is one of the common plants consumed by Thais. Its leaves and seeds are used for cooking in various menus. Premwatana et al.[13] determined the dietary fibre content by the neutral detergent fibre method in 29 commonly eaten Thai plants consisting of ten kinds of vegetables, ten kinds of fruits, and nine kinds of grains and seeds. The results reveal that sweet basil seeds contained the most dietary fibre with a low sugar content, ie 80 g of dietary fibre and 0.55 g of sugar/100 g dry weight. The seeds are readily swollen in water. When 1 g of the seeds is soaked in water it becomes swollen to 40 ml. The determination of physical properties of the mucilage isolated from the sweet basil seeds in a dry powder form shows a high moisture content and moisture adsorption with poor flowability and good compressibility. It is also readily swollen in water with a high viscosity value at low concentration[14]. Thus sweet basil seeds are a good source of soluble dietary fibre which has several physiological effects on the gastrointestinal tract and subsequent systemic effects. Soluble dietary fibre forms a gel and increases the viscosity and stickiness of the stomach content, delays gastric emptying, fills the stomach and provides a feeling of satiety, appears to slow the rate of digestion and absorption of foods, and increases fecal bulk and rate of passage through the large intestine. Thus soluble dietary fibre has been employed in treating gastrointestinal disorders, diabetes mellitus, hypercholesterolaemia and obesity[6].

In Thailand, there are three published medical reports describing the use of sweet basil seeds in treating constipation, diabetes mellitus, and hypercholesterolaemia[15-17]. Muangman et al.[15] reported a beneficial effect of sweet basil seed intake in reducing the incidence of constipation in 53 elderly postoperative patients. This report did not include any anthropometric and biochemical parameters.

Viseshakul et al.[16] evaluated the effect of sweet basil seed intake on oral glucose tolerance tests in 14 patients with non-insulin-dependent diabetes mellitus and two patients with insulin-dependent diabetes mellitus. They were instructed to continue usual dietary habits and medication during the one-month study. They received a daily intake of 30 g of sweet basil seeds which contained 24 g of dietary fibre and were divided into three doses after each meal for one month. The seeds were ingested after they were swollen in water. One hundred g oral glucose tolerance tests were undertaken before and after the one-month study, the results showing an improvement. Plasma glucose levels (mean [±SD] ) at 0, 30, 60, 120, and 180 minutes at the baseline period were 12.93±5.50, 18.15±4.83, 20.98±4.88, 21.43±72, and 19.37±5.50 mmol/l, respectively, whereas the corresponding figures determined at the one-month period were 8.99±2.33, 13.99±2.66, 17.32±3.33, 18.48±4.27, and 15.99±5.00 mmol/l. Data on initial and final body weights, although not discussed, suggested change. Six patients showed a decrease in body weight ranging from 0.2−1.5 kg, one patient had a stable body weight, and nine patients showed an increased body weight ranging from 0.2−4.0 kg at 1 month. Ability to ingest the extract appeared important for weight change.

Chularojanamontri et al.[17] evaluated the effect of sweet basil seed intake on serum lipid levels in 20 hyperlipoproteinaemic patients (ten men and ten women). All of the patients received the same dosage of sweet basil seeds as in the study of Viseshakul et al.[16] for one month. The mean(±SD) body weight, BMI, serum TC, TG, HDL-C, and glucose levels determined at the baseline period were 63.9±8.9 kg, 25.3±3.2 kg/m$^2$, 6.78±1.29, 2.60±0.82, 1.16±0.21, and 8.22±4.33 mmol/l, respectively, where the corresponding figures at the one-month period were 63.8±8.6 kg, 25.2±3.1 kg/m$^2$, 6.26±1.27, 2.29±0.86, 1.29±21, and 7.05±2.44 mmol/l. Only the decrease in serum TC and the increase in serum HDL-C levels were statistically significant.

Three forms of dietary fibre preparation have been employed in clinical studies to date: purified fibre polymers, fibre concentrates, and high-fibre diets[18]. In the studies of Viseshakul et al.[16] and Chularojanamontri et al.,[17] sweet basil seeds were served as high-fibre diets whereas in our study the preparation used was sweet basil seed extract, a fibre concentrate. The daily dosage of dietary fibre in our study was 1/6 of Visesehakul et al.[16] and Chalarojanamontri et al.[17] However, we still observed a significant weight reduction in ten out of 16 obese subjects at the 4th week of intervention (week 8). In the high dose users, there was a significant decrease in BMI at wk8 (Table 2) which was maintained at wk12 and wk16, but no significant decrease in body fat or percent body fat. These data may represent a reduction in total body water, an interpretation supported by the significant increase in serum total protein concentration observed at wk16 (Table 4). A redistribution of water to the intracellular compartment may also have occurred since UAMC increased. On the contrary, the body weight, BMI, and body fat in six low dose users at wk8 increased significantly (Table 5). A lack of ongoing decrease in BMI in five obese high dose users at wk12 and wk16 (Table 3) could have been due to the adaptation of their gastrointestinal tract to the sweet basil seed extract treatment or other changes in fluid or energy balance.

