

Role of Marine-Natural Ingredient Fucoxanthin on Body's Immune Response of Obesity

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Abstract

Backgrounds: The high number of obesity cases was one of the causes of increased mortality and morbidity in Indonesia. Many peoples had not known about the role of marine natural resources on human health yet. Fucoxanthin was one of the marine-natural ingredients that was derived from brown seaweeds that was useful for our health. The purpose of this manuscript was to know the mechanism of fucoxanthin in improving obese body's immune response.

Methods: Systematic review.

Results of studies on bibliography: Fucoxanthin inhibited accumulation of intercellular lipid during differentiation. Fucoxanthin regulated adipocytes involved in insulin resistance.

Conclusion: Fucoxanthin increase obese body's immune response through adipogenesis and NF κ B inhibitors.

Keywords: Fucoxanthin; Obese; Body's immune response; Adipogenesis

Introduction

Fucoxanthin was the main marine carotenoid derived from algae [1], carotenoid that was specific from brown seaweeds. This had unique structure that included alenic bond and 5,6-monopoxide in its molecules. Fucoxanthin had the potential as marine-natural ingredient that could be used in healthcare as antioxidant [2-4] so it could be used as food stuff and nutraceutical [4]. In addition, fucoxanthin also had effect as anti-obesity [5,6].

Factors that Influenced Body Weight Reduction

Factors that influenced stress and mood from feeling of hungry and appetite on body weight reduction consisted of internal factor and external factor. The internal factor was in the form of digestive organ function; central nervous system function; the existence of psychological factor on body weight condition in cases of eating pattern disorder such as anorexia nervosa and bulimia, psychological trauma and physical health, suffering from certain infection/disease; body temperature; consumed drug and effect of drug on eating pattern; body metabolism (hormonal system); neurotransmitter from central nervous system. The external factor was in the form of cultural background, social environment and climate, social relationship, meal time, body sensory function on food (Figure 1) [7].

The Role of Fucoxanthin on Body's Immune Response

The biological activity of fucoxanthin was having effect as anti-inflammatory and activity as radical scavenging [8], as anti-inflammatory (reducing the level of pro-inflammatory mediator including NO, PGE₂, IL-1 β , TNF- α and IL-6 through inhibiting the activation of NF- κ B) [9], antioxidant (Figure 2) [10].

Based on study results, fucoxanthin had advantage in reducing body weight [11] through regulating the expression of UCP-1 in WAT (white adipose tissue) and activating the liver to produce DHA [12]. Fucoxanthin inhibited the accumulation of intercellular lipid during differentiation from 3T3-L1 cells through down regulation from PPAR- γ [13]. Fucoxanthin regulated the expression of adipocytokines mRNA involved in insulin resistance, iNOS and COX-2 in white

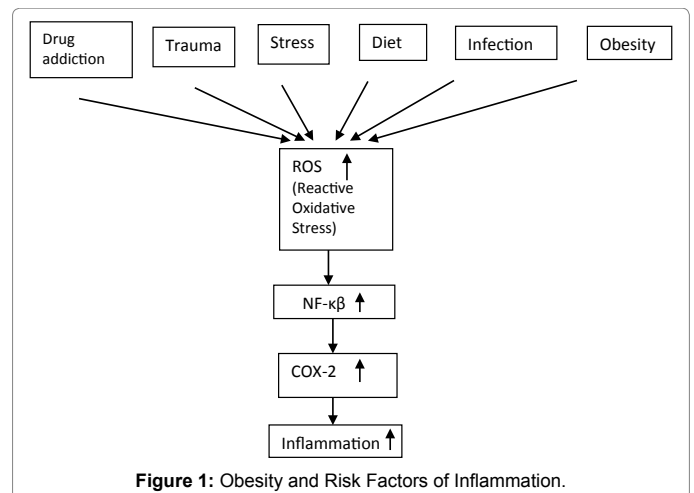


Figure 1: Obesity and Risk Factors of Inflammation.

adipose tissue (WAT) and had specific effect on diabetic/obese KK-Ay mice but had no effect on lean mice [14]. Fucoxanthin decreased body weight and visceral fat [15]. Several studies on fucoxanthin also showed result that diet with combination of fucoxanthin and edible oil or lipid could increase absorption rate of fucoxanthin so it could be used as marine drug [2]. Safety evaluation of fucoxanthin use in single dose and repetitive dose had been performed in mice as experimental animal and resulted no mortality and abnormality during 30 days of administration, but we still had to be alert against effect in the form of hypercholesterolemia [16].

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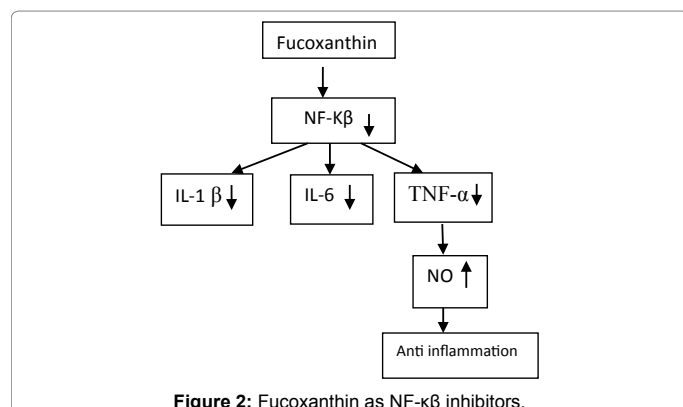


Figure 2: Fucoxanthin as NF-κβ inhibitors.

