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Ginger, micro-inflammation and kidney disease

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Implication for health policy/practice/research/medical education

Inflammation can play an important role in the pathogenic mechanism of some diseases such as kidney disease. Most medicines that control inflammatory are expensive and with prolonged consumption have potential toxic effects that cause gastrointestinal, cardiovascular disorders and immunodeficiency. Thus, ginger that is a nontoxic spice with minor side effects that the FDA diagnosed it as safe and has anti-inflammatory properties is suggested as a nephroprotective supplement.

Keywords: Renal disease, Kidney disease, Inflammation, Ginger

Inflammation is described by an increase in macrophage amounts that effects on circulating quantities of interleukin-6 (IL-6) and tumor necrosis factor (TNF-α) (1). Inflammation can perform an imperative role in the pathogenic mechanism of some diseases such as diabetes, cardiovascular disease, and kidney injury that is usually related with an increase in oxidative stress, which leads the induction of inflammatory cascades (2). In persons with glomerular estimated filtration rates less than 60 ml/min/1.73 m^2, inflammatory markers increase and it is very common in hemodialysis (HD) patients with a prevalence of 40% to 60% (3). but it is not clear whether they act as indications of disease, starting agents or reasons of progression (2).

Most medicines that control inflammatory, such as various steroids, nonsteroidal anti-inflammatory drugs (NSAIDs) are expensive and have not adequate efficacy and with prolonged consumption have potential toxic effects that cause gastrointestinal, cardiovascular disorders and immunodeficiency (4). Thus, in particular after the withdrawal of many Food and Drug Administration (FDA) certified anti-inflammatory drugs, scientists have noted to herbal therapies with least side effects.

Herbal remedies that are effective in treatment of different human disorders, are usually regarded as safe and their consumptions are gradually raising in developed countries. World Health Organization (WHO) has reported that nearly 80% of world's population trusts on traditional treatment (5).

Ginger plant, with the scientific name of *Zingiber officinale* has been planted for thousands of years as a flavoring spice is one of this herbal that give very attention. It is a nontoxic spice with insignificant side effects that the FDA diagnosed it as safe (5). It has been prescribed to treat a broad range of diseases including pain, musculoskeletal disorder, fever, sore throats, indigestion, nausea and vomiting in traditional system of medicine and inflammation or inflammatory conditions such as osteoarthritis, cancer, migraine, hyperlipidemia and diabetes and ischemia/reperfusion (I/R) injury in the rat's kidney in new systems of medicine (6).

There are several ingredients in the ginger that is vary depending on the place of its origin and whether the rhizomes are fresh or dry. Ginger oil consists of over 50 components mainly mono sesquiterpenes; curcumin, camphene and β-phellandrene (7). The study has shown high levels of polyphenolic and flavonoid compounds with high antioxidant activity for ginger. The existence of flavonoids and polyphenols in the *Z. officinale* extract might be responsible for the antioxidant and nephroprotective actions. The main components of ginger are gingerols and shogaols. Gingerols, are homologous series of phenols. The gingerol (polyphenol) and shogaols was identified as the main active constituent in the fresh and dry ginger rhizome respectively. Shogaols are created from the gingerol in thermal processing (7).

Several mechanism were suggested for the effect of ginger components. First, They can inhibit synthesis of several pro-inflammatory cytokines including IL-1, TNF-α and IL-8 which are the major cytokines, start inflammatory reactions and initiate the production of CRP as an acute-phase reactant with inhibiting prostaglandin (PG) and leukotriene (LT) synthesis enzymes. Second, recent investigations showed that ginger has influence on some genes encoding cytokines, the cyclo-oxygenase-2 (COX-2) enzyme, and chemokines (8).

Third, gingerol and gingerdione significantly showed analgesic and anti-inflammatory activities by inhibiting PGE2 synthesis so both nitric oxide (NO) (9) and prostaglandin production significantly decreased by the extract of ginger and 10-gingerol, 8-shogaol, also 10-shogaol inhibits COX-1 and COX- 2 (10,11). Along

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with these, ginger can suppress leukotriene biosynthesis by inhibiting 5-lipoxygenase and 6-gingerol significantly reduces the lysosomal enzymes level as well as inhibiting lactate dehydrogenase and acid phosphate, and protein kinase C (PKC) (12).

Conclusion

Ginger extracts has the antioxidant and nephroprotective actions so it could be used as a nephroprotective supplement although the most of study are in animals and another study in human seems necessary.

Author's contribution

MK was the single author of the manuscript.

Conflicts of interest

The author declared no competing interests.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

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References

1. Glassman BP, Bhagwat D, Glassman D, inventors. Use of urea as a method for improving the effectiveness of topical anti-inflammatory drugs. US Patent 20,040,156,870. 2004.
2. Vlassara H, Torreggiani M, Post JB, Zheng F, Uribarri J, Striker GE. Role of oxidants/inflammation in declining renal function in chronic kidney disease and normal aging. Kidney Int. 2009;76:S3-11.
3. Keller C, Odden M, Fried L, Newman A, Angleman S, Green C, et al. Kidney function and markers of inflammation in elderly persons without chronic kidney disease: the health, aging, and body composition study. Kidney Int. 2007;71:239-44.
4. Ramadan G, El-Menshawy O. Protective effects of ginger-turmeric rhizomes mixture on joint inflammation, atherogenesis, kidney dysfunction and other complications in a rat model of human rheumatoid arthritis. Int J Rheum Dis. 2013;16:219-29.
5. Al-Nahain A, Jahan R, Rahmatullah M. Zingiber officinale: a potential plant against Rheumatoid Arthritis. Arthritis. 2014;2014:159089.
6. Imani H, Tabibi H, Najafi I, Atabak S, Hedayati M, Rahmani L. Effects of ginger on serum glucose, advanced glycation end products, and inflammation in peritoneal dialysis patients. Nutrition. 2015;31:703-7.
7. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinale* Roscoe): a review of recent research. Food Chem Toxicol. 2008;46:409-20.
8. Jolad SD, Lantz RC, Chen GJ, Bates RB, Timmermann BN. Commercially processed dry ginger (*Zingiber officinale*): composition and effects on LPS-stimulated PGE2 production. Phytochemistry. 2005;66:1614-35.
9. Hong SS, Oh JS. Phenylpropanoid ester from Zingiber officinale and their inhibitory effects on the production of nitric oxide. Arch Pharm Res. 2012;35:315-20.
10. Mahluji S, Ostadrahimi A, Mobasseri M, Attari VE, Payahoo L. Anti-inflammatory effects of zingiber officinale in type 2 diabetic patients. Chem Pharm Bull. 2013;3:273.
11. van Breemen RB, Tao Y, Li W. Cyclooxygenase-2 inhibitors in ginger (Zingiber officinale). Fitoterapia. 2011;82:38-43.
12. Lee TY, Lee KC, Chen SY, Chang HH. 6-Gingerol inhibits ROS and iNOS through the suppression of PKC-alpha and NF-kappaB pathways in lipopolysaccharide-stimulated mouse macrophages. Biochem Biophys Res. 2009;382:134-9.

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