

Editorial

Thai Traditional Medical Remedies in Worayokasarn Scripture for Treating Obesity

Pannawat Chaiyawatthananthn, Ph.D.*

Worayokasarn scripture is a Thai traditional medical book that describes five herbal remedies for treating obesity as show in Figure 1. Recipe 1 (Tri-Pha-La) consists of three herbs i.e., *Terminalia chebula* Retz. (Sa-Mor-Thai) fruits, *Terminalia bellirica* (Gaertn.) Roxb. (Sa-Mor-Pi-Pek) fruits, and *Phyllanthus emblica* L. (Ma-Kam-Pom) fruits. Recipe 2 consists of three plants i.e., *T. chebula* fruits, *Cyperus rotundus* L. (Hua-Haw-Mhoo) rhizomes, *Tinospora crispa* (L.) Miers ex Hook.f. & Thomson (Bo-Ra-Pet) vines. Recipe 3 consists of 7 herbal plants i.e., *T. chebula* fruits, *T. bellirica* fruits, *P. emblica* fruits, *Pterocarpus indicus* Willd. (Pra-Doo) stems, *Plumbago indica* L. (Chetta-Mun-Phloeng) roots, *Senna siamea* (Lam.) Irwin & Barneby (Khee-Lek) stems, and *Curcuma longa* L. (Kha-Min-Chan) rhizomes. Recipe 4 consists of 6 medicinal plants i.e., *C. rotundus* rhizomes, *Aucklandia lappa* DC. (Kote-Kra-Dook) root, *P. indica* roots, *Acorus calamus* L. (Wan-Num) rhizomes, *Zingiber officinale* Roscoe (Khing) rhizomes, and *C. longa* rhizomes. Finally, Recipe 5 consists of three herbs i.e., *Z. officinale* rhizomes, *Piper nigrum* L. (Prik-Thai) seeds, and *Piper retrofractum* Vahl (Di-Pli) fruit.

Several herbal ingredients of the remedies showed anti-obese effects by reducing lipid accumulation and lipogenesis. Ethanolic *T. chebula* fruit extract suppresses lipogenesis in obese mice by reducing fatty acid synthase, increasing fatty acid oxidation through peroxisome proliferator-activated receptors α (PPAR α) and carnitine palmitoyltransferase-1 (CPT-1), and triggering anti-inflammatory responses i.e., tumor necrosis factor-alpha (TNF- α) and interleukin 6 (IL-6).¹ Hot aqueous extract of the *T. bellirica*

fruit had an inhibitory effect on the triacylglycerol absorption after loading olive oil in spontaneously obese type 2 diabetic mice.² The *P. emblica* fruit extract significantly inhibited triglyceride accumulation in 3T3-L1 adipocytes by decreasing adiponectin, PPAR γ , CCAAT/enhancer binding proteins α (C/EBP α), and Fatty acid-binding protein 4 (FABP4).³ The extract of *C. rotundus* rhizomes reduced adipogenesis with a dose-dependent in 3T3 L1 adipocytes by an IC₅₀ value of 9.39 μ g/mL.⁴ Fasting blood glucose levels in patients with metabolic syndrome who received 250 mg *T. crispa* dry powder twice a day for 2 months significantly decreased when compared with the baseline (112.06 ± 13.98 and 116.08 ± 10.72 mg/dL, respectively).⁵ Triglycerides and total cholesterol were significantly reduced in high-fat diet (HFD)-induced obese rats after treatment with 500 g/kg body weight (b.w.)/day of 50% ethanolic *C. longa* extract for 12 weeks.⁶ β -asarone, a major compound of *A. calamus* essential oil, inhibited adipogenesis in differentiated 3T3-L cells by suppressing the expression of adipogenic transcription factors i.e., C/EBP α , C/EBP β , and PPAR γ .⁷ HFD-mediated obese mice with 5% ginger powder in the diet presented to reduce total cholesterol and glucose after compared with the HFD group.⁸ HFD-fed rats treating oral administration of 200 mg/kg b.w. of ethyl acetate or aqueous *P. nigrum* extracts markedly decreased body weight, fat%, and fat-free mass.⁹ Total cholesterol, low-density lipoprotein cholesterol, leptin, and lipase were inhibited by piperidine alkaloids from 95% ethanol *P. retrofractum* extract including piperine, piperonaline, and dehydropiperonaline treatment for 8 weeks in HFD-induced rats.¹⁰

These scientific studies presented the anti-obese effect of the herbal ingredients of the remedies by reducing lipid accumulation and lipid profiles.

Thus, the five herbal remedies may be effective for treating obesity following the Thai traditional medical report.

