

The Use of *Curcuma Longa* (Turmeric) and Its Derivatives in the Treatment of Hepatic Disorders

Maria Lal^{1*}, Vedant Samant², Faisal Khan³, Abdul Wahid Khan⁴

Anjuman-I-Islam's Kalsekar Technical Campus, Mumbai University, New Panvel

Plomo.2&3, Sector-16, Near Thana Naka, Khandagaon, New Panvel, Navi Mumbai, Maharashtra. 410206

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ABSTRACT –



During the past 30 years and even after the major progress in the liver disease management, millions of people still suffer from an acute or chronic liver condition worldwide. Liver diseases affect more than 10% of the world population and its mortal end-stage generally follows cirrhosis and liver cancer. Diverse etiologies characterize the disease to constitute about the fourth to the fifth cause of deaths worldwide. The Non-alcoholic Fatty Liver Disease (NAFLD) is the global leading cause of liver diseases with 40% frequently, followed by Hepatitis B virus (HBV), Hepatitis C virus (HCV) and harmful alcohol consumption, accounting for 30%, 15% and 11%, respectively.

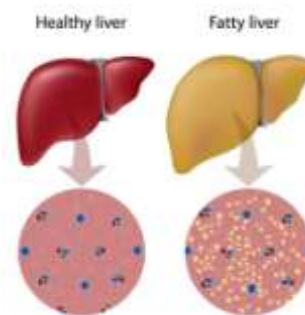
Chronic liver diseases are often accompanied by increased oxidative stress, irrespective of the cause of the liver dysfunction. Oxidative stress (indicating excessive reactive oxygen species (ROS) levels and an oxidant and antioxidant imbalance) can lead to cellular degradation of proteins, lipids and DNA. Reactive oxygen species (ROS) participates in the liver fibrogenic response and contributes to ischemia/regeneration, necrosis and apoptosis. These modifications result in altered gene expression and progressive liver damage.

Natural products provide a repertory for discovery of new leads that can be used in treating different types of diseases such as cancer, inflammation and liver diseases. More than half of all pharmaceutical products have been discovered from natural compounds or their derivatives. In the United

States and Europe, approximately 65% of patients use herbal medicines against liver disease, due to their wide availability, low toxicity, pharmacological activity and chemical diversity and low side effects compared to synthetic drugs. Curcumin is the main constituent of turmeric, the rhizome of *Curcuma longa*. It is widely used due to its therapeutic effectiveness and acceptable safety specification. Curcumin possesses several biological activities such as anti-inflammatory, anticancer, antioxidant and the ability to heal wounds. From these facts, the aim of this review is to compile and discuss the effects of curcumin for the prevention and treatment of oxidative associated liver diseases as well as to highlight its molecular mechanism of action.

KEY WORDS –Turmeric, Turmeric Derivatives, Pharmacological Compounds, Hepatic Disorders.

I. INTRODUCTION –



Liver disease, or hepatic disease, is any of many diseases of the liver. If long-lasting it is termed as chronic liver disease. Although the diseases differ in detail, liver diseases often have features in common. The vitality of the human liver is mainly associated with the impressive processes attributed to this part of the entrails. Its nomination was even regarded as a synonym of life. In fact, multiple functionalities are attributed to this triangular organ extending across the abdominal cavity below the diaphragm. Its metabolic and secretory capacities can cause hepatocellular death

and eventually liver disease by involving a prominent exposure to alcohol, dietary components and viral infections. Apparently, this organ is extremely vulnerable to numerous pathologies mainly associated with its great number of functions, structural organization, strategic localization and cell sensitivities. A number of mechanisms such as direct damage, stimulation of immune response against cells, formation of reactive intermediates, cytoskeletal damage, disruption of normal cell metabolism, triggering of apoptosis and hypoxia are involved in hepatocellular injury.

SIGNS AND SYMPTOMS OF HEPATIC DISORDERS –



Confusion and altered consciousness caused by hepatic encephalopathy
Thrombocytopenia and coagulopathy.

The symptoms also include genetic inheritance and obesity.

It can also cause diabetes in patients and rapid weight loss.

