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Ginger: A Multifunctional Herb

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ABSTRACT:AIM:Zingiber officinale bioactive Components is abundant in active constituents, such as phenolic and terpene compounds. The phenolic compounds in ginger are mainly gingerols, shogaols, and paradols. In fresh ginger, gingerols are the major polyphenols, such as 6-gingerol, 8-gingerol, and 10-gingerol.
OBJECTIVE: Zingiber officinale medicinal plant is reorted to have diverse pharmacological activities like Anticancer and anti inflammatory effects on ethionine induced hepatomarats , Aniticancer in prostate cancer and breast cancer , Anti inflammatory , Anti nflammatory and analgesic activity , Antibacterial activity , Anti-Bioflim activity , Anti Diabetic , Pain Reliver , Anti Oxidant, Hepatoprotective Activity , Pain reliever for nausea and vomiting , Immunity booster against corona virus , Antispasmodic effect.

I. INTRODUCTION

The ginger (Zingiber officinale) belongs to family Zingiberaceae. It is one of the perennial herbs, creeping along the soil plant is with long leaves, yellowish green flowers and thick tuberous rhizome (underground stem). when the plants are about 9 months old, the green leaves turn yellow in colour. The family Zingiberaceae is represented about 46 Genus which is distributed throughout the tropics and subtropical regions of India. The rhizome is oblique, round, annual and covered by smooth sheaths of scale leaves 2-3 feet in height, laterally rhizome are compressed with 7-15 cm long and 1-15 cm broad. About 1-3 cm long branches. Ginger is a cash crop, most of the tribal farmers living in this area follow the traditional and recent trends of ginger cultivation which is generally less expensive and utilizes local resources. Ginger contains highly organic material that facilitates growth, anti stress environment friendly and antimicrobial properties. Nepal is the third biggest for making powder from ginger in the world. The traditional practices of ginger cultivation in northeast India, about 3 lakh tons of gingers are being produced annually. The cultivation of ginger is known originate in china which later on spread to the India. Ginger is known for **'Sunthi'** Ginger is a medicinal plant and some antifungal properties (Nielsen and Rios, 2000) Ginger is used in effective control range of bacterial, viral and fungal diseases. Some says that ginger is strong antioxidant substance. The powder of ginger rhizome is able to enhance non specific response. Ginger may play biological role in antioxidative, cardiovascular etc[28].

Zingiber officinale or more commonly known as ginger has been used in Chinese and Indian medicine over centuries and is also a common household spice found in those regions. It is known to treat gastrointestinal complaints, nausea and vomiting. Ginger also has an anti-inflammatory action which has proven effective in treating arthritis. Furthermore, it has been found to help improve iron absorption in patients with iron deficiency anemia and has a hypoglycemic effect. Ginger is a natural remedy for many illnesses and diseases with no known side effects. Ginger contains 80.9% moisture, 12.3% carbohydrates,

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2.3% protein, 0.95% fat, 1.2% minerals and 2.4% fiber. Minerals present are iron, calcium and phosphorus, while vitamins are thiamine, niacin, riboflavin and vitamin C. The major active component in fresh ginger is gingerol and in dried ginger is shagaol which is a dehydrated product of gingerol. There's 1- 3.5% of volatile oils, primarily sesquiterpenes such as bisabolene, zingi-benene, camphene and acurcumene. Also, 6-10% of lipids comprised of triglycerides, phosphatidic acid, lecithins and free fatty acids[32]

PHARMACOLGY ACTIVITIES:

Anti-cancer and anti-inflammatory effects on ethionine-induced hepatomarats[9]

In which Male Wistar rats were randomly divided into 5 groups based on diet: i) control (given normal rat chow), ii) olive oil, iii) ginger extract (100mg/kg body weight), iv) choline-deficient diet + 0.1% ethionine to induce liver cancer and v) choline-deficient diet + ginger extract (100mg/kg body weight). Tissue samples obtained at eight weeks were fixed with formalin and embedded in paraffin wax, followed by immunohistochemistry staining for NFκB and TNF-α.The expression of NFκB was detected in the choline-deficient diet group, with 88.3 ± 1.83% of samples showing positive staining, while in the choline-deficient diet supplemented with ginger group, the expression of NFκB was significantly reduced, to 32.35 ± 1.34% ($p<0.05$). In the choline-deficient diet group, 83.3 ± 4.52% of samples showed positive staining of TNF-α, which was significantly reduced to 7.94 ± 1.32% ($p<0.05$) when treated with ginger. There was a significant correlation demonstrated between NFκB and TNF-α in the choline-deficient diet group but not in the choline-deficient diet treated with ginger extract group. In conclusion, ginger extract significantly reduced the elevated expression of NFκB and TNF-α in rats with liver cancer. Ginger may act as an anti-cancer and anti-inflammatory agent by inactivating NFκB through the suppression of the pro-inflammatory TNF-α.