Unlike the study in diabetic patients of Viseshakul et al.[16] our high dose users were normoglycaemic and there was no reduction in fasting glucose level while receiving the sweet basil seed extract treatment (Table 3); indeed it increased. In the study of Chularojanamontri et al.[17] nine out of 20 hyperlipoproteinaemic patients were also hyperglycaemic so that a tendency for blood glucose levels to fall may therefore have been seen only in patients with diabetes mellitus.

Out of our ten obese high dose users, seven had type IIa hyperlipoproteinaemia diagnosed by serum TC level of >5.2 mmol/l, a LDL-C level >3.4 mmol/l, and a TG level <2.3 mmol/l, one had type IIb hyperlipoproteinaemia diagnosed by the aforementioned criteria of serum TC and LDL-C levels with serum TG level >2.3 mmol/l, and two showed normolipoproteinaemia[8]. None of the patients had serum HDL-C level <0.9 mmol/l. Their mean serum TC and LDL-C levels tended to decrease, but serum HDL-C tended to increase during receiving sweet basil seed extract treatment (Tables 2 and 3). The increase in serum TC level in five obese high dose users at wk16 was due to the increase in serum HDL-C level (Table 3). Our results are consistent with the report of Chularojanamontri et al.[17] However, the changes in serum lipid levels in our patients did not reach statistical significance, which could have been due to the lower dosage of dietary fibre and/or the lower number of patients than the study of Chularojanamontri et al.[16]

No serious adverse reactions were reported by our subjects during the sweet basil seed extract treatment. One subject reported increased stool frequency and one felt hungry frequently. The safety of sweet basil seed extract was also evident by normal haematological parameters and renal and electrolyte status (Table 4) after receiving the sweet basil seed extract tract treatment for 12 wks in five obese high dose users. The increase in fasting glucose remained within the normal range. However, the possible changes in body water status and distribution need more investigation.

In conclusion, our study has demonstrated that although weight decreases with high doses of sweet basil seed extract, only 50% of subjects manage to continue its use after 4 weeks for 12 weeks in all. Moreover, the decrease in weight does not signify a reduction in body fatness or in its distribution, as judged by waist to hip ratio instead, the extract appears to reduce total body water and its distribution by mechanisms which are at present unclear. Users of low dose extract may experience an increase in body fat, perhaps because of a false sense of security.

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# 摘 要


作者選擇了20個肥胖病人(2男、18女)爲試驗對象，平均年齡(±標準誤) 爲41.7±3.2歲，平均體重指數(BMI)爲31.8±3.8公斤/平方米，病人用甜羅勒子(OCIMUM CANUM SIMS)抽提物治療16週並評估其劑量和治療效果。病人在指導下，減少總能量進食，並經過16週(週0－週16)的研究。經頭4週觀察後，隨後的12週(週4－週16)，病人在午餐和晚餐前分別進食甜羅勒子抽提物2克(4克/日)和240毫升水。16個病人在第4和第8週開始用甜羅勒子抽提物治療，分成高劑量組(n=10)和低劑量組(n=6)。高劑量組進食90%的甜羅勒子抽提物，而低量組進食30%的甜羅勒子抽提物。結果顯示，進食高劑量的肥胖病人，其體重指數在第8週下降，並維持到12週和16週，但是從皮褶厚度的測量未能証明脂肪減少。這也許是由於非脂肪組織（例如全身的水份）減少所致。在16 週時血清總蛋白濃度增加更進一步支持了這個觀點。另一方面，進食低劑量組的肥胖病人，在第8週，從體重指數和皮褶厚度二者的測量都証明了體脂肪增加。病人在治療前後，除血漿蛋白變化外，其餘血脂，血糖，腎臟，或電解質的狀況無明顯改變，作者指出由身高－體重的關係直接測定全身脂肪狀態的重要性，因爲可用以評估肥胖症的治療效果。

**The effects of soluble dietary fibre from the Thai herb, sweet basil seed, on human body composition**

Preeya Leelahagul, Supanee Putadechakum and Vichai Tanphaichitr

*Asia Pacific Journal of Clinical Nutrition* 1992; 1:169–174.