TYPES OF HEPATIC DISEASES -



There are more than a hundred different liver diseases. Some of the most common are:

- 1] Fascioliasis, a parasitic infection of liver caused by a liver fluke of the genus Fasciola, mostly Fasciola hepatica.
- 2] Hepatitis, inflammation of the liver, is caused by various viruses (viral hepatitis) also by some liver toxins (e.g. alcoholic hepatitis), autoimmunity (autoimmune hepatitis) or hereditary conditions.
- 3] Alcoholic liver disease is a hepatic manifestation of alcohol overconsumption, including fatty liver disease, alcoholic hepatitis, and cirrhosis. Analogous terms such as "drug-induced" or "toxic"

liver disease are also used to refer to disorders caused by various drugs.

4] Fatty liver disease (hepatic steatosis) is a reversible condition where large vacuoles of triglyceride fat accumulate in liver cells. Non-alcoholic fatty liver disease is a spectrum of disease associated with obesity and metabolic syndrome.

5] Hereditary diseases that cause damage to the liver include hemochromatosis, involving accumulation of iron in the body, and Wilson's disease. Liver damage is also a clinical feature of alpha 1-antitrypsin deficiency and glycogen storage disease type II.

6] Gilbert's syndrome, a genetic disorder of bilirubin metabolism found in a small percent of the population, can cause mild jaundice.

7] Primary liver cancer most commonly manifests as hepatocellular

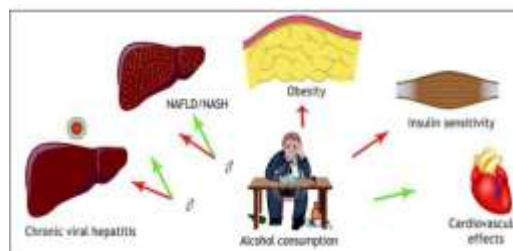
carcinoma or cholangiocarcinoma; rarer forms include angiosarcoma and hemangiosarcoma of the liver. (Many liver malignancies are secondary lesions that have metastasized from primary cancers in the gastrointestinal tract and other organs, such as the kidneys, lungs.)

8] Primary biliary cirrhosis is a serious autoimmune disease of the bile capillaries.

9] Primary sclerosing cholangitis is a serious chronic inflammatory disease of the bile duct, which is believed to be autoimmune in origin.

10] Budd–Chiari syndrome is the clinical picture caused by occlusion of the hepatic vein.

MECHANISM OF ACTION OF TRANSMISSION OF HEPATIC DISEASES -

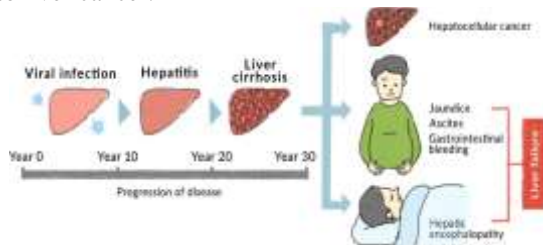


Alcohol consumption in excess causes a build-up of acetaldehyde. Acetaldehyde and free radicals generated by metabolizing alcohol induce DNA damage and oxidative stress. In addition, activation of neutrophils in alcoholic liver disease contributes to the pathogenesis of hepatocellular damage by releasing reactive oxygen species (which can damage DNA). The level of oxidative stress and acetaldehyde-induced DNA adducts due to alcohol consumption does not appear sufficient

to cause increased mutagenesis. alcohol exposure, causing oxidative DNA damage (which is repairable), can result in epigenetic alterations at the sites of DNA repair. Alcohol-induced epigenetic alterations of gene expression appear to lead to liver injury and ultimately carcinoma.

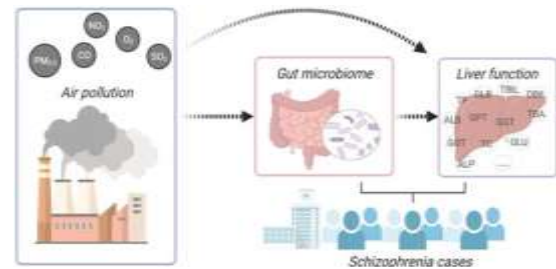


Obesity is associated with a higher risk of primary liver cancer. As shown with mice, obese mice are prone to liver cancer, likely due to two factors. Obese mice have increased pro-inflammatory cytokines. Obese mice also have higher levels of deoxycholic acid, a product of bile acid alteration by certain gut microbes, and these microbes are increased with obesity. The excess deoxycholic acid causes DNA damage and inflammation in the liver, which, in turn, can lead to liver cancer.