ANTI CANCER

In prostate cancer

It is appreciated far and wide that increased and regular consumption of fruits and vegetables is linked with noteworthy anticancer benefits. Extensively consumed as a spice in foods and beverages worldwide, ginger (Zingiber officinale Roscoe) is an excellent source of several bioactive phenolics, including non-volatile pungent compounds such as gingerols, paradols, shogaols and gingerones. Ginger has been known to display anti-inflammatory, antioxidant and antiproliferative activities, indicating its promising role as a chemo preventive agent. Here, we show that whole ginger extract (GE) exerts significant growth-inhibitory and death-inductory effects in a spectrum of prostate cancer cells. Comprehensive studies have confirmed that GE perturbed cell-cycle progression, impaired reproductive capacity, modulated cell-cycle and apoptosis regulatory molecules and induced a caspase-driven, mitochondrially mediated apoptosis in human prostate cancer cells. Remarkably, daily oral feeding of 100 mg/kg body weight of GE inhibited growth and progression of PC-3 xenografts by approximately 56% in nude mice, as shown by measurements of tumour volume. Tumour tissue from GE-treated mice showed reduced proliferation index and widespread apoptosis compared with controls, as determined by immune blotting and immune histochemical methods. Most importantly, GE did not exert any detectable toxicity in normal, rapidly dividing tissues such as gut and bone marrow. To the best of our knowledge, this is the first report to demonstrate the in vitro and in vivo anticancer activity of whole GE for the management of prostate cancer[4].

Despite much recent progress, prostate cancer continues to represent a major cause of cancer-related mortality and morbidity in men. Prostate cancer is the most common on skin neoplasm and second leading cause of death in men. 6-Shogaol (6-SHO), a potent bioactive compound in ginger (Zingiber officinale Roscoe), has been shown to possess anti-inflammatory and anticancer activity. In the present study, the effect of 6-SHO on the growth of prostate cancer cells was investigated. 6-SHO effectively reduced survival and induced apoptosis of cultured human (LNCaP, DU145, and PC3) and mouse (HMVP2) prostate cancer cells. Mechanistic studies revealed that 6-SHO reduced constitutive and interleukin (IL)-6–induced STAT3 activation and inhibited both constitutive and TNF-a–induced NF-kB activity in these cells. In addition, 6-SHO decreased the level of several STAT3 and NF-kB–regulated target genes at the protein level, including cyclin D1, survivin, and cMyc and modulated mRNA levels of chemokine, cytokine, cell cycle, and apoptosis regulatory genes (IL-7, CCL5, BAX, BCL2, p21, and p27). 6-SHO was more effective than two other compounds found in ginger, 6-gingerol, and 6-paradol at reducing survival of prostate cancer cells and reducing STAT3 and NF-kB signaling. 6-SHO also showed

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significant tumor growth inhibitory activity in an allograft model using HMVP2 cells. Overall, the current results suggest that 6-SHO may have potential as a chemo preventive and/or therapeutic agent for prostate cancer and that further study of this compound is warranted[18].

