International Journal of Aquatic Science
ISSN: 2008-8019
Vol 12, Issue 01, 2021

A Scientific Overview On Safety And Effectiveness For Various Internal Organs With Herbamedicus

Dr. Laxmi Kirana Pallathadka[1], Dr. Harikumar Pallathadka[2]

[1,2] *Manipur International University*

Email: [2]harikumar@miu.edu.in

Abstract: Due to today's lifestyle, the human body has a built-in detox system that maintains it functioning smoothly regularly, ranging from the skin to the liver. It includes increasing stress, pollution, and improper eating habits. The time has come to discover the natural herbs that can cleanse the kidneys, liver, intestines, skin, and various body organs. Detoxifiers for the kidney, liver, CVS, and skin are the subject of this review. Sections of the herbs were examined for their ability to detoxify the body's primary organs. Toxins may be removed from the body while increasing the body's general energy and efficiency at the same time when herbal agents are used to detox the main organs.

Keywords: Detoxifiers, Toxins, Kidney, Liver, Skin

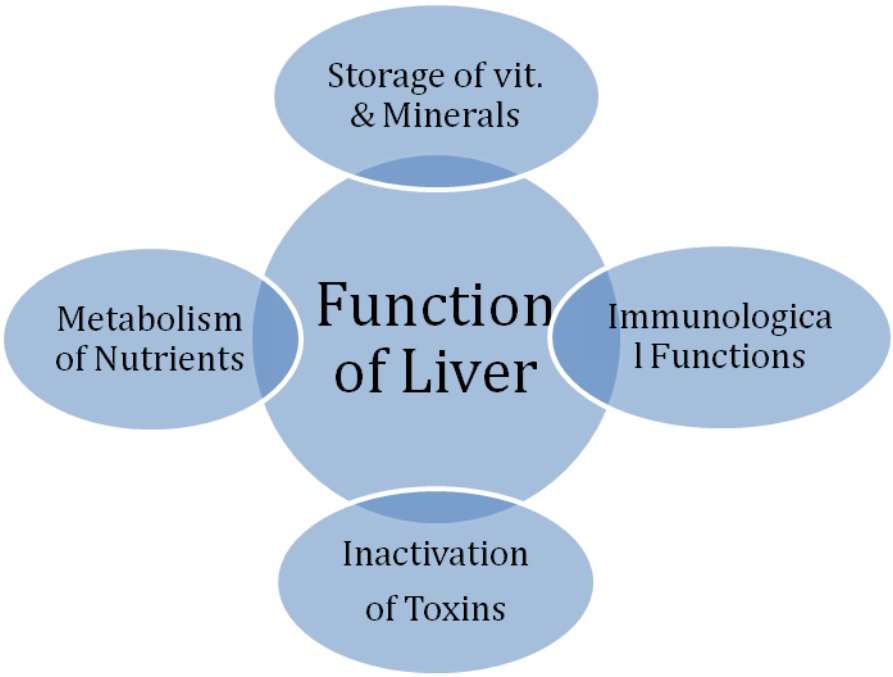
1. INTRODUCTION

Detoxification is the process of cleansing the body of chemicals that impair the function or structure of cells. The need to cleanse and detoxify our bodies has developed in tandem with the number and number of harmful substances in the air, water, and food [1].
Modern research has shown that various plants can neutralize or detoxify toxins and protect the respiratory, urinary, hepatic, and brain systems from the harmful effects of pharmaceuticals and chemicals. This review will focus on the medicinal plant detoxifying properties for kidneys, liver, intestines, skin, blood, and others [2].

Organs

Liver

An essential part of our body's metabolism and excretion process, our liver is one of our most critical solid organs and glands. Its principal role is to regulate the flow and safety of chemicals ingested from the digestive system before being sent to the circulatory system [3]. This research was conducted to evaluate and demonstrate the liver's physiology and significance, keep it running at its maximum, and maintain excellent health to prevent liver injuries such as fatty liver, liver fibrosis, and cirrhosis, which might result in death within minutes [4]. Bile production, bilirubin's metabolism, blood circulation, the metabolism of nutrients, metabolic cleansing, and storage of minerals and vitamins are just a few of the liver's many tasks [5].



The Skin

Skin is our most important organ, with a mass that accounts for more than 10% of the total body mass and directly connects to our environment. These four layers are referred to as "skin": stratum corneum (nonviable epidermis), elastin and collagen fibers (viable epidermis), and dermis and subcutaneous tissues. Hair follicles, sweat ducts, apocrine glands, and nails are all linked appendages [6]. Many skin functionalities are necessary for animals' and humans' overall survival in a harsh environment [7]. Protective, maintaining homeostasis, and sensing are all examples of these roles. A barrier feature serves as an excellent example of the skin's protective and homeostatic function. In this way, people may live and thrive in a variety of environments, including those with fluctuating temperatures, water content (humidity, bathing), and environmental hazards, including chemicals, germs, and allergies, as well as radiation [8]. Secondly, the skin is essential for sustaining the body's homeostasis, particularly its composition, heat regulation, blood pressure management, and excretory functions. It is important. Animals of varying sizes have been suggested to keep a steady body temperature via the skin's thermoregulatory regulation by scaling their basal metabolic rate to their surface area [9]. Third, the skin is a primary sensory organ in perceiving environmental impacts, such as heat, pressure, pain, allergy, and microorganisms [10]. Last but not least, the skin is a living organ that is constantly regenerating and repairing the damage. The skin must be strong, durable, and flexible, with adequate communication between all of its intrinsic components, in order to accomplish these roles [11].

Kidney

Nearly two-thirds of the human body consists of water. Maintaining fluids in balance and other organ systems to operate regularly is a primary function of the renal system [12]. Two kidneys, two ureters, a urinary bladder, and the urethra make up the renal-urologic system. Adult kidneys are bean-shaped and positioned between the 12th thoracic and 3rd lumbar vertebrae in the retroperitoneum [13]. Because of the liver's displacement, the right kidney is somewhat lower than the left. The left kidney is somewhat longer and closer to the center than the right kidney. A thick layer of fat supports the kidneys. The kidneys are less vulnerable to injury when protected by the stomach and back muscles surrounding them [14].

The ureters range in length from 27 to 30 cm and in width from 1 to 5 mm. They reach from the kidneys to the bladder [15].

Peristaltic contractions transfer urine from the renal pelvis to the bladder. The bladder, situated behind the symphysis pubis, serves as a urine reservoir. It serves as a channel for urine before releasing it from the body [16]. Urine enters the bladder through the ureters and leaves the bladder by the urethra; there are three bladder openings total. It is the urethra's job to carry urine from the bladder to the urethra. Females have a length of roughly 4 cm, while males have a length of approximately 21 cm. The urethra can evacuate urine via the urinary meatus [17]. The kidney's functional components include an outer renal medulla and an inner renal cortex. In the renal pyramids, the medulla is split into a series of wedges, which open onto the renal calyces. In order to construct the renal pelvis, the major calyces of the ureter connect. Between the renal pyramids and the renal cortex are renal columns. The nephrons are the primary functional units of the kidneys [18]. Each kidney has around 1.2 million nephrons, which produce urine. All four parts of the glomerular capillary tuft, the Bowman's capsule, the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule make up a single nephron [19]. Starting in the brain, the process of urination proceeds through tubules and collecting ducts until it reaches its final destination. It then passes via Bellini's ducts into the calyces and renal pelvis before exiting the kidney by the ureter to the bladder, cleaned. Smooth muscles in the calyces, pelvis, and ureter contract in a pulsatile manner, causing urinary peristalsis [20].

Gall Bladder

Pear-shaped vesica fellea is the human gallbladder located between the liver and serous membrane. The neck, the body, and the fundus are the three areas that make up the organ (a blind end). The neck and the cystic duct, which joins the gallbladder and common bile-duct, are connected by a sphincter (ductus choledochus). Since Wallraff highlighted it, the absence of morphological knowledge on the normal human gallbladder, particularly at the electron microscope level, has remained almost constant [21].

Obtaining healthy organs and processing them rapidly to produce a desirable morphology are challenging or impossible tasks. The vast majority of our knowledge about the gallbladder is derived from animal research [22].

However, given the vast range of anatomical and physiological distinctions seen at every level of the vertebrate hierarchy, the issue remains as to how far these observations about animals can be applied to humans [23]. Gallbladder function is closely linked to hepatic bile production, according to Schmidt and Ivy. The anatomical capacity (i.e., the organ's volume), physiological capacity (i.e., how long the entire hepatic secretion can be held in the gallbladder), and sphincteric resistance (i.e., how much resistance is present at the sphincter of Oddi) all differ consistently from one species to the following [24].

