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Review Article

A Critical Review on Pharmaceutical and Medicinal Importance of Ginger

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Abstract

Traditionally, the well-known and widely used herb, which is ginger having scientific name "*Zingiber officinale*" that contains several bioactive constituents, has been extensively used for a number of medicinal purposes like to cure pain, lowers cholesterol level in the body and to fight arthritis and act as a stimulant for digestion and absorption, also provide alleviation from constipation and flatulence by enhancing activity of muscles in the digestive tract. For over one thousand years, China has been using ginger as an herbal medicine, it is used as Materia Medica that helps to improve body fluids flow and also by diluting blood and producing strong stimulating effect on heart muscle, and it stimulates the blood circulation in the body. Ginger is considered an aphrodisiac in Arabian medicine. In 19th century, the Electric physicians were used to rely on ginger to improve appetite, cure nausea, induce sweating and lower topical irritation. In India it has been estimated that the average daily consumption of fresh ginger root is 8-10 g.

Keywords: Ginger; Medicine; Antioxidant; CVDs

Introduction

Ginger unveil an important prospective as its hypoglycaemic, hypotensive, anti- inflammatory, antioxidant, antiplatelet aggregation, antibiotic, dropping of lipid and chemo- preventative characteristics [1,2]. Traditional Chinese and Indian has been using ginger as medicine for over 25 centuries [3]. For over one thousand years, China has been used ginger as an herbal medicine, used as Materia Medica that helps to improve body fluids flow and also by diluting blood and producing strong stimulating effect on heart muscle, it stimulates the blood circulation in the body [4]. The Spaniards brought ginger to Mexico and then introduced to Jamaica and became the world's foremost producers of this species [3]. Throughout the world, in various cultures plants such as herbs have long been utilized as and in folk medicine. These traditional/ folk medicinal plants also include ginger (*zingiber officinale*) that have been utilized to cure mainly gastrointestinal complaints and also to cure pain, cancer high blood pressure and diabetes for over 2000 years. Ginger is also worldwide used as cooking spice and food preservation [5]. Recently, ginger has been brought to various tropical countries where many different chemotypes have been developed. *Zingiber officinale* is as an anti-nausea [6], but also used to treat migraines, inflammatory disorders like hepatitis, esophagitis and gastritis that are known to be provoked by bacteria, viruses and parasites like infectious agents, acid, heat and cigarette like chemical and physical agents, known to be the potential factors behind the cancer to humans, [7] a pain and warming remedy, and as an herb it lowers cholesterol in the body. The health benefiting effects of ginger have been well understood and well documented. To prevent nausea irregular restrained trials, assist ginger use. In treating migraines and inflammatory arthritis case studies suggest its usefulness, but there have no randomized trials done. There is deficient data to propose *zingiber officinale* as supplement to lower cholesterol in the body [8]. It is presumed safe to consume as supplement because of its given long history of use as food. Clinically no significant anticoagulant effect has been reported, on the other hand, because of gingers' effects on *in vitro* thromboxane synthesis and platelet aggregation, some herbalist advice caution for patients who take anticoagulant or scheduled for surgery. On Generally Recognized as Safe (GRAS) list, during stage of pregnancy, lactation stage or during childhood no specific studies have evaluated on gingers' safety. Some botanists suggest the use of ginger should be shunned during the time of pregnancy in animals due to uterotonic effects in animals [3]. A perennial herbaceous plant Ginger, its rhizomatous goes

to *Zingiberaceae* family [9,10], consisting of 49 genera and 1300 species and is largely cultivated in warm climatic countries of the world like Jamaica, Taiwan, India, Nigeria, Bangladesh and USA. Ginger is conferred the characteristics medicinal properties of being pungent and a stimulant as it is rhizome and holds a spectrum of biologically active compounds (gingerol, hogoals, bisabolene, curcumin, zingiberene, salicylate, caffeic acid, capsaicin) and other types of lipids. These characteristic medicinal properties have been documented to be accountable for its several medical applications such as antiemetic, analgesic, antiulcer, antipyretic, prostaglanding suppression and cardio depressant. Also, used as flavouring agent because of its aroma and flavour, like to flavour bread, carbonated drinks, pickles, biscuits, tea and confectionaries [5].