In Breast cancer

Chemotherapy-induced nausea and vomiting (CINV) places a significant burden on the patient. Herbal agents are the most commonly complementary therapies used among the public. This study was done to determine the effect of ginger and chamomile capsules on nausea and vomiting in cases undergoing chemotherapy for breast cancer (BC). In a randomized, double-blind and clinical trial study, 65 women with BC undergoing chemotherapy were referred to Breast Cancer Research Center, Tehran, Iran, between May 2013 to June 2014. Regimen for ginger group for 5 days before and 5 days after chemotherapy was: 2 times a day and 500 mg capsules of powdered ginger root in addition to a routine antiemetic regimen consisting of dexamethasone, metoclopramide and aprepitant (DMA) capsules. Chamomile group similarly was: 2 times a day and 500 mg capsules of Matricaria chamomilla extract in addition to a routine antiemetic regimen consisting of DMA capsules. Control group, routine antiemetic regimen consisting of DMA capsules. Results were there were no significant differences between the ginger, chamomile and control groups regarding age. Drugs used for chemotherapy were identical and duration of disease was also matched (1-4 months). Ginger and chamomile were both significantly effective for reducing the frequency of vomiting, there being no significant difference between the ginger and chamomile groups. Moreover, unlike the chamomile, ginger significantly influenced the frequency of nausea. Conclusions were according to the findings of this study, it should be declared that taking ginger capsules (1 g/day) might relieve CINV safely. Nurses dealing directly with cancer patients should be responsible for providing educational programs for patients and their families about how to deal with their drug regimens and associated side effects[37].

ANTI INFLAMMATORY

Anti-inflammatory action of ginger has been confirmed by various scientists, but there is very few review article published till date on inflammation associated diseases. Inflammation is mainly, culprit of anemia and inflammation associated disorder (like- Pulmonary diseases, Cardiovascular diseases, Diabetes Type-2, cancer, Arthritis, Alzheimer, Neurological diseases and Autoimmune diseases).Since Infection (bacterial/ viral), activate Nuclear factor –-κB, which is a major mediator of inflammation in most of the disease. Zinger has been established potent NF–ƙB inhibitory action via the suppression of pro-inflammatory cytokine, TNF-α and also provides a molecular link between the innate and adaptive immune system. This review takes the Zinger bioactive components, property, Chemical composition, Mechanism of action, function, side effects, current research and their potential application in modern medicine. The present study demonstrates that ginger showed broad spectrum action in which Anti inflammatory action is one of them. So the present study concludes that ginger and its bioactive components have the potential for development of modern medicine in the treatment of anemia and various diseases in near future[5].

Ginger has been shown to exert anti-inflammatory effects in rodents, but its effect on human muscle pain is uncertain. Heat treatment of ginger has been suggested to enhance its hypoalgesic effects. The purpose of this study was to examine the effects of 11 days of raw (study 1) and heat-treated (study 2) ginger supplementation on muscle pain. Study 1 and 2 were identical double-blind, placebo controlled, randomized experiments with 34 and 40 volunteers, respectively. Participants consumed 2 grams of either raw (study 1) or heated (study 2) ginger or placebo for 11 consecutive days. Participants performed 18 eccentric actions of the elbow flexors to induce pain and inflammation. Pain intensity, perceived effort, plasma prostaglandin E2, arm volume, range-of motion and isometric strength were assessed prior to and for 3 days after exercise. Results Raw (25%, –.78 SD, P = .041) and heat-treated (23%, –.57 SD, P = .049) ginger resulted in similar pain reductions 24 hours after eccentric exercise compared to placebo. Smaller effects were noted between both types of ginger and placebo on other measures. Daily supplementation with ginger reduced muscle pain caused by eccentric exercise, and this effect was not enhanced by heat treating the ginger. In summary, the present investigation demonstrated that 11 consecutive days of dietary supplementation with 2 grams of raw and heat treated ginger reduces muscle pain caused by eccentric exercise, and raw ginger is as effective as heat-treated ginger in achieving this effect[42].

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Anti-inflammatory and analgesic activity[38]

Ginger is also often applied for stomach and chest pain, toothaches and as anti-inflammatory agent. The aim of this study is to investigate analgesic and anti-inflammatory activities of Z. officinale dense extract after its transdermal delivery using allyl isothiocyanate (AITC) induced model with further discussion of possible action mechanism of ginger phyto constituents. In which inflammation was induced by sub plantar injection to the plantar fasciitis (aponeurosis) of the hind limb of rats using 30 µL AITC solution (100 µg/limb) in 1,2-propyleneglycol. The dynamics of changes of inflammatory process was evaluated before addition of the inflammation inducer and after 1, 2, 3, 4, 6 and 24 hours of its injection for measuring the volume and the thickness of affected limb. Analgesic activity of ointments with ginger extract was examined using the model of AITC-induced pain.The most effective inhibition of the development of inflammation process was 0.025% ointment with ginger extract, and the highest anti-nociceptive effect was observed at the application of 0.05% ointment 10 minutes before pain inducer agent. They concluded Zingiber officinale dense extract was revealed to possess significant antinociceptive and anti-inflammatory actions after its transdermal delivery. Since the pharmacological effects of ginger extract have been investigated on AITC-induced model, we may suggest the vital role of phytoconstituents binding to TRPA1 and TRPV1 ion channels as possible mechanism of action.