Human gallbladder capacity varies from person to person. X-ray cholecystography readings vary from 14 ml to 60 ml, with an average capacity of 33 ml. As cholescintigraphy in ordinary people has shown, this should be linked to individual variability in the emptying process of the organ [25]. Water and other solutes are selectively retained by the human gallbladder, which concentrates between 10% and 20% of the initial liver-bile volume (800-1000ml during 24-hour production) by selective reabsorption. As a result, the dry content increases from 1% to 3% while the gallbladder's volume remains unchanged, resulting in a dry content increase from 14% to 20%. The gallbladder to fill requires a significant sphincteric resistance [26]. In both animals and humans, the gallbladder regulates the intraluminal pressure of the bile duct. Most of what we know about the gallbladder's anatomy and function comes from animal research [27]. No matter how far these discoveries on

animals may be applied to humans, the substantial anatomical and physiological variations at lower vertebrate scales raise some concerns. Schmidt and Ivy found that hepatic bile and the gallbladder's function are closely linked. There was a wide variation in sphincteric resistance and other anatomical and physiological capacity measures from species to species. The sphincter of Oddi, for example, was shown to have a higher resistance in certain species than in others [28].

Human gallbladder capacity varies from person to person. By x-ray cholecystography, the volume ranges from 14 ml to 60 ml, with an average of 33 ml. As cholescintigraphy in ordinary people recently shown, this should be linked to individual variability in the organ's emptying process [29].

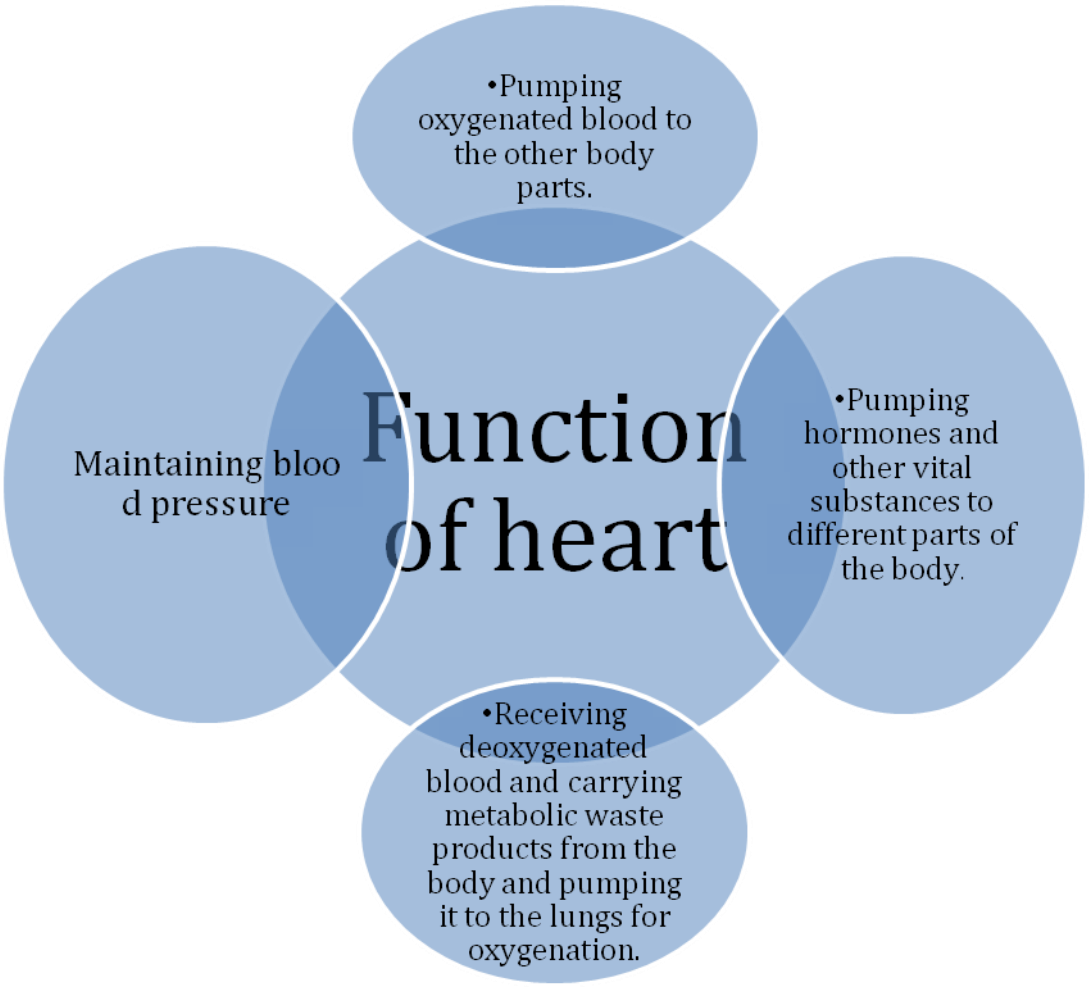
The human gallbladder concentrates between 10% and 20% of the initial liver bile volume (800-1000 ml during 24-hour production) [30]. There is no change in gallbladder volume, but the dry content increases from 1 to 3 percent (hepatic bile) to 14 to 20 percent (gallbladder bile). For the gallbladder to fill, it requires a significant sphincteric resistance. As a result, in both animals and humans, the gallbladder regulates the intraluminal pressure of the biliary system [31].

Heart

The heart is a muscular organ that pumps blood throughout the body, located directly beneath and slightly to the left of the breastbone. It is about the size of a fist closed [32]. Every second of the day, the heart pumps blood through the body's network of arteries and veins. The heart and its blood vessels are part of the cardiovascular system. The heart is divided into four chambers [33]. The atria are the heart's top two chambers, while the ventricles are the bottom two. A person's right heart consists of the right atrium and ventricle, whereas a person's left atrium and ventricle are referred to as the left heart [34][35]. Each of the septums that divide the heart's chambers is a partition. The right atrium receives and pumps deoxygenated blood [36].

Oxygenated blood from the right atrium enters the right ventricle, which pumps it to the lungs to supply them. The lungs provide oxygenated blood to the left ventricle via the left atrium. The most vital part of the heart is the left ventricle. As a result, the body receives more oxygen-rich blood [37][38].

The heart's four valves protect blood flow into, though, and out of the heart chambers. The coronary arteries, which run along the surface of the heart, provide the heart with nutrition and oxygen [39]. The heart's regular beating is also supported by a network of nerve tissue [40]. The pericardium is a fluid-filled sac that surrounds the heart. It prevents friction between the heart and surrounding organs by producing fluid, which lubricates the pericardium [41].



Liver detoxification

Zingiber officinale

Ginger, derived from the plant *Zingiber officinale* Roscoe (Family Zingiberaceae), is possibly the most extensively used culinary agent and spice globally [42]. Apart from its culinary uses, ginger has medicinal properties and has been used in various alternative and folk systems of medicine throughout the world to treat ailments such as colds, headaches, nausea, stomach upset, diarrhea, digestive, gastrointestinal disturbances, rheumatic complaints, diarrhea, nausea, asthma, parasitic infections, arthritis, and muscular discomfort [43]. The distinctive culinary and therapeutic characteristics of ginger have been attributed to the presence of phytochemicals such as zingerone, shogaols, gingerols(fig.1), pardols, and -phellandrene, curcumin, cineole, geranyl acetate, terpineol, terpenes, and borneol are all examples of terpenes, geraniol, limonene, -elemene, zingiberene, linalool, and -zingiberene-sesquiphellandrene, -bisabolene, zingiberenol [44].