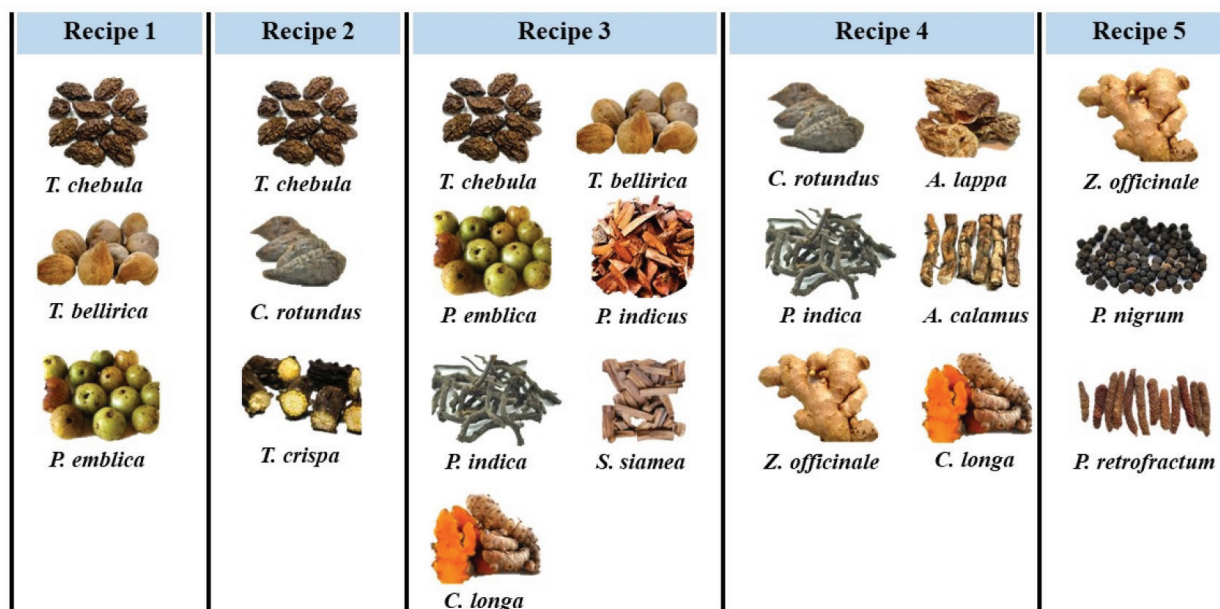


Figure 1 The herbal components of the remedies in Worayokasarn scripture.

References

- Subramanian, G., Shanmugamprema, D., Subramani, R., Muthuswamy, K., Ponnusamy, V., Tankay, K., Velusamy, T., Krishnan, V., Subramaniam, S., Anti-Obesity Effect of *T. Chebula* Fruit Extract on High Fat Diet Induced Obese Mice: A Possible Alternative Therapy. *Mol. Nutr. Food Res.* 2021;65: 2001224.
- Makihara, H., Shimada, T., Machida, E. et al. Preventive effect of *Terminalia bellirica* on obesity and metabolic disorders in spontaneously obese type 2 diabetic model mice. *J Nat Med*, 2012;66:459-467.
- Balusamy SR, Veerappan K, Ranjan A, et al. *Phyllanthus emblica* fruit extract attenuates lipid metabolism in 3T3-L1 adipocytes via activating apoptosis mediated cell death. *Phytomedicine*. 2020;66:153129.
- Majeed M, Nagabhushanam K, Bhat B, Ansari M, Pandey A, Bani S, Mundkur L. The Anti-Obesity Potential of *Cyperus rotundus* Extract Containing Piceatannol, Scirpusin A and Scirpusin B from Rhizomes: Preclinical and Clinical Evaluations. *Diabetes Metab Syndr Obes.* 2022;15:369-382.
- Sriyapai C, Dhumma-upakorn R, Sangwatanaroj S, Kongkathip N, Krittiyanunt S. Hypoglycemic effect of *Tinospora crispa* dry powder in outpatients with metabolic syndrome at King Chulalongkorn memorial hospital. *J Health Res.* 2009;23:125-133.
- Kim JH, Kim OK, Yoon HG, et al. Anti-obesity effect of extract from fermented *Curcuma longa* L. through regulation of adipogenesis and lipolysis pathway in high-fat diet-induced obese rats. *Food & Nutrition Research.* 2016; 60(1):30428.
- Lee MH, Chen YY, Tsai JW, Wang SC, Watanabe T, Tsai YC. Inhibitory effect of β -asarone, a component of *Acorus calamus* essential oil, on inhibition of adipogenesis in 3T3-L1 cells. *Food Chemistry.* 2011;126(1): 1-7.
- Seo SH, Fang F, Kang I. Ginger (*Zingiber officinale*) attenuates obesity and adipose tissue remodeling in high-fat diet-fed C57BL/6 Mice. *International Journal of Environmental Research and Public Health.* 2021;18(2):631.
- Parim B, Harishankar N, Balaji M, Pothana S, Sajjalaguddam RR. Effects of *Piper nigrum* extracts: Restorative perspectives of high-fat

- diet-induced changes on lipid profile, body composition, and hormones in Sprague–Dawley rats. *Pharmaceutical Biology*. 2015; 53(9):1318-1328.
10. Kim KJ, Lee MS, Jo K, Hwang JK. Piperidine alkaloids from *Piper retrofractum* Vahl. protect against high-fat diet-induced obesity by regulating lipid metabolism and activating AMP-activated protein kinase. *Biochemical and Biophysical Research Communications*. 2011;411(1):219-225.