ANTIBACTERIAL ACTIVITY

Zingiber officinale Roscoe leaves oil was hydro distilled and analyzed by gas chromatography/mass spectrometry for the first time from the Egyptian chemo type. Ninety compounds (96.63% of total peak area) were identified. Methyl cinnamate (29.21%) represented the most abundant oxygenated compound. Monoterpene hydrocarbons (23.83%) were rich in β-pinene (8.59%) and terpinolene (7.46%). δ-Cadinene (7.05%) represented the majority of sesquiterpene hydrocarbons (20.86%). A nanoemulsion (diameter of 151.4 nm) was formulated by a low-energy method using Tween-80 as a surfactant, with a polydispersity index of 0.27, the zeta potential of −13.75 mV and pH value of 4. Transmission electron microscopy (TEM) confirmed the nanometric-sized particles. The formulation was stable by keeping in the refrigerator for one month. The nanoemulsion antimicrobial activity was tested against Streptococcus mutants (compared to clindamycin) with MIC value of 62.5 µL/mL, confirmed by TEM showing bacterial scattering with impaired biofilm formation, and by in-silico molecular docking of methyl cinnamate to the C-terminal region of S. mutants surface protein antigen. To our knowledge, the formulation and its anticariogenic activity validation were carried out for the first time. Thus, ginger leaves oil is rich in valuable phytoconstituents; its nanoemulsion showed efficacy on S. mutants, yet further studies are requiredfor testing its applicability as a gargle[12].

In one study they were used Cultures of E. Coli, Bacillus subtilis, Staphylococcus aureus and Streptococcus faecalis to identify the antimicrobial strength. Effectiveness of ginger against different conditions attributed to its different constitu-ents (volatile oils, shogaols, Gingerols and diarylheptanoids) that show their therapeutic efficacy by modulating the genetic or metabolic activities of our body. In this study, we performed phytochemical evaluation and antimicrobial assay of ginger root extract which were available in our local farms of Lahore. Ginger possesses a noticeable antimicrobial activity which was confirmed by checking the susceptibility of different strains of bacteria and fungus by measuring the zone of inhibition. In the light of several socioeconomic factors of Pakistan mainly poverty and poor hygienic condition, present study encourages the use of spices as alternative or supplementary medicine to reduce the burden of high cost, side effects and progressively increasing drug resistance of pathogens[23].

One more study was done, Essential oils isolation was conducted using water and steam distillation method, while microdilution method was adopted in the testing for antibacterial activities against Gram positive and negative bacteria. Furthermore, the mode of action was evaluated using Scanning Electron Microscopy (SEM). Result revealed that antibacterial activity demonstrated antibacterial activities in the essential oils of elephant and emprit ginger rhizome, with minimal inhibition concentrations (MIC) value of 250-1000 µg.mL-1 and minimal bacterial concentrations (MBC) value of 500-1000 µg.mL-1, while chemical evaluation showed the presence of 45 and 38 constituents, respectively. they concluded that both essential oils possess antibacterial activities against Gram positive and negative bacteria, with different strengths, which are based on chemical composition. Conversely, SEM micrographs demonstrated the ability for

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elephant and emprit ginger rhizome essential oils to change the morphology of bacteria[43].