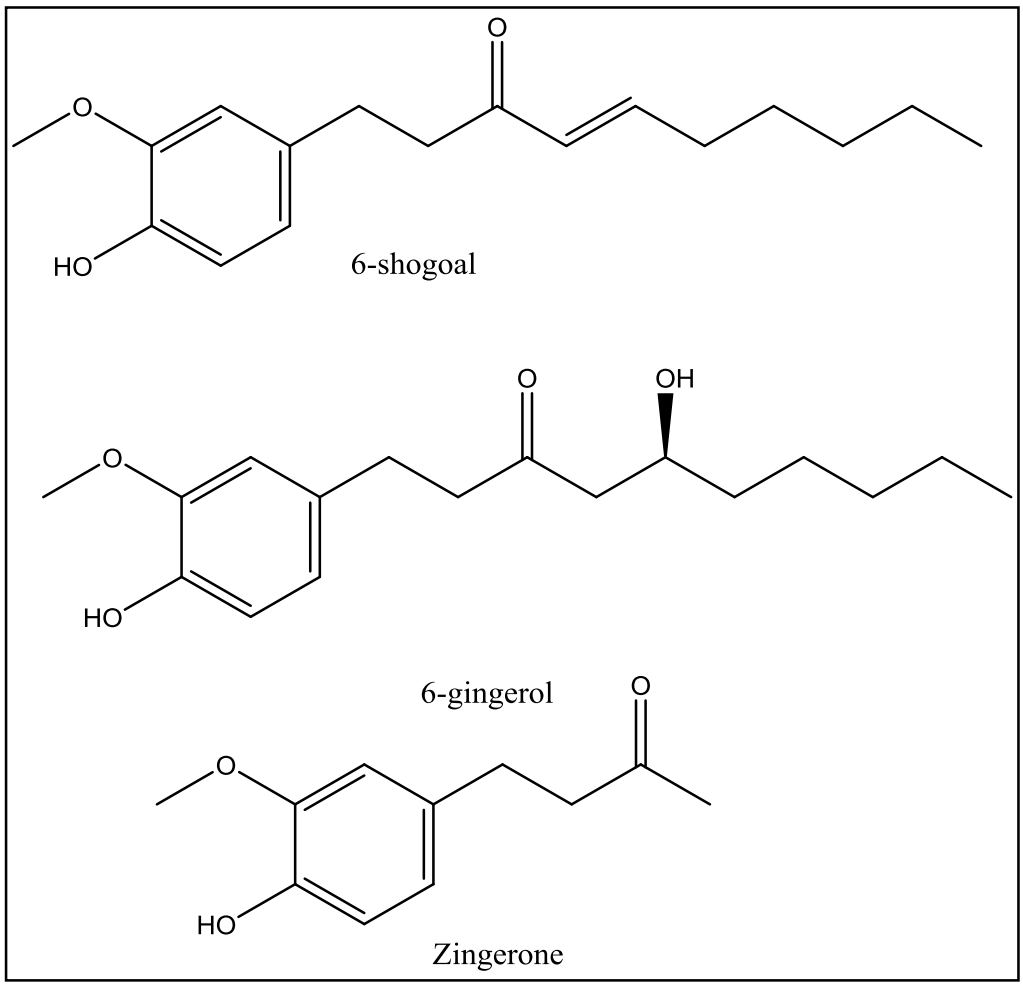


Figure1: Structure of chemical constituents of ginger

Ginger Protects Against Hepatotoxicity Caused by Alcohol

Numerous investigations have shown that prolonged high-ethanol use is a crucial cause of liver cirrhosis and cancer [45]. The ingested ethanol is oxidized chiefly to acetaldehyde in the liver by ADH and then detoxified to acetate by ALDH [46].

Variation in the genes encoding these enzymes has been shown to affect alcohol intake, alcohol-induced tissue damage, and alcohol dependency. In preclinical studies, rats fed a ginger-containing diet (1%) for four weeks were able to reduce the hepatotoxic effects of ethanol. When rats fed just the laboratory food (without ginger) were compared to rats fed the ginger-containing diet, the cohorts fed the ginger-containing diet exhibited elevated levels of SOD, GPx, GR, CAT, and GSH with a concurrent drop in LPx levels [47].

Following that, studies with laboratory mice showed that giving an aqueous extract of ginger (500 mg/kg b.wt.) for two weeks reduced the ethanol-induced increase in nitric oxide. The LPx increased total antioxidant capacity. The GPx activity reduced the alcohol-induced increase in serum levels of the liver function enzymes L-gamma-glutamyl transpeptidase and butyrylcholinesterase [48]. Additionally, investigations have shown that oral treatment of ethanolic ginger extract (200 mg/kg) was efficient in lowering blood AST, ALT, ALP, and GGT levels, as well as tissue LPx levels. According to the researchers, the beneficial effects of ginger were compared to the regularly used hepatoprotective drug silymarin (25 mg/kg) [10]. These findings indicate that ginger was effective in two animals (rats and mice), whether given orally or through food.

Ginger Prevents Chemical-Induced Liver Cancer

Liver cancer, officially referred to as hepatocellular carcinoma, is one of the five most prevalent types of cancer worldwide. It is caused by persistent exposure to hepatotoxins and infection with the hepatitis B virus. Ginger is shown to have chemopreventive effects in rats, effectively inhibiting hepatocarcinogenesis caused by ethionine, DEN, and CCl4 [50]. For the first time, researchers found that giving ginger oleoresin (100 mg/kg body weight) to rats on a choline-deficient diet who also had access to 0.1 percent ethionine-containing drinking water for eight weeks reduced the incidence of liver nodules. Additionally, co-administration of ginger resulted in a reduction in LPx levels [51].

Furthermore, molecular studies have demonstrated that ginger reduces the high expression of NF-B and TNF- in rats with liver cancer, implying that the observed chemopreventive advantages are mediated by NF-B inhibitory actions, possibly through the lowering of proinflammatory TNF-. Ginger extract dramatically reduced the amount of LPx in the blood of rats given a choline-deficient diet and the carcinogen ethionine in drinking water, both of which were used to induce hepatocarcinogenesis [52]. Additionally, ginger has been demonstrated to help suppress hepatocarcinogenesis induced by DEN and increased by CCl4.

Ginger (50 mg/kg/day) in drinking water was efficacious in suppressing chemical hepatocarcinogenesis in mice for eight weeks. When compared to DEN-induced and CCl4-promoted cohorts, the animals obtaining ginger (along with the carcinogens and promoters) had lower levels of neoplastic changes. The serum hepatic tumor markers declined hepatic tissue growth factors (vascular endothelial growth factor, essential fibroblast growth factor), and increased hepatic metallothionein and endostatin were also seen [53].

Mechanism of action

Numerous investigations have shown that increased production of reactive oxygen and nitrogen species (ROS and RNS) is associated with various liver disorders and the toxic manifestations of a variety of hepatotoxins. Numerous investigations have shown that ginger extracts, oleoresins, and volatile oils are efficient at scavenging free radicals like superoxide, hydroxyl, and nitric oxide in vitro. Additionally, it has been found that the phytochemical zingerone is an excellent scavenger of free radicals such as superoxide, peroxyl, and peroxynitrite and an inhibitor of peroxynitrite-mediated tyrosine nitration [54]. Another significant ginger phytochemical-Gingerol has been demonstrated to scavenge peroxyl radicals, block nitric oxide synthesis, and decrease iNOS formation in LPS-stimulated cells [55]. The liver is the primary organ responsible for the metabolism and detoxifying xenobiotic substances in animals, followed by phase I and phase II enzymes. Phase I reactions, primarily mediated by the cytochrome P-450 monooxygenase system, change the polarity of xenobiotic compounds by adding new functional groups. Conjugation to endogenous hydrophilic molecules (such as GSH by GST) occurs during phase II, and the ensuing reaction improves the polarity and water solubility of the xenobiotic metabolite, allowing it to be eliminated from the body [57].

Ginger extracts and some phytochemicals have been shown to impact phase I and phase II enzyme activity and, at least in part, exert their hepatoprotective benefits through this mechanism [58]. When it comes to phase I enzymes, ginger increases the levels of microsomal cytochrome P 450-dependent aryl hydroxylase, cytochrome P 450, and cytochrome b5, all of which increase the polarity of non-polar xenobiotics. Additionally, oral administration of ginger oil has been demonstrated to boost the activities of aryl hydrocarbon hydroxylase and GST in mice [59]. Additionally, ginger has been demonstrated to boost the activity of GST, UDPGT, aryl hydrocarbon, and quinone reductase and accelerate the liver's clearance of partly metabolized hepatotoxins [60].

Beetroot

The beetroot (*Beta vulgaris* ssp, Chenopodiaceae) is a staple food in Eastern and Central European cuisines. Beetroot juice is also a common folk cure for liver and kidney problems and stimulates the immunological and hematopoietic systems. Recently, there has been a surge of interest in the anticancer qualities of red beet and the use of beetroot products or ingredients as dietary supplements for cancer prevention [61]. Chemoprevention is natural or artificial medicine to prevent, reduce, delay, or reverse cancer progression. Beetroot extract is a powerful chemopreventive medication capable of reducing N-nitrosodimethylamine (NDEA)-induced hepatocarcinogenesis in mice [62]. The most intriguing finding in this research was that the cancer chemopreventive effect was shown at a relatively low dosage, suggesting that beetroot deserves more investigation for potential human applications in cancer management. Our recent work showed that beetroot juice might similarly protect rats' livers from NDEA-induced damage, perhaps via the stimulation of phase II enzymes such as NAD(P)H: quinone oxidoreductase 1 (NQO1) and glutathione S-transferases (GST) [63].

Several pathways have been postulated for beetroot's anticancer efficacy at the cellular level, including antioxidant, free radical scavenging, anti-proliferative, anti-inflammatory, pro-apoptotic, and key enzyme inhibitory activities [64]. Beetroot is one of the plants with the most significant antioxidant capacity due to the presence of red pigments (betacyanins) and yellow pigments (betaxanthins) (fig 2), generally referred to as betalains. Betanin (BET), the primary pigment and active phytochemicals in beets, accounts for 75–95 percent of the betacyanins detected. Thus, it may be believed that BET is primarily responsible for beetroot extract or juice's positive benefits [65].