Materials and Methods

Article was written by reviewing literature from Google Scholar and PubMed.

Results and Discussion

Pharmacological Effects

Effects on the gastrointestinal tract

Ginger is traditionally used as remedy for the gastrointestinal complaints [11]. Ginger has number of active compounds which are known to excite digestion, absorption, alleviation from constipation and flatulence by accelerating activity of muscles in the digestive tract. A study was conducted on 18 males and 18 female college students, to find the effectiveness of ginger 940 mg in motion sickness was compared to that of dimenhydrinate 100 mg, who were having motion sickness. The study resulted, ginger is more useful in preventing motion sickness than dimenhydrinate [12,13].

Hypoglycaemic Potentials

Ginger causes a significant decrease in the lipid peroxidation [14]. Hypoglycaemic potential of the ginger was studied in diabetic rats, In the study it was proven that ginger significantly reduces glucose level in serum, triacylglycerol level and cholesterol in the diabetic rats so the study indicated that raw ginger possess hypoglycaemic, hypolipidaemic and hypocholesterolaemic potential [15,16].

Antimicrobial effects

Ginger shows important antibacterial properties and some antifungal properties. Active compounds of ginger help in the inhabitation of multiplying bacteria (i.e., *E. coli, Proteus spp., Staphylococci, Streptococci, Salmonella*) in colon *in vitro*. Colon bacteria result in flatulence by fermenting undigested carbohydrates which can be controlled by ginger. Ginger inhibits the growth of aspergillus (fungus) which produce aflatoxin that is carcinogen. Fresh extract of ginger (juice) posed inhabitation against *S. cerevisiae* (10%), *A. niger* (4%), *Mycoderma spp.* (12%), and *L. acidophilus* (14%) at room temperature [3].

Effects on the Cardiovascular Health

Ginger has a favourable impact on cardiovascular system [12,17]. Blood clotting leads to plaque formation or thrombosis which can results in various heart diseases however ginger prevent heart diseases by reducing blood clotting and also aids in opening the obstruction in the blood vessels that helps in reducing blood pressure and peripheral vascular resistance. Also, it significant to reduce increased level of cholesterol that makes the heart healthy [18]. Due to which ginger has been known as great tonic for heart in Ayurvedic science [13].

Antiplatelet effects

ADP, epinephrine, collagen, and arachidonic acid *in vitro* have found to induce platelet aggregation which can be inhibited by ginger's aqueous extract. Ginger has found to hinder thromboxane synthesis and the most abundant 6-gingerol in ginger is known to have antiplatelet action which is mainly based on the inhabitation of thromboxane formation. In rat aorta, ginger also inhibit formation of prostacyclin [13,19].

Antioxidant effects

In plants, Phenolic compounds are the main sponsor of antioxidant activity [20]. Ginger has antioxidant effect as of having polyphenols content [12]. Ginger is natural anti-oxidant [21,22]. Antioxidant is significant in preventing certain diseases, it slowdowns aging process. In a research, conducted on more than 120 plant foods, in which ginger ranked first amid the five affluent food wellsprings of the anti-oxidants and published in the Journal of Nutrition [13]. Also, ginger enhance the antioxidant production in the body. Ginger prevents free radicals [23].

Effects on cancer therapy

Ginger possess anti-carcinogenic properties [24]. As gingers' active constituents can reduce nausea that's why it is beneficial in chemotherapy which is used for cancer treatment. Any chemotherapy can result in side effects like nausea (approaching as a major side effect resulting from treatment of chemotherapy)

and hair fall. Ginger has some important properties which are favourable and offer protection against cancer cells [13,25,26]. In adult cancer patients, Ginger significantly reduces potency of acute chemotherapy-induced nausea [27].

Anti- Inflammatory effects

Ginger also acts as Anti-Inflammatory agent, Diarylhepatanoids and Gingerols in ginger act as anti-prostaglandin compounds [12,28,29]. The Anti-inflammatory effects of the ginger are valued from centuries [30]. (6)-shogaol one of gingers' active constituent, which is found in the hardly fresh and semi-dried ginger, poses to intrude arachidonic (inflammatory) cascade. In rabbits and rats, it inhibits the cyclooxygenases and prevent particular release of prostaglandin. Ginger is powerful inhibitor for the synthesis of prostaglandin and effective for the treatment of osteoarthritis or rheumatoid. On osteoarthritic sow cartilage *in vitro*, extract of ginger is anti-inflammatory [13,15,31].