Anti-Biofilm Activity[45]

Biofilm formation by Microbe causes a variety of infections which complicates the antimicrobial therapy. In the present study, the Pseudomonas aeruginosa and Staphylococcus aureus strains have been isolated from the clinical samples and characterized. Zingiber officinale root and Coriandrum sativum seed's hot and cold extract was prepared in ethanol and water. Visible eye scoring was given to judge anti-biofilm activity. P. aeruginosa in treatment with Zingiber officinale root extract displayed maximum anti-biofilm activity whereas in study with S. aureus, no encouraging results were obtained**.**

ANTI-DIABETIC

In the present study, the hypoglycemic potentials of ginger (Zingiber officinale) were studied in rats (four groups: control, ginger, diabetics and diabetics treated with ginger). Ginger extract was daily orally administered (400 mg/kg,) for 4 weeks to alloxan-induced diabetic rats (150 mg/kg). Fasting blood serum was analyzed for blood glucose, insulin, creatinine, blood urea nitrogen, aspartate aminotransferase, alanine aminotransferase, hemoglobin concentration, and erythrocytes, leucocytes, and platelets counts, and histological and immunohistochemical studies of the liver and kidney tissues. The alloxan-injected rats exhibited hyperglycemia accompanied with increases in creatinine, uric acid, blood urea nitrogen, AST and ALT. On the other hand, there were decrease in insulin, hemoglobin concentration, erythrocytes, leucocytes and platelets counts occurred. Ginger was significantly effective in lowering serum glucose, and returned the other previously mentioned blood assays levels in the ginger treated diabetic rats to almost normal value. A significant reduction in pyknotic nuclei, vacuolation, inflammatory infiltration cells in liver sections in the alloxan-injected rats treated with ginger. Also, reduction of the diffuse changes bring about loading of the Bowman's capsule space and adhesion of capillaries to the wall, hyalinized changes in kidney sections of the alloxan-injected rats treated with ginger. In addition, the ginger treated diabetic sections were immune stained with Bax antibody which was more positive than diabetic group in both liver and kidney sections. The present study clearly indicates that the ginger can be effective in inhibiting hyperglycemia, and decreases the damage in liver and kidneys by enhancing insulin level. Consequently, the ginger can be used as improvement material for treatment of Diabetes mellitus and its toxicity[17].

One investigation clearly showed that the herb extracts of Ginger and Oregano had a very great potential as drug alternative in diabetic patients and related disorder demonstrated significant antidiabetic activity. In conclusion, their present study reveals that the herb extracts of Ginger and Oregano had potential effects in improving blood sugar level in BPA induced diabetic catfishes. This study provides experimental evidence that two herb extracts may be a potential therapeutic agent for hyperglycemia that is associated with diabetic complications[35].

PAIN RELIEVER

The study was based on a sample of one hundred and twenty students with moderate or severe primary dysmenorrhea. The students were all residents of the dormitories of Shahed University. They were randomly assigned into two equal groups, one for ginger and the other for placebo in two different treatment protocols with monthly intervals. The ginger and placebo groups in both protocols received 500 mg capsules of ginger root powder or placebo three times a day. In the first protocol ginger and placebo were given two days before the onset of the menstrual period and continued through the first three days of the menstrual period. In the second protocol ginger and placebo were given only for the first three days of the menstrual period. Severity of pain was determined by a verbal multidimensional scoring system and a visual analogue scale. Results revealed There was no difference in the baseline characteristics of the two groups (placebo n = 46, ginger n = 56). The results of this study showed that there were significant differences in the severity of pain between ginger and placebo groups for protocol one (P = 0.015) and protocol two (P = 0.029). There was also significant difference in duration of pain between the two groups for protocol one (P = 0.017) but not for protocol two (P = 0.210).Treatment of primary dysmenorrhea in students with ginger for 5 days had a statistically significant effect on relieving intensity and duration of pain[20].

ANTI OXIDANT

Mercuric chloride toxicity experimentally induced in mice were associated with chronic neuropathology in brain including ischemic neuronal injury, spongiosis, liqufactive necrosis, perivascular and precellular edema, congestion and

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hyalinization of chroid plexus of lateral and fourth ventricles of the brain. These changes were observed in cerebral cortex, hypothalamus and cerebellum. The experimental animal showing clinical signs related to neuropathological changes as impared response to noise, loss of perfect movement and sleeping altitude. Co-administration of garlic and ginger oil together with mercuric chloride greatly inhept the above mentioned changes and result an improvement and recovery, so in area with suspected mercuric chloride pollution they advised that garlic and ginger must be a constant component of food[31].