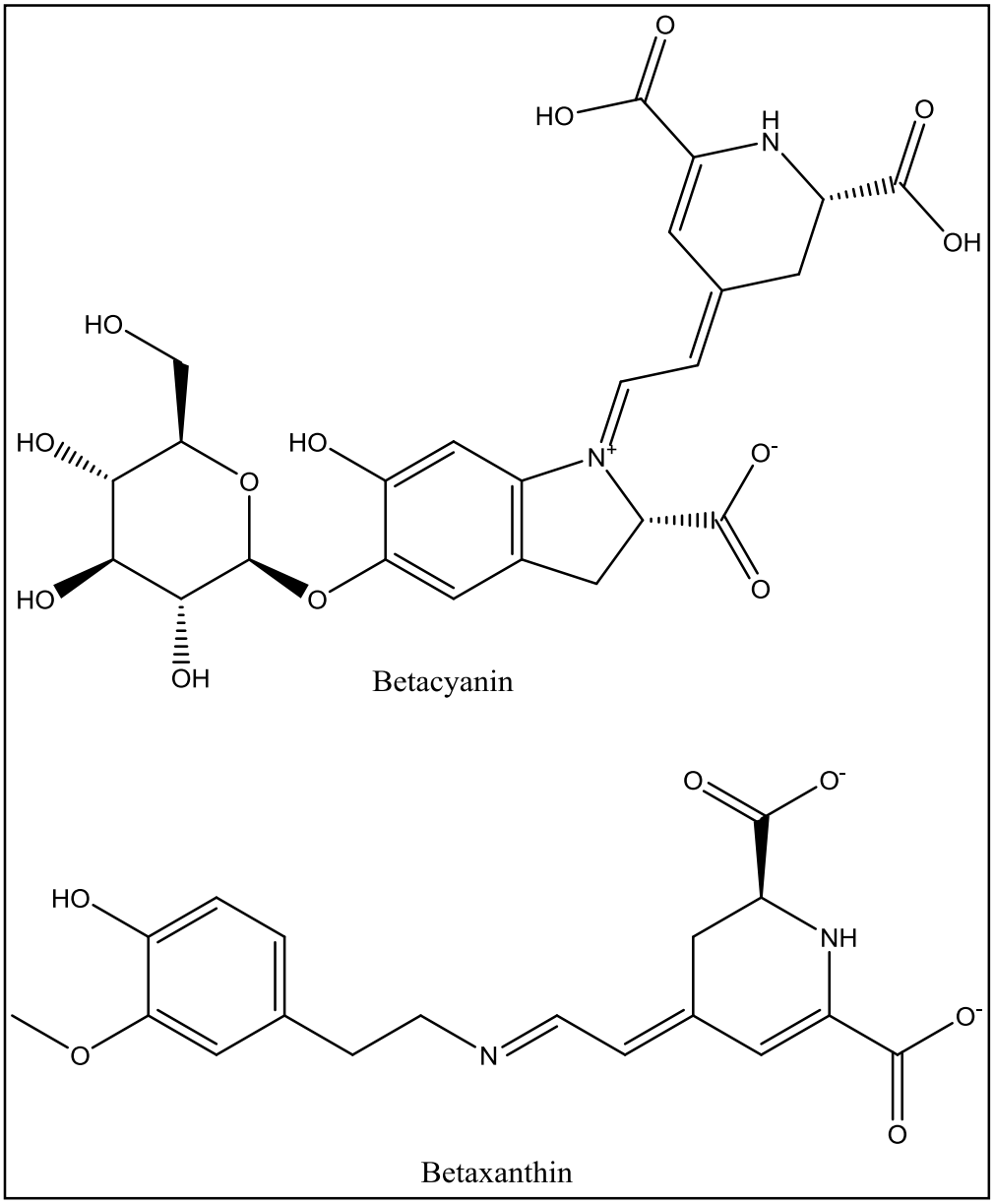


Figure 2: Chemical Constituents of Beetroot

Skin detoxification

GREEN TEA

It is a widely consumed beverage globally and includes many polyphenols with antioxidant activity superior to any naturally occurring antioxidant. Numerous laboratory investigations using chemical carcinogens and UV-induced skin cancer have shown that its topical treatment or oral ingestion inhibits carcinogenesis [66]. Additionally, studies have shown that green tea extract exhibits anti-inflammatory activity. Green tea's anti-inflammatory and skin cancer-preventive properties have been attributed to its polyphenolic constituents. Green tea's primary and most preventative ingredient is (-)-epigallocatechin-3-gallate (EGCG). Numerous labs investigate the molecular processes behind these widespread effects of green tea. Green tea polyphenols (GTPs) have been shown to significantly affect metabolic pathways, critical in inflammatory responses, cell proliferation, and tumor promoter responses [67].

Additionally, treatment with EGCG on mouse skin prevents immunosuppression and reactive oxygen species production caused by UV-B. The effect of topical or oral green tea therapy on human skin inflammatory reactions and cancer is unknown. Due to the considerable beneficial benefits of green tea on mouse skin models, several pharmaceutical and cosmetic industries are using green tea extracts in skincare products [68].

Chemical Constituents

Green tea contains polyphenols identical to fresh leaves, including flavonoids and certain phenolic acids. The majority of the polyphenols found in green tea are flavanols, more often referred to as catechins. (-) epicatechin (EC), (-) epicatechin-3-gallate (ECG), (-) epigallocatechin (EGC)(fig.3), and EGCG are the primary catechins found in green tea. The Figure depicts their chemical structures [69]. These polyphenols have been demonstrated to be antioxidants and act as an anti-inflammatory and anti-carcinogenic agents in various biological systems. EGCG is the principal component and the most potent chemopreventive agent against cutaneous inflammatory or carcinogenic reactions [70].

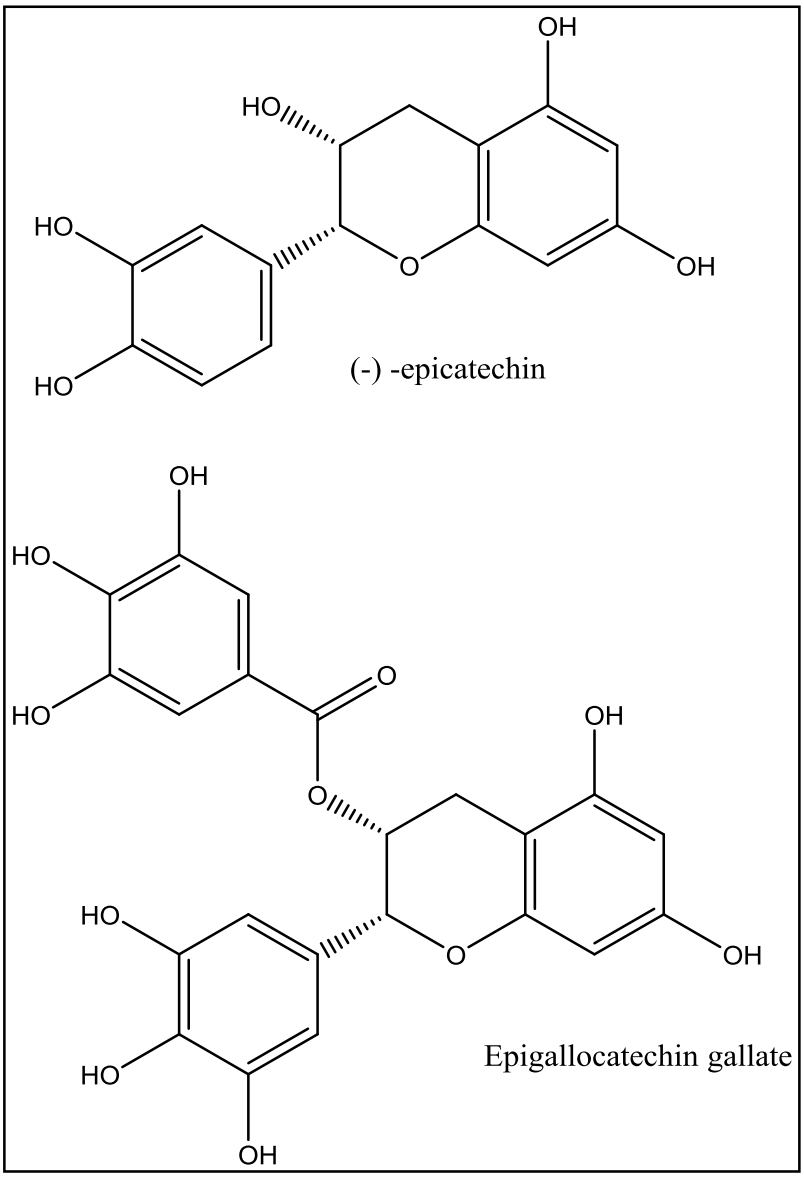


Figure 3: Chemical constituents of Green Tea

Mechanism of action

Anti-inflammatory on skin

Erythema, edema, and hyperplastic epithelial responses are often employed as early indicators of the development of skin tumors. GTPs protect mice from edema, erythema, hyperplasia, leukocyte infiltration, and activation of cyclooxygenase and lipoxygenase activities in the skin caused by 12-O-tetradecanoylphorbol-13-acetate (TPA) [71]. GTPs also suppress the expression of messenger RNA encoding the proinflammatory cytokine interleukin 1 (IL-1) in response to tumors promoters such as TPA, mezerein, and benzoyl peroxide on mouse skin [72].