Viral infection by hepatitis B virus, or hepatitis C virus causes an increase of reactive oxygen species. The increase in intracellular reactive oxygen species is about 10,000-fold with chronic hepatitis B virus infection and 100,000-fold following hepatitis C virus infection. This increase in reactive oxygen species causes inflammation and more than 20 types of DNA damage. Oxidative DNA damage is mutagenic and also causes epigenetic alterations at the sites of DNA repair. Epigenetic alterations and mutations affect the cellular machinery that may cause the cell to replicate at a higher rate or result in the cell avoiding apoptosis, and thus contribute to liver disease. By the time accumulating epigenetic and mutational changes eventually cause hepatocellular carcinoma, epigenetic alterations

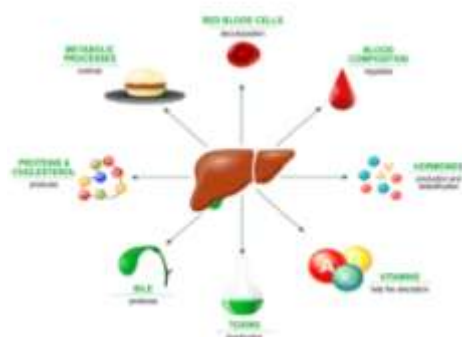
appear to have an even larger role in carcinogenesis than mutations. Only one gene, TP53, is mutated in more than 20% of liver cancers while 41 genes each have hypermethylated promoters (repressing gene expression) in more than 20% of liver cancers.



Particulate matter or carbon black are common pollutants. They have a direct toxic effect on the liver; cause inflammation of liver caused by and thereby impact lipid metabolism and fatty liver disease; and can translocate from the lungs to the liver.

Because particulate matter and carbon black are very diverse and each has different toxicodynamics, detailed mechanisms of translocation are not clear. Water-soluble fractions of particulate matter are the most important part of translocation to the liver, through extrapulmonary circulation. When particulate matter gets into the bloodstream, it combines with immune cells and stimulates innate immune responses. Pro-inflammatory cytokines are released and cause disease progression

PHARMACOLOGICAL TREATMENT OF HEPATIC DISORDERS –



1] Drink alcohol in moderation. For healthy adults, that means up to one drink a day for women and up to two drinks a day for men. Heavy or high-risk drinking is defined as more than eight drinks a

week for women and more than 15 drinks a week for men.

2] Avoid risky behaviour. Use a condom during sex. If you choose to have tattoos or body piercings, be picky about cleanliness and safety when selecting a shop. Seek help if you use illicit intravenous drugs, and don't share needles to inject drugs.

3] Get vaccinated. If you're at increased risk of contracting hepatitis or if you've already been infected with any form of the hepatitis virus, talk to your doctor about getting the hepatitis A and hepatitis B vaccines.

4] Use medications wisely. Take prescription and nonprescription drugs only when needed and only in recommended doses. Don't mix medications and alcohol. Talk to your doctor before mixing herbal supplements or prescription or nonprescription drugs.

5] Avoid contact with other people's blood and body fluids. Hepatitis viruses can be spread by accidental needle sticks or improper clean-up of blood or body fluids.

6] Keep your food safe. Wash your hands thoroughly before eating or preparing foods. If traveling in a developing country, use bottled water to drink, wash your hands and brush your teeth.

7] Take care with aerosol sprays. Make sure to use these products in a well-ventilated area, and wear a mask when spraying insecticides, fungicides, paint and other toxic chemicals. Always follow the manufacturer's instructions.

8] Protect your skin. When using insecticides and other toxic chemicals, wear gloves, long sleeves, a hat and a mask so that chemicals aren't absorbed through your skin.