The antioxidant activity were also determined using the DPPH and FRAP methods and the consumer preference evaluated using 102 untrained panellists. From the results obtained, incorporation of ginger powder increased the iron, copper and manganese contents of yoghurt while incorporation of aqueous ginger extract led to an improvement in iron and copper content. Yoghurt spiced with ginger powder showed the highest antioxidant activity ($P<0.05$) while the yoghurt spiced with decocted dry ginger and the unspiced yoghurt had the lowest antioxidant activity ($P<0.05$). All spiced yoghurt samples had similar ($P>0.05$) ferric reduction power. The yoghurt spiced with 0.5% of ginger powder was least preferred. The yoghurt made with macerated dry ginger at room temperature had a lower level of preference compared to the samples of other yoghurt spiced with ginger extracts. The form of incorporation of ginger affects the mineral profile, the antioxidant activity and the consumer preference of yoghurt. The use of ginger extracts in the production of yoghurt can therefore be considered in the milk industry with little prospects for the incorporation of powder ginger into yoghurt[39].

HEPATOPROTECTIVE ACTIVITY

Hepatic cells participate in a variety of metabolic activities and contain a host of enzymes. AST and ALT are reliable markers of liver function which are found in higher concentrations in the cytoplasm and an altered form of AST also exists in the hepatocyte mitochondria. Although both transaminase enzymes are widely distributed in other tissues of the body, the activities of ALT outside the liver are low and therefore this enzyme is considered more specific for hepatocellular damage. During liver injury, transport function of the hepatocytes is disturbed which leads to leakage of plasma membrane, thereby causing an increased enzyme level in serum and soluble enzymes like AST will also be similarly released. Estimation of these enzymes in serum is a useful quantitative marker for the extent and different types of hepatocellular damage. The present study elevated activities of AST and ALT in serum were observed in paracetamol administered rats which indicates increased permeability, damage and/or necrosis of hepatocytes[33].

PAIN RELIEVER

Menstrual pain is pain that is felt in the pelvis, lower abdomen, lower back, severe lower abdominal cramps, pain that occurs before or during menstruation. This study used true experimental design, and pretest-post-test design with a simple random sampling technique. Treatment group was given aromatherapy lavender, clary sage, Ginger, geranium with a ratio of 1: 1: 1: 1 with a final concentration of 4% mixed with almond oil through massage effleurage and Treatment II was given aromatherapy lavender concentration of 1% mixed with almond oil. Changes pain intensity are measured using a Numerical Rating Scale. Results: Based on the Mann Whitney test results obtained between the treatment group I and treatment group II with p-value = 0.001 means that there was a significant difference in the decrease in pain intensity in the groups given essential oils: lavender, clary sage, ginger, geranium with a concentration of 4% mixed with almond oil through massage effleurage and groups that were only given lavender oil 1% and mixed with almond oil through massage effleurage. Lavender, clary sage, ginger and geranium essential oils mixed with almond oil through massage effleurage are more effective in decreasing pain intensity than those who were only given lavender oil[36].

FOR NAUSEA AND VOMITING

Ginger (Zingiber officinale) is often advocated as beneficial for nausea and vomiting. Whether the herb is truly efficacious for this condition is, however, still a matter of debate. We have performed a systematic review of the evidence from randomized controlled trials for or against the efficacy of ginger for nausea and vomiting. Six studies met all inclusion criteria and were reviewed. Three on postoperative nausea and vomiting were identified and two of these suggested that ginger was superior to placebo and equally effective as metoclopramide. The pooled absolute risk reduction for the incidence of postoperative nausea, however, indicated a non-significant difference between the ginger and

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placebo groups for ginger 1 g taken before operation (absolute risk reduction 0.052 (95% confidence interval –0.082 to 0.186)). One study was found for each of the following conditions: seasickness, morning sickness and chemotherapy induced nausea. These studies collectively favoured ginger over placebo[41].