It has been shown that oxidative stress and UV-induced skin damage are connected with several skin disorders, including photoaging, inflammation, and cancer. GTPs have been shown to protect SKH-1 hairless mice from UV-induced cutaneous edema, erythema, and depletion of antioxidant-defense enzyme systems in the epidermis and prostaglandin synthesis, inhibiting cyclooxygenase activity. Topical injection of GTPs to mouse skin before UV exposure (72 mJ/cm2) reduced the UV-induced hyperplastic response, myeloperoxidase activity, and the number of infiltrating inflammatory leukocytes protected against UV-induced reduction of the contact hypersensitive response. [74,75]

The applicability of comprehensive in vitro and in vivo laboratory studies on GTPs to the detrimental effects of solar UV on human skin is unknown at the moment. However, using GTPs 30 minutes before UV irradiation from a solar simulator resulted in much less erythema than UV alone on the untanned backs of regular volunteers [76]. We recently discovered that topically applied EGCG (3 mg/2.5 cm2) reduced UV-B–induced erythema, myeloperoxidase activity, and leukocyte infiltration significantly before UV-B (4 times the minimum erythema dosage) exposure.8 EGCC, which plays a vital role in inflammatory disorders and proliferative skin diseases, was also observed to block UV-B–induced synthesis of prostaglandin metabolites. These findings suggest plausible pathways behind green tea's anti-inflammatory properties [77].

Anticancer effect on the skin

GTPs provided considerable protection against skin tumorigenesis when given orally to SENCAR, CD-1, and Balb/C mice. Topical treatment of GTPs to Balb/C mice for 7 days prior to administering 3-methylcholanthrene provided considerable protection against the development of skin cancers [78]. Topical application of GTPs for 7 days prior to a single dose of 7,12-dimethylbenz(a)anthracene (DMBA) as the initiating agent. The tumor promoter following its TPA resulted in significant protection against tumorigenesis in tumor incidence and tumor multiplicity in SENCAR mice in a two-stage skin carcinogenesis protocol. The use of EGCG to SENCAR mice prior to the injection of DMBA as a tumor initiator was also found to reduce tumor incidence and multiplicity. [28] The most often used tumor promoter in two-stage skin tumorigenesis models is phorbol ester TPA.

The impact of GTPs was investigated in SENCAR mice after DMBA- and TPA-induced skin tumor promotion. Topical administration of different dosages of GTPs prior to TPA resulted in dose-dependent protection against skin tumor promotion. Protection by GTPs was seen in these trials in terms of the number of tumors per mouse and the size and volume of each tumor. GTPs or their primary component, EGCG, are used topically. TPA, teleocidin, and okadaic acid were also demonstrated to suppress tumor promotion. Skin malignancies that are not melanoma, such as basal cell and squamous cell carcinomas, are the most prevalent malignant neoplasms in humans [29].

Although several environmental and genetic variables have a role in developing skin cancer, the most crucial is prolonged exposure to solar UV radiation. Epidemiological, clinical, and

biological studies have shown that solar UV radiation is the primary etiologic factor in the development of skin cancer. Long-term oral administration of GTPs in mice's drinking water throughout UV-B exposure resulted in a decreased tumor burden than control animals not administered GTPs. EGCG decreased photocarcinogenesis in BALB/cAnNHsd mice without causing apparent toxicity. 37 In another study38, female CD-1 mice were given a water extract of green tea as their only source of drinking water, which protected UV-B radiation-induced tumor start and progression and partial regression of existing skin papillomas [30].

Mechanistic Studies on Green Tea Chemoprevention

Cytochrome P-450 is required to convert procarcinogens to their carcinogenic DNA-binding intermediates in chemical carcinogenesis. This interaction with DNA is thought to be critical for tumor initiation. GTP or the individual ingredients inhibited P-450–dependent aryl hydrocarbon hydroxylase, 7-ethoxycoumarin-O-deethylase, and 7-ethoxyresorufin-O-deethylase activities dose-dependent manner in invitro studies42. In the lung, liver, and small intestine, oral administration of GTPs boosted the activity of glutathione peroxidase, catalase, nicotinamide adenine dinucleotide phosphate quinone oxidoreductase, and glutathione-S-transferase enzymes. Because these enzymes are essential for detoxifying carcinogenic metabolic products produced by P-450 and other enzyme systems, they are thought to have anti-carcinogenic properties [31]. When skin is exposed to tumor promoters or UV radiation, it develops erythema, edema, hyperplasia, leukocyte infiltration, various enzymes responsible for the generation of reactive oxygen species (ROS) or free radicals (cyclooxygenase, lipoxygenase, and myeloperoxidase), hydrogen peroxide production, and increased ornithine decarboxylase (ODC) activity [32].

It is difficult to determine which of these characteristics, or many others, are required or sufficient for tumor promotion. However, these occurrences contribute to the development of skin cancer, either directly or indirectly. The fact that various inhibitors of epidermal ODC, cyclooxygenase and lipoxygenase diminish tumor formation in mouse skin [33] demonstrates the crucial function of these enzymes in skin tumor growth.

GTPs were observed to suppress TPA-mediated activation of epidermal ODC, cyclooxygenase, and lipoxygenase activity when applied topically to mouse skin. Before tumor promoters, GTP administration to mouse skin prevented erythema, edema, hyperplasia, and inflammatory leukocyte infiltration generated by tumor promoters [34].

Inhibition of UV-Induced Oxidative Stress

UV-B wavelengths (290-320 nm) are absorbed by the skin, resulting in erythema, burns, and ultimately skin cancer. The skin has an extensive antioxidant defense mechanism to combat UV-induced oxidative damage. On the other hand, excessive UV exposure may deplete the cutaneous antioxidant capacity, resulting in oxidative damage and, eventually, skin cancer, immunosuppression, and premature skin aging. The addition of epicatechin derivatives to mouse epidermal microsomes increased lipid peroxidation due to photoreduction, confirming green tea's antioxidant potential [35]. We recently discovered that administering EGCG topically to human skin before UV exposure reduces UV-B–induced erythema, myeloperoxidase activity, hydrogen peroxide production, and leukocyte infiltration considerably. Accumulation of infiltrating leukocytes is a hallmark of UV-B–induced skin inflammation, and induction of myeloperoxidase activity is utilized to estimate tissue neutrophil concentration. We demonstrated that green tea, namely the component EGCG, inhibits UV-B–induced leukocyte infiltration in mouse and human skin, suggesting limiting ROS formation by these infiltrating leukocytes. While ROS aid the host in destroying

invading microorganisms, their excessive and uncontrolled production may also cause harm to host tissues, predisposing the host to a variety of disease conditions [36]. Thus, the use of EGCG may be beneficial in mitigating the harmful effects of UV-B exposure by reducing ROS formation.

Additionally, we demonstrated that topical application of GTPs prior to UV irradiation of human skin significantly reduced the synthesis of cyclobutane pyrimidine dimers in DNA produced by UV irradiation. These cyclobutane pyrimidine dimers are required to initiate the UV-induced mutagenesis and carcinogenesis processes. A study recently showed that oral administration of green tea extract reduced hyperplasia, hyperkeratosis, erythema, and edema development in mouse skin before and throughout numerous psoralen–UV-A treatments. Green tea extract treatment of Epiderm (MatTek, Ashland, Mass), a reconstituted human skin equivalent, similarly reduced the production of 8-methoxy psoralen-DNA adducts and p53 protein accumulation produced by psoralen–UV-A. These findings in human skin suggest that green tea may have the capacity to mitigate the risk of UV-induced oxidative stress-mediated skin disorders in both people and mice [37].

Kidney detoxification

Pedelium murex Linn.