Contraindications

In Pregnancy, the contraindication of ginger has been stated by the German Commission E. There are no evidence of the adverse effects of the ginger consumption during time of pregnancy. However, certain clinical trials certified that extracts of the ginger show significance in easing of the emesis and nausea at the time of pregnancy [13].

Treatment of Pain

Ginger is very helpful in healing the pains as proved by many clinical trials. A study reveals that, an effective decline in muscle pain was observed by daily consumption of ginger, either as raw or heat-treated [32]. In another study impacts of ginger were evaluated on pain relief in the primary dysmenorrhea, ginger was found to significantly reduce the pain [33].

Effects on Diseases

Diabetes

It's been investigated by several clinical trials that ginger has significant effects on diabetes [34]. A major pungent component, Gingerol, of ginger significantly reduces diabetes [35], it also enhances the insulin activity [36]. In a research a meta-analysis and five randomized clinical trials were determined, The supplementation of ginger lowered fasting blood glucose concentrations significantly [37].

Nausea and Vomiting

Ginger is very impactful and beneficial for vomiting and nausea [38,39]. A meta-analysis and five randomized trials were conducted in 2006, in a study conducted on 363 patients, to appraise the use of the ginger for vomiting and nausea, unveiled, ginger was effectual than the placebo [40,41].

Ginger, during pregnancy, is very impactful for vomiting and nausea [42]. In 2005, a review assay 33 studies to appraise the productiveness of the ginger in relieving of vomiting and nausea induced at the time of the pregnancy. With total of 675 participants in only six studies, encounter the included criteria, being double blind, randomized controlled trials (RTC's). Out of 33 four of these studies displayed ginger to be imperious to placebo. Two of these studies unveiled it to be resemblent to vitamin B6, which has been found to be helpful in treatment of nausea induced in pregnancy. The review resulted that there were no negative impacts of ginger on outcomes of pregnancy [43].

Arthritis

In osteoarthritis case, the efficiency of ginger showed mixed outcomes. Whereas one research unveiled that ginger have a analytically eloquent upshot on disrate symptoms of osteoarthritis of knee [44]. In another crossover research, effectualness of ginger was eloquent only in the first interval of treatment [41,45].

Vascular conditions

One study has unveiled that using 5g of ginger powder after dietary supplementation has an eloquent increase in fibrinolytic activity [46], although, another study demonstrated that ginger doesn't affect the International Normalized Ratio (INR) [41,46,47].

Other reported uses

The effects of ginger have been widely studied in animals and *in vitro* models, these studies are leading to supposition for its use as an antihypertensive, antifungal, antimicrobial, antioxidant and antineoplastic agent. But in humans none of these possible potential uses have been studied [41].

Conclusion

Ginger is a significant herb that unveil many medicinal and ethno- medicinal properties. Various healing characteristics of ginger are due to the existence of number of bioactive compounds

and in ginger major constituents are gingerols. Ginger unveil an important effectiveness because of its hypoglycaemic, hypotensive, antibiotic, antioxidant, anti- inflammatory, antiplatelet aggregation, reducing lipid content and chemo- preventative characteristics. In conclusion, ginger has diversified amount of medicinal uses due to which it can be used to treat different aliments as single drug or compound drugs. Due to its potential against oxidative stress it can be used as preventative drug.

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Conflict of Interest

No financial interest or any conflict of interest exists.

Bibliography

1. K Gunathilake and H Rupasinghe. "Recent perspectives on the medicinal potential of ginger". *Targets and Therapy* 5 (2015): 55-63.

2. AJ Murray. "Pharmacological PKA inhibition: All may not be what it seems". *Science Signaling* (2008).

3. JB Zadeh and NM Kor. "Physiological and pharmaceutical effects of Ginger (Zingiber officinale Roscoe) as a valuable medicinal plant". Faculty of Animal Science, Shahid Bahonar University, Kerman, Iran Jalal Bayati Zadeh and Nasroallah Moradi Kor 4 (2014): 87-90.

