

Investigation of the Traditional Japanese food “Tororo-kombu”: The Nutrient Component Elution and Anti-Obesity Effect

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What's Tororo-kombu?

➢ One of the traditional Japanese foods made from kelp.



➢ It is produced by a characteristic processing method.

- **Unimmersed or unboiled in water.**
→ Loss of nutrient components (minerals and dietary fiber) will be avoided.
- **Shave tangle in extremely thin.**
→ It will be expected to increase in physiological function of components.

Aims

➢ We examined the possibility that the characteristic processing affects the elution of nutrient components and the expression of physiological functions.

<Experiment 1> The Nutrient Component Elution

【Samples】 Tororo-kombu, Non-shaved Material

【Methods】 We dipped the samples into the artificial digestive fluid. (37°C, 3hours, pH4)
The amount of polysaccharides and minerals in supernatant were quantified.

【Results】

Table 1 Amount of the components eluted from Tororo-kombu and non-shaved material.

Components	The amount of elution (mg / 5g sample)		Ratio (TK/NS)	
	Tororo-kombu (TK)	Non-shaved material (NS)		
Polysaccharides	Fucoidan	111.70	47.50	2.35
	Water soluble alginate	112.30	27.00	4.16
	Mg	18.11	14.18	1.28
Minerals	Ca	10.15	7.09	1.43
	Zn	0.02	0.01	1.46
	K	277.10	211.60	1.31
	Na	101.86	87.06	1.17

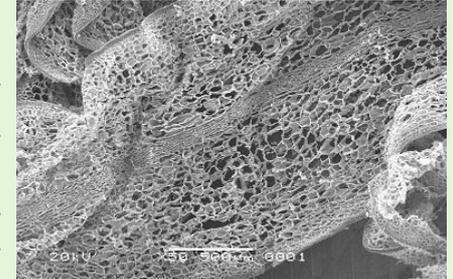


Fig.1 SEM image of Tororo-kombu

The cell size is between 0.01–0.1mm, and the thickness of Tororo-kombu is about 0.02 mm. This result indicates that by shaving the Tororo-kombu we are in fact slicing through its cells.

The amount of components eluted from Tororo-kombu were higher than that of non-shaved. It is considered that disruption of cell by shaving affects component elution property.

<Experiment 2> Anti-Obesity Effect on Rodents

Effect on the Triglyceride absorption.
(Single Oral Administration)

【Animals】 SD rats (8 weeks old, female, n=6)

【Test groups】①control

- ②Non-shaved material (NS)
- ③Tororo-kombu (TK)

【Methods】

The test sample was orally administered before an oral administration of corn oil. The area under curve (AUC) value was calculated from the time-course plot of serum TG as the index of the total absorbance amount.

【Results】

(*** p<0.005 vs. ①control)

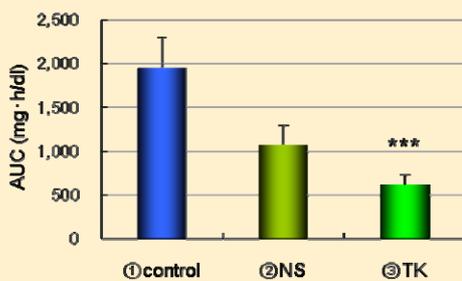


Fig.2 Influence on TG absorption in rats.

The AUC value for the Tororo-kombu group was significantly lower than that of the control group.

Effect of Tororo-kombu on Obese Mice Induced by a High Fat Diet.
(Long-term Oral Administration)

【Animals】 ddY mice (5 weeks old, female, n=8)

【Test groups】①Control

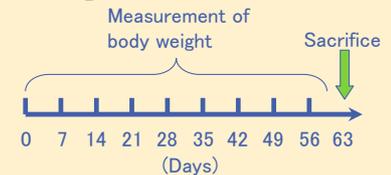
- ②High fat diet (HF)
- ③HF+non-shaved material (NS)
- ④HF+Tororo-kombu (TK)

【Methods】

Each diet was fed to mice for 63 days.

We measured body weight weekly. On the 63rd days, mice were sacrificed, and the parauterus adipose tissues removed and weighed.

【Schedule】



【Results】

(*** p<0.005, ** p<0.01, * p<0.05 vs. ②HF)

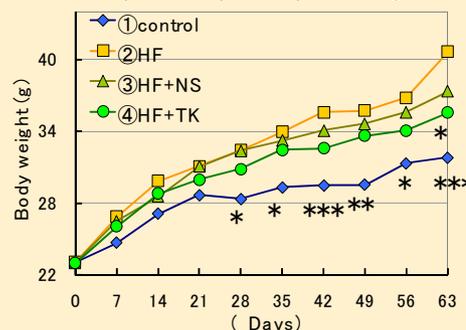


Fig. 3 Body weights of mice fed HF.

On the 63rd days, the body weights and the parauterus adipose weights in Tororo-kombu group (④) were significantly lower than those in the HF group.

(*** p<0.005, * p<0.05 vs. ②HF)

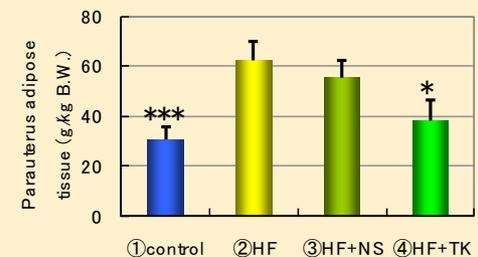


Fig.4 Parauterus adipose tissue weights of mice fed HF.

Conclusion

- The shaving process fractured cells and thus was responsible for the high component elution of Tororo-kombu.
- The characteristic processing way of Tororo-kombu would affect the inhibitory effect on triglyceride absorption and the anti-obesity effect *in vivo*.