It is used to treat urinary tract infections as a nephroprotective, diuretic, aphrodisiac, and aphrodisiac. A hot fruit infusion is used to cure enuresis, and a burning micturition is made by combining fruit decoction with licorice and nutgrass. It is often combined with Commiphora Mukul. Its formulations, such as fruit decoctions and gokshuradi Guggulu, are utilized as nephroprotective agents. The nephroprotective effect of an ethanolic extract of dried Pedalium murex Linn fruits was examined. Cisplatin 5mg/kg was administered intraperitoneally to Wistar rats to produce nephrotoxicity. The effect of concurrent administration of Pedalium murex ethanolic extract at a dosage of 250 mg/kg orally on serum creatinine and blood urea levels, as well as change in body weight, as indications of kidney injury, was assessed. Cystone was utilized as the reference medication. The extract considerably reduced the nephrotoxicity caused by cisplatin. According to the findings, the ethanolic extract of dried fruits of Pedalium murex demonstrated higher nephroprotective activity when compared to cystone, according to findings [38].

Saunf (*Trigonella foenum-graecum*)

Traditional herbalists have used its seeds to treat renal and male reproductive system diseases. The principal alkaloid in fenugreek seeds is trigonelline (Nmethylnicotinic acid, N-methyl betaine). It reduces apoptosis and fibrosis in renal cells and inhibits oxidative stress in the kidney. Increased diuresis, antioxidant activity, and decreased urine concentrations of stone-forming components are proposed mechanisms for fenugreek seeds' anti-urolithiasis actions [39].

Curcuma longa

The nephroprotective and diuretic properties of three medicinal herbs, Petroselinum sativum, Eruca sativa, and Curcuma longa, were examined in rats exposed to gentamicin-induced nephrotoxicity. The findings indicated that oral administration of aqueous infusions of Petroselinum sativum, Eruca sativa, and Curcuma longa herbs alleviated gentamicin-induced nephrotoxicity. Turmeric contains polyphenolic chemicals called rutin and curcumin, which have been shown to have antioxidant and anti-inflammatory properties. Supplementation with rutin and curcumin restored calcium and oxalate levels in urine and kidney samples to near-normal levels. It demonstrated minimal tissue damage and a lower number of calcium oxalate

deposits in the kidney of animals treated with rutin and curcumin compared to calculi-induced animals [40]. This impact may be mediated through a decrease in the urine concentration of stone-forming components, as well as anti-inflammatory and antioxidant properties. Tribulus Terrestris (Gokshura)- T. Terrestris diuretic qualities result from the high concentrations of nitrates and essential oil found in its fruits and seeds. Additionally, the diuretic effect might be linked to the presence of large concentrations of potassium salts. The aqueous extract of T. Terrestris was assessed in a rat diuretic model and isolated Guinea pig strips. T. Terrestris aqueous extract evoked a positive diuresis at a 5 g/kg dosage, which was somewhat more significant than furosemide [41]. The amounts of sodium and chloride in the urine were increased. With its diuretic effect, the enhanced tonicity of the smooth muscles induced by T. Terrestris extracts aided the propulsion of stones down the urinary system. Saurabh et al. examined the diuretic efficacy of several T. Terrestris fruit extracts, including aqueous, methanolic, Kwatha-high strength, Kwatha-low strength, and Ghana powder. Kwatha-high strength demonstrated diuretic activity equivalent to that of the reference standard frusemide but with the added benefit of the potassium-sparing activity. Tribulus Terrestris diuretic activity makes it an effective antihypertensive [42].

Gall Bladder Detoxification

Glechoma Herba

Glechoma Herba is a traditional Chinese medicine that has been used in China for thousands of years, mainly to treat nephrolithiasis. Lamiaceae is a dicotyledon family with around 3500 species classified into 200 genera. It is found across the globe but is most prevalent in the Mediterranean and Central Asia. Glechoma Herba (GH) is dried whole grass from the Lamiaceae Glechoma longituba (Nakai) Kupr. (GLK). It is gathered in the spring and fall, washed, chopped into pieces, dried, and stored. It has a refreshing property and a harsh, pungent flavor. It acts on the kidney, liver, and bladder meridians, eliminating moisture, clearing heat and detoxifying, dispersing blood stasis, and promoting detumescence. GH is primarily used in clinical practice to treat urine and bladder calculi [43].

Chemical Constituents

Numerous chemical components have been isolated and identified from GH, including flavonoids and their glycosides, terpenoids, organic acids, and their esters, volatile oils, and alcohols. Among them, it is considered that organic acids and flavonoids are the primary non-volatile substances having significant biological characteristics. For example : (10E,12Z)-Octadeca-10,12-dienoic acid, (10E,12Z,15Z)-9-Hydroperoxyoctadeca-10,12,15-trienoic acid, (9S,10E,12Z)-9-Hydroxyoctadeca-10,12-dienoic acid(fig.4), Caffeic acid, Ferulic acid, 1-Benzenepropanoic acid-cis-5-caffeoylquinic acid, 1-Benzenepropanoic acid-trans-5-caffeoylquinic acid, 1-Caffeic acid glucoside-3-caffeoylquinic acid, 1-Caffeic acid glucoside-4-caffeoylquinic acid, 1-Caffeic acid glucoside-5-caffeoylquinic acid, 1-Caffeoylquinic acid,1-p-Coumaric acid-3-caffeoylquinic acid, 3,4-Dimethyl-3-cyclohexenyl methanal, Eicosane, Palmitic acid, [44].

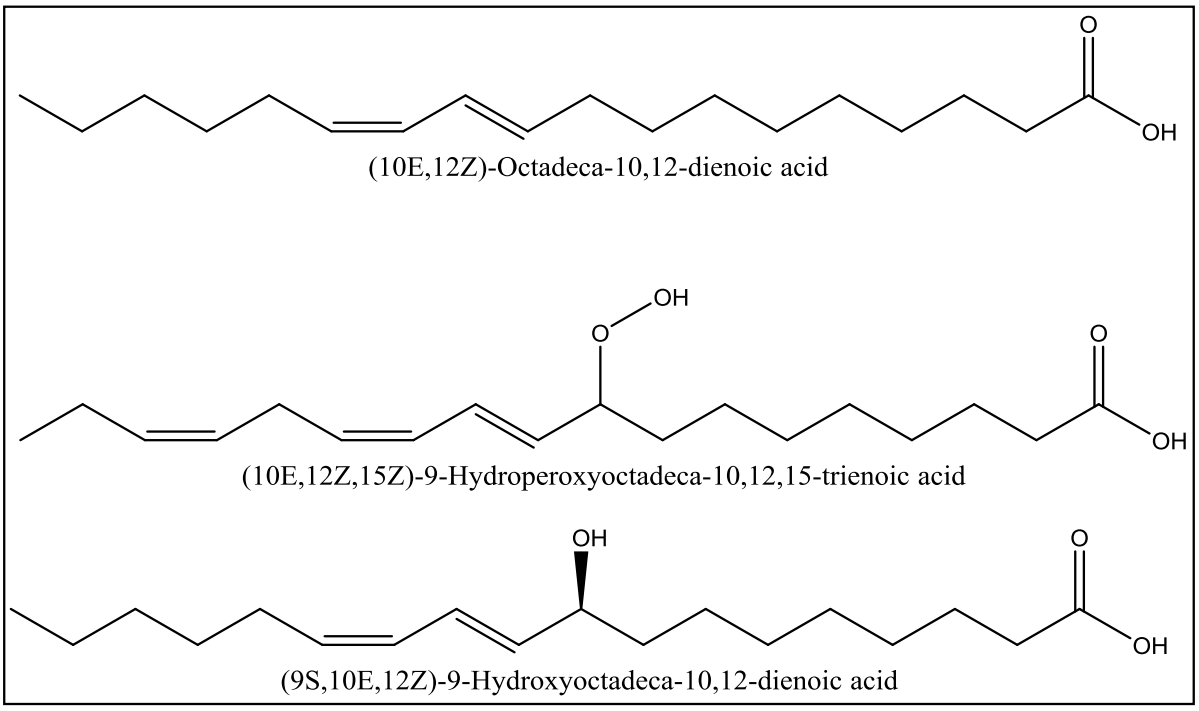


Figure 4: Chemical constituent of *Glechomae Herba*

Mechanism of Action

The formation of a solid mass inside the lumen of a catheter or the lumen of sexual organs in the human or animal body is called calculosis (the kidney, ureter, gallbladder, or bladder). Calculosis occurs in various locations, including the extrahepatic and intrahepatic bile ducts, cholecystolithiasis, and common bile duct calculi. There are several types of lithiasis, including urinary calculi, ureteral calculi, bladder calculi, and gastrointestinal calculi. Specific individuals have a unique constitution and may suffer from lung stones, muscle stones, and other ailments. GH is often used to treat kidney stones and gallstones and is more successful than LCH in treating kidney stones [44]. Xue found in 2005 that a water extract of GH (WGH) was capable of curing urinary stones in domestic animals. In 2017, Ge et al. conducted in vivo and in vitro studies on the antiurolithic activity of GH. We performed in vitro research to determine the impact of GH extract on the weight of cholesterol calculi in people. However, in vitro trials were relatively straightforward, focusing only on the anti-calculi activity of GH, and more extensive in vitro research was absent. In vivo investigations demonstrated that the extract of GH reduced blood lipid levels and inhibited the production of cholesterol stones. In 2012, Xiao He summarised that GH combined with LCH, Desmodium styracifolium (Osh.) Merr. Moreover, other medications may be effectively utilized to treat urolithiasis. Yang et al. noticed and described in 2014 that GH extract produced by water extraction and alcohol precipitation had a preventative and therapeutic impact on renal stone model rats [45].