4. C Yang., *et al*. "The effect of ginger juice processing on the chemical profiles of rhizoma coptidis". *Molecules* 23 (2018).

5. OB Ajayi., *et al*. "Food Value of Two Varieties of Ginger (Zingiber officinale) Commonly Consumed in Nigeria". *ISRN Nutrition* (2013): 1-5.

6. MS Moghaddasi and HH Kashani. "Ginger (Zingiber officinale): A review". *Journal of Medicinal Plants Research* 6 (2012): 4255-4258.

7. SHM Habib., *et al*. "Ginger extract (Zingiber officinale) has anti-cancer and anti-inflammatory effects on ethionine-induced hepatoma rats". *Clinics* 63 (2008): 807-813.

8. M Thomson., *et al*. "The use of ginger (Zingiber officinale Rosc.) as a potential anti-inflammatory and antithrombotic agent". *Prostaglandins, Leukotrienes and Essential Fatty Acids* (2002).

9. NS Mashhadi., *et al*. "Anti-oxidative and anti-inflammatory effects of ginger in health and physical activity: Review of current evidence". *International Journal of Preventive Medicine* (2013).

10. "Ginger". in Botanical Medicine for Women's Health, (2010).

11. I Lete and J Allué "The effectiveness of ginger in the prevention of nausea and vomiting during pregnancy and chemotherapy". *Integrative Medicine Insights* (2016).

12. NAZ Yassin., *et al*. "The study of the antispasmodic effect of ginger (Zingiber officinale) in vitro". *Der Pharmacia Lettre* 4 (2012): 263-274.

13. R Rehman., *et al*. "(Zingiber officinale Roscoe) pharmacological activity". *Journal of Medicinal Plants Research* (2015).

14. AT Afshari., *et al*. "The effect of ginger on diabetic nephropathy, plasma antioxidant capacity and lipid peroxidation in rats". *Food Chemistry* 101 (2007): 148-153.

15. BH Ali., *et al*. "Some phytochemical, pharmacological and toxicological properties of ginger (Zingiber officinale Roscoe): A review of recent research". *Food and Chemical Toxicology* (2008).

16. ZM Al-Amin., *et al*. "(Anti-diabetic and hypolipidaemic properties of ginger (Zingiber officinale) in streptozotocin-induced diabetic rats". *British Journal of Nutrition* (2006).

17. S Chrubasik., *et al*. "Zingiberis rhizoma: A comprehensive review on the ginger effect and efficacy profiles". *Phytomedicine* (2005).

18. JFTK Akoachere., *et al*. "Antibacterial effect of Zingiber officinale and Garcinia kola on respiratory tract pathogens". *East African Medical Journal* 79 (2002): 588-592.

19. JH GUH., *et al*. "Antiplatelet Effect of Gingerol Isolated from Zingiber officinale". *Journal of Pharmacy and Pharmacology* 47 (1995): 329-332.

20. M Maizura., *et al*. "Total phenolic content and antioxidant activity of kesum (Polygonum minus), ginger (Zingiber officinale) and turmeric (Curcuma longa) extract". *International Food Research Journal* (2011).

21. AH El-Ghorab., *et al*. "A Comparative study on chemical composition and antioxidant activity of ginger (Zingiber officinale) and cumin (Cuminum cyminum)". *Journal of Agricultural and Food Chemistry* (2010).

22. H yu Yeh., *et al*. "Bioactive components analysis of two various gingers (Zingiber officinale Roscoe) and antioxidant effect of ginger extracts". *LWT - Food Science Technology* (2014).

23. KC Srivastava and T Mustafa. "Ginger (Zingiber officinale) and rheumatic disorders". *Medical Hypotheses* 29 (1989): 25-28.

24. J Rhode., *et al*. "Ginger inhibits cell growth and modulates angiogenic factors in ovarian cancer cells". *BMC Complementary and Alternative Medicine* (2007).

25. K Platel and K Srinivasan. "Influence of dietary spices or their active principles on digestive enzymes of small intestinal mucosa in rats". *International Journal of Food Sciences and Nutrition* 47 (1996): 55-59.

26. Y Shukla and M Singh. "Cancer preventive properties of ginger: A brief review". *Food and Chemical Toxicology (*2007).