**ใยอาหารละลายน้ำจากเมล็ดแมงลักสกัดกับการบำบัดโรคอ้วน***

ปรียา ลีฬหกุล วท.ด. สุภาณี พุทธเดชาคุ้ม วท.ม. และ วิชัย ตันไพจิตร พ.บ.,Ph.D., F.A.C.P.,F.R.A.C.P.

*หน่วยโภชนวิทยาและชีวเคมีทางการแพทย์ ภาควิชาอายุรศาสตร์และศูนย์วิจัย
คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
กรุงเทพฯ 10400 ประเทศไทย

**บทย่อ** ได้ศึกษาถึงผลของการรักษาด้วยเมล็ดแมงลักสกัด เป็นเวลา 18 สัปดาห์ในผู้ป่วยโรคอ้วนที่มารับบริการที่คลินิกโภชนวิทยา แผนกผู้ป่วยนอก ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี จำนวน 20 คน ประกอบด้วยชาย 2 คนและหญิง 18 คน โดยมีค่ามัชฌิม ± ค่าความคลาดเคลื่อนมาตรฐาน ของอายุเท่ากับ 41.7±3.2 ปี และดัชนีความหนาของร่างกายเท่ากับ 31.8±3.8 กก./ตารางเมตร ตลอดการศึกษา (สัปดาห์ 0-16) ได้แนะนำให้ผู้ป่วยลดปริมาณอาหารที่รับประทานในแต่ละวันลง ช่วงสัปดาห์ 4-16 ให้ผู้ป่วยรับประทานเมล็ดแมงลักสกัด 2 กรัมซึ่งพองตัวเต็มที่แล้วในน้ำ 240 มล. ก่อนอาหารกลางวันและอาหารเย็น (4 กรัม/วัน) มีผู้ป่วยเพียง 16 คนที่มารับการบริการต่อเนื่องถึงสัปดาห์ที่ 8 ในผู้ป่วย 16 คนนี้ 10 คนได้รับประทานเมล็ดแมงลักสกัดประมาณร้อยละ 90 ของขนาดที่กำหนดให้จึงจัดเป็นกลุ่มที่ได้รับเมล็ดแมงลักสกัดขนาดสูง ส่วนอีก 6 คนรับประทานเพียงร้อยละ 30 และจัดเป็นกลุ่มที่ได้รับเมล็ดแมงลักสกัดขนาดต่ำ ในผู้ที่ได้รับเมล็ดแมงลักสกัดขนาดสูงพบว่าดัชนีความหนาของร่างกายลดลงอย่างมีนัยสำคัญทางสถิติที่สัปดาห์ที่ 8 และคงสภาพอยู่ที่สัปดาห์ที่ 12 และสัปดาห์ที่ 16 แต่ไม่พบความเปลี่ยนแปลงของความหนาของไขมันใต้ผิวหนังซึ่งบ่งบอกถึงปริมาณไขมันในร่างกาย ดังนั้นการเปลี่ยนแปลงดังกล่าวนี้ จึงเกิดจากการลดลงของส่วนที่ไม่ใช่ไขมัน เช่นเกิดจากการลดลงของน้ำภายในร่างกาย โดยมีข้อมูลที่สนับสนุนคือระดับโปรตีนทั้งหมดในซีรัมเพิ่มขึ้นในสัปดาห์ที่ 16 ส่วนข้อมูลที่สนับสนุนว่ามีการเปลี่ยนแปลงของการกระจายตัวของน้ำภายในร่างกายคือการเพิ่มขึ้นของเส้นรอบวงกล้ามเนื้อกึ่งกลางต้นแขน ในทางตรงกันข้ามผู้ได้รับเมล็ดแมงลักสกัดขนาดต่ำปริมาณไขมันในร่างกายเพิ่มสูงขึ้นในสัปดาห์ที่ 8 ซึ่งบ่งชี้โดยดัชนีความหนาของร่างกายและความหนาของไขมันใต้ผิวหนัง ในกลุ่มผู้ได้รับเมล็ดแมงลักสกัดขนาดสูง นอกจากการเปลี่ยนแปลงของระดับโปรตีนทั้งหมดในซีรัมแล้วการตรวจทางชีวเคมีไม่พบการเปลี่ยนแปลงของภาวะไขมัน ไต หรือ อีเล็กโทรลัยต์ ส่วนระดับกลูโคสในเลือดที่สูงขึ้นยังอยู่ในเกณฑ์ปกติ การศึกษานี้แสดงให้เห็นถึงความสำคัญของการวัดไขมันในร่างกายโดยตรงมากกว่าการใช้ความสัมพันธ์ระหว่างน้ำหนักกับส่วนสูงในการประเมินผลการบำบัดโรคอ้วน