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Review

An overview of the therapeutic functions of ginger

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ABSTRACT: Ginger (*Zinger officinale* Roscoe, Zingiberaceae) is mainly consumed as food condiments globally. It is one of the most widely used natural products. Ginger has long been used as an important ingredient in cooking and traditional herbal Medicine. It contains many bioactive constituents, which have notable pharmacological and physiological properties. Ginger is employed in the treatment of several diseases. This review gives an overview of the chemical composition of ginger and its many dietary and therapeutic uses.

Keywords: Ginger, pharmacological, physiological, rhizome, therapeutic, *Zinger officinale.*

INTRODUCTION

The part of the plant, *Zingiber officinale* that is used for dietary condiments and medicine is the rhizome or ginger root. The rhizome of the plant has a wide range of prophylactic and therapeutic properties (Semwal et al., 2015, Sukumaran et al., 2016). Ginger is remarkably recognized for its spicy and flavouring properties and has been in use traditionally since ancient times as therapy for many ailments. It is commonly grown in some regions of Africa and Asia. The plant has certain characteristics that are similar to that of the turmeric plants. Ginger is an erect perennial plant growing from one to three feet in height. The stem is about 12 inches above ground and is surrounded by the sheathing bases of the two-ranked leaves. Ginger grows horizontally, laterally flattened with branching pieces; a configuration known as rhizome. The whole rhizome has a firm, striated texture. It is 5 to 15 cm long, 1.5 to 6 cm wide and 2 cm thick. Warm, humid climate is the most ideal for ginger cultivation. It grows best in rich soil and shady places (Bhatt et al., 2013).

Zinger officinale possess an unpleasant and aromatic smell and taste, and it is a valuable source of phytochemicals (Bruneton, 1995; Zadeh and Kor, 2014; Yadav et al., 2016). This important medicinal plant contains essential oils such as gingerol and zingiberene, and the unpleasant and aromatic smell is from its constituents like the zingerone, gingerol and shogaol (Yamahara et al., 1985; Koh et al., 2009). The traditional herbal medicinal applications and uses include the treatment of nausea and vomiting (Borrelli et al., 2005), nervous disease (Der Marderosian and Beutler, 2006), headache (Young et al., 2005; Minghetti et al., 2007) and migraine headaches without side effects and has been prescribed as remedies for rheumatic disorders and muscular pain (Srivastava and Mustafa, 1992). Ginger has been considered to have broad-spectrum prophylactic and therapeutic functions (Ernst and Pittler, 2000, Talpur et al., 2013).

NUTRITIONAL COMPOSITION

Ginger, when it is fresh has a very high moisture content of about eighty-one percent, protein (two percent), fat (one percent), minerals (one percent), fibre (less than three percent) and carbohydrates (more than twelve percent). The micronutrients in ginger include phosphorous, calcium and iron. In addition, it is very rich in vitamins such as thiamine, riboflavin, vitamin C and niacin. This nutrient composition differs from one variety of ginger to another (Gugnani and Ezenwanze, 1985; Srivastava and Mustafa, 1992; Zadeh and Kor, 2014).