27. JL Ryan., *et al*. "Ginger (Zingiber officinale) reduces acute chemotherapy-induced nausea: A URCC CCOP study of 576 patients". *Support Care Cancer* (2012).

28. M Yoshikawa., *et al*. "Qualitative and quantitative analysis of bioactive principles in Zingiberis rhizoma by means of high performance liquid chromatography and gas liquid chromatography. On the evaluation of Zingiberis Rhizoma and chemical change of constituents during Zingib". *Yakugaku Zasshi* 113 (1993): 307-315.

29. F Kiuchi., *et al*. "Inhibition of prostaglandin and leukotriene biosynthesis by gingerols and diarylheptanoids". *Chemical and Pharmaceutical Bulletin* 40 (1992): 387-391.

30. R Grzanna., *et al*. "Ginger - An Herbal Medicinal Product with Broad Anti-Inflammatory Actions". *Journal of Medicinal Food* (2005).

31. CL Shen., *et al*. "Effects of Ginger (Zingiber officinale Rosc.) on Decreasing the Production of Inflammatory Mediators in Sow Osteoarthrotic Cartilage Explants". *Journal of Medicinal Food* 6 (2003): 323-328.

32. CD Black., *et al*. "Ginger (Zingiber officinale) reduces muscle pain caused by eccentric exercise". *Pain* (2010).

33. P Rahnama., *et al*. "Effect of Zingiber officinale R. Rhizomes (ginger) on pain relief in primary dysmenorrhea: A placebo randomized trial". *BMC Complementary and Alternative Medicine* (2012).

34. Y Li., *et al*. "Preventive and protective properties of zingiber officinale (Ginger) in diabetes mellitus, diabetic complications, and associated lipid and other metabolic disorders: A brief review". *Evidence-based Complementary and Alternative Medicine* (2012).

35. RB Semwal., *et al*. "Gingerols and shogaols: Important nutraceutical principles from ginger". *Phytochemistry* (2015).

36. M Priya Rani., *et al*. "Inhibitory potential of ginger extracts against enzymes linked to type 2 diabetes, inflammation and induced oxidative stress". *International Journal of Food Sciences and Nutrition* (2011).

37. JW Daily., *et al*. "Efficacy of ginger for treating Type 2 diabetes: A systematic review and meta-analysis of randomized clinical trials". *Journal of Ethnic Foods* 2 (2015): 36-43.

38. E Viljoen., *et al*. "A systematic review and meta-analysis of the effect and safety of ginger in the treatment of pregnancy-associated nausea and vomiting". *Nutrition Journal* (2014).

39. E Ernst and MH Pittler. "Efficacy of ginger for nausea and vomiting: A systematic review of randomized clinical trials". *British Journal of Anaesthesia* (2000).

40. N Chaiyakunapruk., *et al*. "The efficacy of ginger for the prevention of postoperative nausea and vomiting: A meta-analysis". *American Journal of Obstetrics and Gynecology* 194 (2006): 95-99.

41. B White. "Ginger: An overview". *American Family Physician* 75 (2007): 1689-1691.

42. D Jewell and G Young. "WITHDRAWN: Interventions for nausea and vomiting in early pregnancy". *Cochrane Database of Systematic Reviews* (2010): CD000145.

43. F Borrelli., *et al*. "Effectiveness and safety of ginger in the treatment of pregnancy-induced nausea and vomiting". *Obstetrics and Gynecology* 105 (2005): 849-856.

44. RD Altman and KC Marcussen. "Effects of a ginger extract on knee pain in patients with osteoarthritis". *Arthritis and Rheumatology* 44 (2001): 2531-2538.

45. H Bliddal., *et al*. "A randomized, placebo-controlled, cross-over study of ginger extracts and Ibuprofen in osteoarthritis". *Osteoarthritis and Cartilage* 8 (2000): 9-12.

46. S Verma and A Bordia. "Ginger, fat and fibrinolysis". *Indian Journal of Medical Sciences* 55 (2001): 83-86.

47. X Jiang., *et al*. "Effect of ginkgo and ginger on the pharmacokinetics and pharmacodynamics of warfarin in healthy subjects". *British Journal of Clinical Pharmacology* 59 (2005): 425-432.

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