

Editorial note

The possible role of nutritional intervention to prevent diabetic retinopathy

Diabetic retinopathy, one of the complications of diabetes mellitus, is a devastating condition that has similar pathogenesis with atherosclerosis. In this issue of Med J Indones, Rianita et al working on diabetic retinopathy showed that there was no association between plasma lipid profile and the severity of diabetic retinopathy, while some other studies showed the opposite.¹

The result of this study might be due to other risk factors that were present in some of the subjects analyzed, such as hyperglycemia (61.5%), hypertension (systolic 38%, diastolic 34.6%), and obesity (38.5%) that were not analyzed for the association with diabetic retinopathy, or for the relative risk to have diabetic retinopathy. Moreover, different setting, population, study design and approach in statistical analysis might contribute in the different results between studies.

Moreover, the study did not have data about nutrition intake except for fat, fatty acid and cholesterol and exclusion of subjects taking antihyperlipidemic agents. The study in this issue was conducted in Indonesia and the income of 94.2% of the subjects was below poverty level.¹ *Tahu* and *tempe* that are made of soy beans are nutrient rich but cheap for those people, and are believed to have lipid lowering effect that might contribute to the normal triglyceride level found in the majority of the subjects in the study.

Soy-based diet was proven to give protection against the development of atherosclerosis, though the mechanism for this protection was still unsolved. A study on apolipoprotein E knockout mice comparing 3 kinds of diet containing either soy protein isolate associated with or without phytochemicals, or casein showed reduced atherosclerotic lesions in aortic sinus and descending aorta in mice receiving the two first diets compared to mice receiving casein containing diet.²

Further, mice receiving diet containing soy protein isolate with phytochemicals showed 20% fewer lesions compared to those without phytochemicals. Therefore it may be supposed that soy based diet both containing

soy protein only or the whole component including the phytochemicals (the isoflavons genistein, daidzein and equol) will give the same protection against diabetic retinopathy, which have similar pathogenesis.²

However, plasma lipid profiles did not show significant difference among the 3 groups.² This fact may be due to the use of apolipoprotein E knockout mice that are hyperlipidemic prone. Therefore, atheroprotection by soy based diet was supposed to occur via a mechanism other than lipid lowering properties.

An explanation to the problem came from real-time quantitative PCR analyses of proximal aorta that showed reduced expression of monocyte chemoattractant protein-1 (MCP-1) in mice receiving the two first diets compared to casein containing diet. This finding was supported by the reduced number of macrophages found in the lesion in the aorta of mice receiving the two soy based diets compared to casein containing diet. Further, in an in vitro inflammation model, genistein, daidzein, and equol alone or in combination showed dose dependently inhibition of MCP-1 secretion by macrophages.² Therefore, isoflavones in soy based diet are supposed to play a role in mediating inhibition of MCP-1 secretion, thus monocyte migration and inflammation leading to diabetic retinopathy.

We also know that some other nutrients/food such as garlic was proven to have lipid lowering activity. Garlic is one of the spices used in cooking that contains allicin, a substance proven to alter lipid metabolism and prevent oxidation of blood lipids. A study on allicin showed moderate hypolipidemic and anti-oxidative effect after 6 months.³ A study showed that diabetic retinopathy as a complication in diabetic patient was due to dyslipidemia and not hyperglycemia,⁴ though other studies showed different results. The effect of dyslipidemia was aggravated by lipid oxidation.⁵ Therefore, to minimize the effect of dyslipidemia, antioxidant might be important, and nutritional intervention using antioxidant-rich food may be beneficial.

In conclusion, nutritional intervention using soy based food product, and anti-oxidant rich food may be used in the prevention of diabetic retinopathy.

REFERENCES

1. Rianita, Bardosono S, Victor AA. Relationship between plasma lipid profile and the severity of diabetic retinopathy in type 2 diabetes patients. *Med J Indones*. 2008.
2. Nagarajan S, Burriss RL, Stewart BW, Wilkerson JE, Badger TM. Dietary soy protein isolate ameliorates atherosclerotic lesions in apolipoprotein E-deficient mice potentially by inhibiting monocyte chemoattractant protein-1 expression. *J Nutr*. 2008;138(2):332-7.
3. Gromnatskiĭ NI, Sereditskaia ZhE, Lazareva NV, Sereditskiĭ AV, Annenkova GV. Effects of garlic allicor tablets on lipid metabolism and risk of fatal cardiovascular complications in patients with atherogenic dyslipoproteinemia. [Article in Russian]. *Vopr Pitan*. 2007;76(6):60-4. (Abstract).
4. Chen W, Jump DB, Grant MB, Esselman WJ, Busik JV. Dyslipidemia, not hyperglycemia induces inflammatory adhesion molecules in human retinal vascular endothelial cells. *Invest Ophthalmol Vis Sci*. 2003;44:5016-22.
5. Tsimikas S, Glass CK, Steinberg D, Witztum JL. Lipoprotein oxidation, macrophages, immunity and atherogenesis. In: Chien KR. *Molecular basis of cardiovascular disease*. 2nd edition. Philadelphia; Saunders:2004. pp.385-413

Jeanne Adiwinata Pawitan

Editor of Med J Indones

Department of Histology, Faculty of Medicine,

University of Indonesia