BIOACTIVE CONSTITUENTS OF GINGER

Several analytical procedures have been used to identify

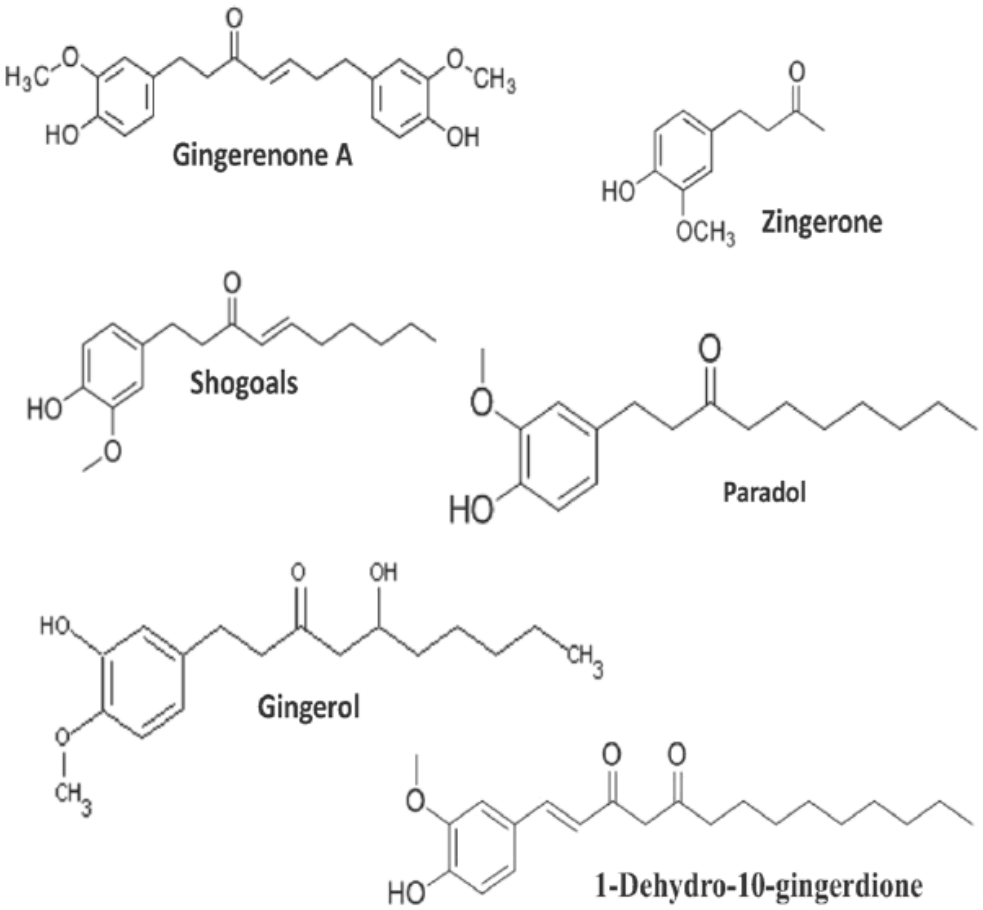

Figure 1. Structure of bioactive components (Rahmani et al., 2014; Yadav et al., 2016).

over a hundred chemical components from both dried and fresh ginger. The major bioactive compounds of this plant (especially in the fresh) are the gingerols, which are usually converted to the shogaols when the rhizome is dried (Figure 1) (Jolad et al., 2005; Bode and Dong, 2011). The levels of the constituents in a sample of ginger varies from one area of cultivation to another and the processing and preservation methods (Schwertner et al., 2006; Rahmani et al., 2014). The main phytochemical in the essential oil contents of ginger is the sesquiterpene, and that include b –bisabolene, E- a –farnesene, (+)-ar-curcumene and (-)-zingiberene among others (Figure 2) (Bruneton, 1995).

PHYSIOLOGICAL AND PHARMACOLOGICAL USES

Literature data from several biological and clinical research findings reveal that the plant has analgesic and anti-inflammatory (Minghetti et al., 2007; Bode and Dong, 2011; Ueki et al., 2008; Black and Oconnor, 2008), antioxidant (Bode and Dong, 2011; El-Sharaky et al., 2009; Ahmed et al., 2008), anti-nausea (Bode and Dong, 2011; White, 2007; Qian et al., 2009), anti-carcinogenic (Bode and Dong, 2011; Aggarwal et al., 2008; Chen et al., 2009), antihypertensive (Bode and Dong, 2011; Nicoll and Henein, 2009), antimicrobial (Zadeh and Kor, 2014; Ody, 2000), blood clotting (Zadeh and Kor, 2014; Castleman and Emmaus, 2001), Antinociceptive (Yadav et al., 2016), weight loss (Yadav et al., 2016), radio protective (Yadav et al., 2016; Kim et al., 2007) and antigenotoxic (Yadav et al., 2016; Beg et al., 2008) activities.