Experimental research has preliminarily demonstrated that GH extract benefits overall kidney stone control. They believe that after water extraction and alcohol precipitation, the GH supernatant contains various organic acids and flavonoids that can form a soluble salt or complex with Ca2+, increasing urinary crystallization inhibitors while decreasing lithogenic substances, reducing calcium oxalate deposition, and effectively inhibiting stone formation. Additionally, it may acidify the urine and dissolve stones, increase Ca2+ excretion and

metabolism in renal tissue and blood, and decrease Ca2+ and oxalic acid levels in renal tissue. Simultaneously, it can improve the metabolism and function of renal tissue cells, speed up urine excretion, promote the excretion of microcalculi from the body, reduce the formation of calculi in renal tissue, and reduce kidney damage, all of which protect renal tissue and prevent and treat renal calculi in rats [46].

Cardiotoxicity

Allium sativum

The dogbane family Apocynaceae includes the blooming shrub or small tree Nerium oleander. Toxic to both animals and humans, the oleander's whole plant is dangerous to the cardiovascular system.

In 2013, Fattahi et al. researched whether garlic extract (A. sativum) might be used to prevent and treat N. oleander poisoning in sheep. We administered an intravenous garlic hydro-ethanol extract to eight sheep before or after receiving a fatal dosage of dried oleander leaves. Both preventative and therapeutic, garlic extract treatments decreased oleander deaths from 100% to 12.5% and 33.3%, respectively.

Garlic extract administration increased the period between intoxication and death in animals and slowed the development of arrhythmias in those animals. In several studies, garlic extract showed promise as an antidote for oleander toxicity [47].

Caesalpinia crista

The alch. and aq. Extracts of *Caesalpinia crista* were investigated for their ability to protect albino rats from myocardial infarction caused by isoproterenol (85 mg/kg bw). Isoproterenol-induced heart damage was demonstrated by increased levels of marker enzymes, such as creatine kinase-isoenzyme (CK-MB), lactate dehydrogenase (LDH), serum glutamate oxaloacetate transaminase (SGOT), and serum glutamate pyruvate transaminase (SGPT). It was found in serum, increased lipid peroxide, and reduced glutathione content. In isoproterenol-induced myocardial infarction, pretreatment for 30 days with an ethanolic and aqueous extract of Caesalpinia crista at a 400 mg/kg dosage reduced bodyweight significantly (p 0.01) and elevated marker enzyme levels in the blood and heart homogenates. Histopathological examination demonstrated that the extract provided significant protection against necrotic cardiac damage. In albino rats, the methanol extract of *Caesalpinia crista* was investigated for its hepatoprotective and antioxidant properties. The CCl4-treated rats received a methanolic extract of *Caesalpinia crista* at dosages of 50, 100, and 200 mg/kg, as well as silymarin at a dose of 25 mg/kg. The impact of a methanol extract of *Caesalpinia crista* and silymarin on serum glutamyl pyruvate transaminase, serum glutamyl oxalacetic acid transaminase, serum alkaline phosphatase, bilirubin, uric acid, and total protein was determined in rats exposed to CCl4.

The extract's effects on lipid peroxidation (LPO), enzymatic antioxidants (superoxide dismutase and catalase), and non-enzymatic antioxidants (glutathione (GSH), vitamin C, and vitamin E) were also investigated. Caesalpinia crista and silymarin methanol extract significantly reduced serum enzyme activity, bilirubin, uric acid, and lipid peroxidation (p 0.05) while significantly raising SOD, CAT, GSH, vitamin C, vitamin E, and protein levels [49]. Several studies have been conducted to see if Caesalpinia crista Linn. (CCME) extract can protect against iron-overload-induced liver damage. CCME significantly reduced the percentage rise in liver iron and serum ferritin levels compared to the control group. Additionally, CCME inhibited lipid peroxidation, protein oxidation, and liver fibrosis in a dose-dependent manner. Serum enzyme indicators were found to be decreased, while liver antioxidant enzymes were found to be increased in the CCME-treated group. The reductive release of ferritin iron was dramatically boosted in the presence of CCME. Additionally,

CCME was capable of scavenging DPPH radicals and protecting against Fe2+-mediated oxidative DNA damage [50].

Other Miscellaneous Plants used for detoxification

Table 1: List of some other herbs with their use

Plant	Role	Use
Alfalfa	using alfalfa pills in conjunction with colonic hydrotherapy treatments because they give the most volume for stool cleaning. It contains vital enzymes and a variety of minerals and vitamins. Silica-rich, which is anti-aluminum.	2—3 tablespoons dry herb to 1 cup boiling water produces a grassy tea beneficial for bone and tooth strength. Fresh green grass should be juiced using a cold-pressed juicer. Sprouts are a high-protein food.
Marigold blossoms	Alterative. Numerous antifungals, antibacterial, anti-worming, antiseptic, and immune, were stimulating properties. Assists in the resolution of swollen lymph glands and inflammation. On the skin, it accelerates the healing process.	It Can be consumed as tea on its own or combined with other cleaning herbs. Make a compress with strong tea to relieve itchy, non-inflamed skin.
Slippery elm inner bark	Bartram is a digestive system cleaner owing to its sedative impact on the digestive tract. Slippery elm covers the digestive system softly and promotes healing. It can be used for constipation as well as diarrhea.	Consume as a powder with yogurt and grated apple to aid digestion. Before bedtime, take a teaspoon mixed in 500mls water to calm and mend the digestive system.
Rosella florets	It supports a fatty liver, enhances renal function, and boosts uric acid excretion (thus, care must be taken with kidney stones).	It can be consumed in the form of tea.
Coriander seed, leaf, root	The seed has a sedative effect on the gastrointestinal system. Leaves and roots promote blood chelation and may aid in the reduction of heavy metal toxicity.	It can be combined with other relaxing spices, such as cumin and fenugreek in curries. Make pesto with fresh leaf and root and consume a dessertspoon daily.

2. CONCLUSION

The paper reviewed the detoxification effect of various medicinal plants for different parts of the body like kidneys, liver, etc. Numerous medicinal plants and plant extracts have been implicated in renal and liver detoxification. The activity of these drugs is likely due to their nephroprotective, cytoprotective, immunomodulatory, antioxidant, and anti-inflammatory properties. It can also reduce oxidative stress and various toxins found in the body parts, damaging our vital organs. Thus, it can be concluded that herbal medicine has a highly diverse spectrum of medications that may be utilized to cure and rejuvenate various illnesses due to their variety. Thus, further research is advised to understand medications' many aspects and mechanisms better.

3. REFERENCES

[1] Detoxification - definition of detoxification by the Free Online Dictionary, Thesaurus, and Encyclopedia. Thefreedictionary.com [Retrieved 2013-04-21].

[2] The definition of detoxifying in the medical dictionary is by the Free Online Medical Dictionary, Thesaurus, and Encyclopedia. Medical-dictionary.thefreedictionary.com [Retrieved 2013-04-21].

[3] Baliga MS, Haniadka R, Pereira MM, D'Souza JJ, Pallaty PL, et al. (2011) Update on the chemopreventive effects of ginger and its phytochemicals. Crit Rev Food Sci Nutr 51: 499-523.

[4] Baliga MS, Haniadka R, Pereira MM, Thilakchand KR, Rao S, et al. (2012) Radioprotective effects of Zingiber officinale Roscoe (ginger): Past, present, and future. Food Funct 3: 714-723.

[5] Chrubasik S, Pittler MH, Roufogalis BD (2005) Zingiberis rhizoma: A comprehensive review of ginger's effect and efficacy profiles. Phytomedicine 12: 684-701.

[6] Ali BH, Blunden G, Tanira MO, Nemmar A (2008) Some phytochemical, pharmacological and toxicological properties of ginger (Zingiber officinale Roscoe): A review of recent research. Food Chem Toxicol 46: 409-420.

[7] Palatty PL, Haniadka R, Valder B, Arora R, Baliga MS (2013) Ginger in the prevention of nausea and vomiting: A review. Crit Rev Food Sci Nutr 53: 659- 669.

[8] Haniadka R, Rajeev AG, Palatty PL, Arora R, Baliga MS (2012) Zingiber officinale (ginger) as an anti-emetic in cancer chemotherapy: A review. J Altern Complement Med 18: 440-444.