Chemotherapy-induced nausea and vomiting (CINV) is a common side-effect of cytotoxic treatment. It continues to affect a significant proportion of patients despite the widespread use of antiemetic medication. In traditional medicine, ginger (Zingiber officinale) has been used to prevent and treat nausea in many cultures for thousands of years. However, its use has not been confirmed in the chemotherapy context. To determine the potential use of ginger as a prophylactic or treatment for CINV, a systematic literature review was conducted. Reviewed studies comprised randomized controlled trials or crossover trials that investigated the anti-CINV effect of ginger as the sole independent variable in chemotherapy patients. Seven studies met the inclusion criteria. All studies were assessed on methodological quality and their limitations were identified. Studies were mixed in their support of ginger as an anti-CINV treatment in patients receiving chemotherapy, with three demonstrating a positive effect, two in favor but with caveats, and two showing no effect on measures of CINV[2]

IMMUNITY BOOSTER AGAINST CORONA VIRUS (COVID-19)[44]

Virus responsible for SARS disease, Spread during 2003. SARS-COV, Primarily binds to Heparon Sulphate Proteoglycan (HSPG) sites of human cell membrane. Lactoferrin has the ability to pre-bind HSPG Sites & block SARS-COV interaction on human respiratory tract. Novel Coronavirus(SARS-COV2) has certain close similarities with SARS-COV. Based on the available literature, it is hypothesized that human colostrums & dairy products, Ginger, Garlic, Honey, Turmeric, Sour Cabbage, Tomato, Flax Seeds, Blueberries, Olive, Onion, Carrot and Spinach can boost immune system to fight against against Novel Coronavirus.

Relying on the genetic similarities between SARS-COV and SARS-COV-2, Dairy products, has an element having the ability to bind and block the adhesion sites of virus on human cell membranes can be considered as dietary inhibitor of coronavirus. Ginger and Garlic contains many beneficial components with enhancing effects on respiratory ailments, immune system and killing the pathogens. Honey contains healing properties but manuka honey is not only anti-bacterial but also an anti-microbial. Use of Turmeric enhances immunity by its anti-inflamatory properties. Tomatoes has chlorogenic acid, which regulates apoptosis and stem cell marker related to gene expression A549 human lung cancer cells. Olive has the Anti-viral properties that reduces upper respiratory ailments (URI). Black Seeds stimulates the body's energy. Blueberries contains flavonoids that reduce the damage to the cells. Flax Seeds with its anti-oxidant properties helps in regeneration and repair of body cells. Onions has the immune boosting nutrient like selenium. Carrot helps in increasing the metabolism. Spinach is super low in calories and provides all essential nutrients. Hence, usage of these products is suggested, As various countries around the globe have started working on immunity boosters to combat novel coronavirus. However this hypothesis needs to be scientifically confirmed and clinically proven through specific studies on SARS-COV-2's interaction on human cell membrane. In the current scenario of COVID-19 outbreak and vaccines are in clinical evaluation.

ANTISPASMODIC EFFECT

The aim of the present work is to demonstrate the antispasmodic effect of ginger (Zingiber officinale) on rat intestine in vitro. Methods Rats (150–200 g) were used throughout the experiment, Sacrificing was done by cervical dislocation The abdomens excised immediately, the jejunum Segments 2 cm long are cut mounted in a 10 ml tissue automatic organ bath containing Tyrode's solution at 37◦C and aerated with carbogen (oxygen + 5 % carbon dioxide) gas, where one end is attached to the hook and the other is tied by a thread to the transducer. The transducers were connected to an amplifier to amplify the magnitude of contractions; these in turn were interpreted by a data acquisition system to obtain the final results by computer system. Results The results revealed that the effect of low doses of ginger on exogenous acetyl choline (ACh) induced contraction is spasmogenic as a dose of 0.2ml=20µg of ginger / tissue bath produced increase in the magnitude of ach induced contraction from 0.91 to 1.17 , while doses of 0.4 ml = 40µg of ginger/of tissue bath produced decrease in magnitude of ach induced contraction from 0.61 to 0.45 , and a dose of 0.8 ml=80µg of ginger / tissue bath produced decrease in magnitude of ach induced contraction from 0.85 to 0.11[47

II. CONCLUSION

Zingiber officinale has been subjected to many extensive clinical investigations. Experimental studies have demonstrated its anti-inflammatory, analgesic, antiemetic properties. So further many kinds of research can be done for finding out the more medicinal use of ginger and it can be an alternative to modern medicine for the treatment of any underlying disease. We hope this review will facilitate all about the past scientific research and the necessary information about the enormous pharmacological activities of ginger and more detailed clinical research appears.

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