Conclusion

Fucoxanthin as NF-κβ and adipogenesis inhibitors could increase obese body's immune response.

References

1. Kim SM, Jung YJ, Kwon ON, Cha KH, Um BH, et al. (2012) Potencial Commercial Source of Fucoxanthin Extracted from the Microalga *Phaeodactylum tricornutum*. *Biochemistry and Biotechnology* 166: 1843-1855.
2. Peng J, Yuan JP, Wu CF, Wang JH (2011) Fucoxanthin, a marine carotenoid present in brown seaweeds and diatoms: metabolism and bio-actives relevant to human health. *Marine Drugs* 9: 1806-1828.
3. Ngo DH, Wijisekara I, Vo TS, Van Ta, Q Kim, et al. (2011) Marine Food-derived Functional ingredients as potential antioxidants in the food industry: an Overview. *Food Research International* 44: 523-529.
4. Fung A, Hamid N, Lu J (2013) Fucoxanthin content and antioxidant properties of *Undaria pinnatifida*. *Food Chem* 136: 1055-1062.
5. Maeda H, Hosokawa M, Sashima T, Funayama K, Miyashita K (2005) Fucoxanthin from edible seaweed *Undaria Pinnatifida* shows anti-obesity effect through UCP1 expression in white adipose tissues. *Biochem Biophys Res Commun* 332: 392-7.
6. Maeda H, Hosokawa M, Sashima T, Funayama K, Miyashita K (2007) Effect of Medium Chain Triacylglycerols on Anti-obesity Effect of Fucoxanthin. *J Oleo Sci* 56: 615-621.
7. Insel P, Turner RE, Ros D (2006) *Discovering Nutrition* (2nd edn) Jones and Bartlett Publishers. Sudbury, USA, 275.
8. Ikeda K, Kitamura A, Machida H, Watanabe M, Negishi H, et al. (2003) Effect of *Undaria Pinnatifida* (Wakame) on the development of cerebrovascular diseases in stroke prone spontaneously hypertensive rats. *Clin Exp Pharmacol Physiol* 30: 44-48.
9. Kim KN, Heo SJ, Yoon WJ, Kang SM, Ahn G, et al. (2010) Fucoxanthin inhibits the inflammatory response by suppressing the activation of NF-κB and MAPKS in Lipopolysaccharide-induced RAW 264.7 macrophages. *Eur J Pharmacol* 649: 369-375.
10. Fung A, Hamin N, Lu J (2013) Fucoxanthin content and antioxidant properties of *Undaria Pinnatifida*. *Food Chemistry* 136: 1055-1062.
11. Woo MN, Jeon SM, Shin YC, Lee MK, Kang MA, et al. (2009) Anti Obese Property of Fucoxanthin is partly mediated by altering lipid-regulating enzymes and uncoupling proteins of Visceral Adipose Tissue in Mice. *Molecular Nutrition and Food Research* 53: 1603-11.
12. Maeda H, Hosokawa M, Sashima T, Funayama K, Miyashita K (2005) Fucoxanthin from edible seaweed, *Undaria pinnatifida*, shows anti-obesity effect through UCP1 expression in White Adipose Tissue. *Biochemical and Biophysical Research communication* 332: 392-397.
13. Maeda H, Hosokawa M, Sashima T, Takahashi N, Kawada T, et al. (2006) Fucoxanthin and its metabolite, fucoxanthinol, suppress adipocyte differentiation in 3T3-L1 cells. *International Journal of Molecular Medicine* 18: 147-52.
14. Hosokawa M, Miyashita T, Nishikawa S, Emi S, Tsukui T, et al. (2010) Fucoxanthin regulates adipocytokine mRNA expression in white adipose tissue of diabetic/obese KK-Ay mice. *Arch Biochem Biophys* 504: 17-25.
15. Woo MN, Jean SM, Shin YC, Sin YC, Lee MK, et al. (2009) Anti obese property of Fucoxanthin is partly mediated by altering lipid-regulating enzymes and uncoupling proteins of visceral adipose tissue in mice. *Molecular Nutrition and Food Research* 53: 1603-1611.
16. Beppu F, Niwana Y, Tsukui T, Hosokawa M, Miyashita K (2009) Single and Repeated Oral Dose Toxicity Study of a Marine Carotenoid, in Mice. *J Toxicol Sci* 34: 501-510.

Citation: Lelyana R (2016) Role of Marine-Natural Ingredient Fucoxanthin on Body's Immune Response of Obesity. J Nanomed Nanotechnol 7: 397. doi: 10.4172/2157-7439.1000397

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