[9] Haniadka R, Saldanha E, Sunita V, Palatty PL, Fayad R, et al. (2013) A review of the gastroprotective effects of ginger (Zingiber officinale Roscoe). Food Funct 4: 845-855.

[10] Mallikarjuna K, Sahitya Chetan P, Sathyavelu Reddy K, Rajendra W (2008) Ethanol toxicity: rehabilitation of hepatic antioxidant defense system with dietary ginger. Fitoterapia 79: 174-178.

[11] Shati AA, Elsaid FG (2009) Effects of water extracts of thyme (Thymus vulgaris) and ginger (Zingiber officinale Roscoe) on alcohol abuse. Food Chem Toxicol 47: 1945-1949.

[12] Ajith TA, Hema U, Aswathy MS (2007) Zingiber officinale Roscoe prevents acetaminophen-induced acute hepatotoxicity by enhancing hepatic antioxidant status. Food Chem Toxicol 45: 2267-2272.

[13] Vitalis EC, Chukwemeka R, Philippe ME, Chinonso NC (2007) Effects of Zingiber officinale on liver function of mercuric chloride-induced hepatotoxicity in adult Witar rats. Electron J Biomed 3: 40-45.
[14] Khaki AA, Khaki A (2010) Antioxidant effect of ginger to prevents lead-induced liver tissue apoptosis in rat. J Med Plants Res 4: 1492-1495.
[15] Yemitan OK, Izegbu MC (2006) Protective effects of Zingiber officinale (Zingiberaceae) against carbon tetrachloride and acetaminophen-induced hepatotoxicity in rats. Phytother Res 20: 997-1002.
[16] Verma RJ, Asnani V (2007) Ginger extract ameliorates paraben induced biochemical changes in liver and kidney of mice. Acta Pol Pharm 64: 217-220.
[17] El-Sharaky AS, Newairy AA, Kamel MA, Eweda SM (2009) Protective effect of ginger extract against bromobenzene-induced hepatotoxicity in male rats. Food Chem Toxicol 47: 1584-1590.
[18] Kapadia, GJ & Rao, GS (2012) Anticancer effects of red beet pigments. In Red Beet Biotechnology. Food and Pharmaceutical Application, pp. 125–154
[19] Moreno, DA, Garcia-Viguera, C, Gil, JI, et al. (2008) Betalains in the era of global agri-food science, technology, and nutritional health. Phytochem Rev 7, 261–280.
[20] Suhr, YJ (2003) Cancer chemoprevention with dietary phytochemicals. Nat Rev Cancer 3, 768–780
[21] Wang ZY, Agarwal R, Bickers DR, Mukhtar H. Protection against ultraviolet B radiation-induced photocarcinogenesis in hairless mice by green tea polyphenols. Carcinogenesis. 1991; 12:1527-1530.
[22] Gensler HL, Timmermann BN, Valcic S, et al. Prevention of photocarcinogenesis by topical administration of pure epigallocatechin gallate isolated from green tea. Nutr Cancer. 1996; 26:325-335.
[23] Wang ZY, Huang MT, Ferraro T, et al. Inhibitory effect of green tea in the drinking water on tumorigenesis by ultraviolet light and 12O- -tetradec- anoylphorbol-13-acetate in the skin of SKH-1 mice. Cancer Res. 1992;52: 1162-1170.
[24] Wang ZY, Huang MT, Ho CT, et al. Inhibitory effect of green tea on the growth of established skin papillomas in mice. Cancer Res. 1992; 52:6657-6665.
[25] Conney AH. Induction of microsomal enzymes by foreign chemicals and carcinogenesis by polycyclic aromatic hydrocarbons: GHA Clowes Memorial Lecture. Cancer Res. 1982; 42:4875-4917.
[26] Mukhtar H, Agarwal R, Bickers DR. Cutaneous metabolism of xenobiotics and steroid hormones. In: Mukhtar H, ed. Pharmacology of the Skin. Boca Raton, Fla: CRC Press LLC; 1991:89-110.
[27] Wang ZY, Das M, Bickers DR, Mukhtar H. Interaction of epicatechins derived from green tea with rat hepatic cytochromeP-450D. rug MetabDispos. 1988; 16:98-103.
[28] Khan SG, Katiyar SK, Agarwal R, Mukhtar H. Enhancement of antioxidant and phase II enzymes by oral feeding of green tea polyphenols in drinking water to SKH-1 hairless mice: possible role in cancer chemoprevention A. DV Cancer Res. 1992; 52:4050-4052.
[29] Mukhtar H, Elmets CA. Photocarcinogenesis: mechanisms, models and human health implications. Photochem Photobiol. 1996; 63:355-447.
[30] Agarwal R, Mukhtar H. Oxidative stress in skin chemical carcinogenesis. In: Fuchs J, Packer L, eds. Oxidative Stress in Dermatology. New York, NY: Marcel Dekker Inc; 1993:207-241.

[31] Perchellet JP, Perchellet EM. Antioxidants in multistage carcinogenesis in mouse skin. Free Radic Biol Med. 1989; 7:377-408.
[32] Agarwal R, Katiyar SK, Zaidi SI, Mukhtar H. Inhibition of tumor promoter- caused induction of ornithine decarboxylase activity in SENCAR mice by a polyphenolic fraction isolated from green tea and its individual epicatechin derivatives. Cancer Res. 1992; 52:3582-3588.
[33] Parrish JA, Jaenicke KF, Anderson RR. Erythema and melanogenesis action spectra of normal human skin. Photochem Photobiol. 1982; 36:187-191.
[34] Kligman LH, Kligman AM. The nature of photoaging: its prevention and repair. Photodermatology. 1986; 3:215-227.
[35] Gilchrest BA. Actinic injury. Annu Rev Med. 1990; 41:199-210.
[36] Young AR. Cumulative effects of ultraviolet radiation on the skin: cancer and photoaging. Semin Dermatol. 1990; 9:25-31.
[37] Katiyar SK, Agarwal R, Mukhtar H. Inhibition of spontaneous and photo- enhanced lipid peroxidation in mouse epidermal microsomes by epicatechin de- rivatives from green tea. Cancer Lett. 1994; 79:61-66.
[38] Nash K, Hafeez A, Hou S. Hospital-acquired renal insufficiency. Am J Kidney Dis. 2002;39(5):930-936.
[39] Bellomo R. The epidemiology of acute renal failure: 1975 versus 2005. Curr Opin Crit Care. 2006; 12(6): 557-560.
[40] Kohli HS, Bhaskaran MC, Muthukumar T, et al. Treatment-related acute renal failure in the elderly: a hospital-based prospective study. Nephrol Dial Transplant. 2000;15(2):212-217.
[41] Gandhi TK, Burstin HR, Cook EF, et al. Drug complications in outpatients. J Gen Intern Med. 2000;15(3):149-154.
[42] Schetz M, Dasta J, Goldstein S, Golper T. Druginduced acute kidney injury. Curr Opin Crit Care. 2005;11(6):555-565.
[43] K. Hosni, A. Kerkenni, W. Medfei, N. B. Brahim and H. Sebei, Org. Chem. Int., 2010, 2010, 2010 CrossRef.
[44] J. F. Ma, Plant Cell Physiol., 2000, 41, 383–390 CrossRef CAS PubMed.
[45] Y. H. Fan, G. Zhou, L. Zhang, X. Y. Chen and L. I. Cui-Ping, Chin. J. Exp. Tradit. Med. Formulae, 2010, 13, 49–52 Search PubMed.
[46] Z. Y. Zhou, G. Y. Lin, J. L. Li and C. X. Wang, Chin. J. Mod. Appl. Pharm., 2011, 028, 737–739
[47] Ahmed, H. I., Ezzeldin, E., Ahmed, A. A., & Ali, A. A. (2013). The possible protective effects of some antioxidants against growth retardation and malformations induced by Bisphenol-A in rats. Life Science Journal, 10, 1575–1586.
[48] Ahmed, W., Zaki, A., & Nabil, T. (2015). Prevention of methotrexate-induced nephrotoxicity by concomitant administration of aqueous garlic extract in rats. Turkish Journal of Medical Sciences, 45, 507.
[49] Sambath R K, Kumar A K, and Venkateswara M N. Hepatoprotective and antioxidant effects of Caesalpinia bonducella on carbon tetrachloride-induced liver injury in rats. International Research J Plant Science, 1(3), 2010, 62-68.
[50] Sarkar R, Hazra B and Mandal N. Hepatoprotective potential of Caesalpinia crista against iron-overload-induced liver toxicity in mice. Evidence-based Complementary and Alternative Medicine 2012.

[51] Pallathadka, L. K., and Pallathadka, H. Revealing The Reliability Of Ayurveda Over Other Vedas. *European Journal of Molecular & Cilinical Medicine*, *07*(10), 2020, 4346–4353.