Ginger is known to have an alleviating effect in Alzheimer's disease. An increasing number of experimental studies propose that 6-shogaol, a bioactive component of ginger, may play an important role as a memory-enhancing and anti-oxidant agent against neurological diseases. 6-Shogaol has also recently been shown to have anti-neuroinflammatory effects in lipopolysaccharide (LPS)-treated astrocytes and animal models of Parkinson's disease, LPS-induced inflammation and transient global ischemia (Moon et al., 2014). However, it is still unknown whether 6-shogaol has anti-inflammatory effects against oligomeric forms of the Ab (AbO) in animal brains. Furthermore, the effects of 6-shogaol against memory impairment in dementia models

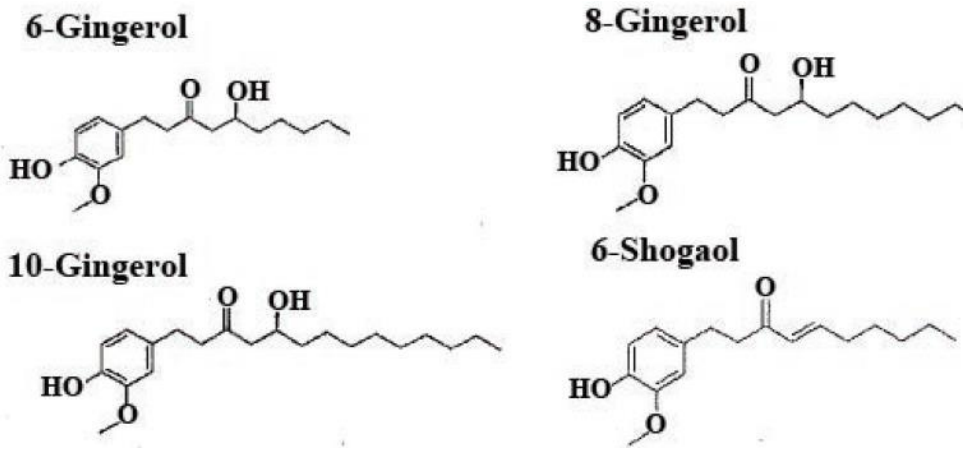

Figure 2. The major components of the essential oil of ginger.

are also yet to be investigated. The results from study by Moon and co-workers suggest that 6-shogaol may play a role in inhibiting glial cell activation and reducing memory impairment in animal models of dementia (Moon et al., 2014). The results of the study by Talpur et al. (2013) demonstrated that dietary ginger doses might strengthen the non-specific immunity and reduce susceptibility to *Vibrio harveyi*. It has also been suggested that dietary supplements of ginger could enhance growth performance, skin mucus immune production, and strengthen immunity of *L. rohita* and that ginger represents a promising food additive for carps in aquaculture (Sukumaran et al., 2016). Nanoparticles derived from edible ginger is a novel and natural delivery mechanism that has demonstrated to improve Inflammatory Bowel Disease (IBD) prevention and it is a treatment with an added advantage of overcoming limitations such as potential toxicity and limited production scale that are associated with synthetic nanoparticles. This system could easily be developed for large-scale production and may eventually provide an effective therapeutic strategy for the prevention and treatment of IBD (Zhang et al., 2016). The structure-activity relationships of ginger phytochemicals show that ginger can be used to treat Age-related neurological disorders (ANDs) by targeting different ligand sites. Choi et al. (2018) reviewed the use of ginger and its constituents, such as 6-gingerol, 6-shogaol, 6-paradol, zingerone, and dehydrozingerone, and their effectiveness in ameliorating the neurological symptoms and pathological conditions of ANDs through the modulation of cell death or cell survival signaling molecules (Choi et al., 2018).

CONCLUSION

The amazing and mighty benefits of ginger cannot be overemphasized, as it is not only extremely useful as dietary condiment for spicing and flavoring food but also an herb with numerous and diverse pharmacological and physiological properties. It is believed that with more innovations and advancement in scientific research on the medicinal uses of ginger, scientists may be able to develop and design drugs from ginger, as effective alternatives to the ones presently used for some diseases.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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