9] Maintain a healthy weight. Obesity can cause non alcoholic fatty liver disease.

TREATMENT OF HEPATIC DISEASES USING NATURAL PRODUCTS – THERE ARE VARIOUS NATURAL PRODUCTS WHICH ARE USED IN THE TREATMENT OF HEPATIC DISEASES SUCH AS

SR NO	NAME OF PLANT	BIOLOGICAL SOURCE
1	Giloy	TinosporaCordifolia
2	Turmeric	Curcuma Longa
3	Gale of the wind	Phyllanthus Niruri
4	Liquorice	Glycyrrhiza Glabra
5	Karira	CapparisDeciduas

6	Punarnava	BoerhaviaDiffusa
7	Wild indigo	TehrosiaPurpurea

These are various natural drug sources which plays a very important role in treatment of the hepatic disorders.

Out of all these drugs curcuma longa (turmeric) plays a very high and a crucial role in the treatment of hepatic disorders.

CURCUMA LONGA – (TURMERIC)



INTRODUCTION -

Turmeric(Curcuma Longa) is a spice, widely used in Asian cooking.

It is a rhizomatous herbaceous perennial plant. Family- Zingiberaceae.

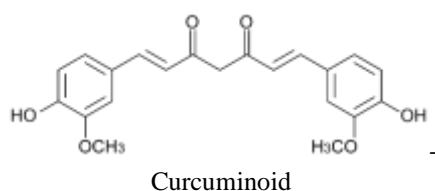
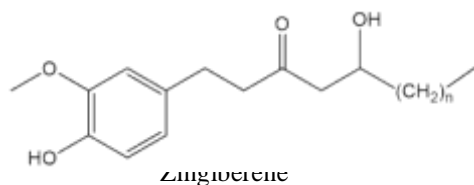
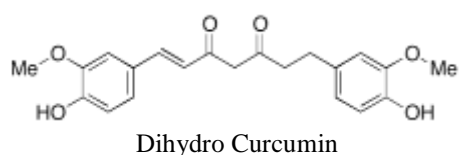
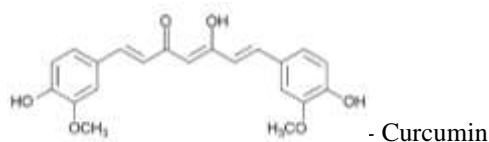
CHARACTERISTICS –

The primary rhizomes are ovate or pear-shaped, oblong or pyriform or cylindrical, and often short branched. The rhizomes are known as 'bulb' or 'round' turmeric. The secondary, more cylindrical, lateral branched, tapering on both ends, rhizomes are 4–7 cm long and 1–1.5 cm wide and called as 'fingers'. The bulbous and finger-shaped parts are separated and the long fingers are broken into convenient bits. They are freed from adhering dirt and fibrous roots and subjected to curing and polishing process. The curing consists of cooking the rhizomes along with few leaves in water until they become soft. The cooked rhizomes are cooled, dried in open air with intermittent turning over, and rubbed on a rough surface. Colour is deep yellow to orange, with root scar and encircling ridge-like rings or annulations, the latter from the scar of leaf base. Fracture is horny and the cut surface is waxy and resinous in appearance. Outer surface is deep yellow to brown and longitudinally wrinkled. Taste is aromatic, pungent and bitter; odour is distinct.



CHEMICAL CONSTITUENTS –

Turmeric contains yellow colouring matter called as curcuminoids (5%) and essential oil (6%). The chief constituent of the colouring matter is curcumin I (60%) in addition with small quantities of curcumin III, curcumin II and dihydro curcumin. The volatile oil contains mono- and sesquiterpenes like zingiberene (25%), α -phellandrene, sabinene, turmerone, arturmerone, borneol, and cineole. Choleric action of the essential oil is attributed to β -tolylmethyl carbinol. The volatile oil also contains α - and β -pinene, camphene, limonene, terpinene, terpinolene, caryophyllene, linalool, isoborneol, camphor, eugenol, curdione, curzerenone, curlone, AR-curcumenes, β -curcumene, γ -curcumene. α - and β -turmerones, and curzerenone.



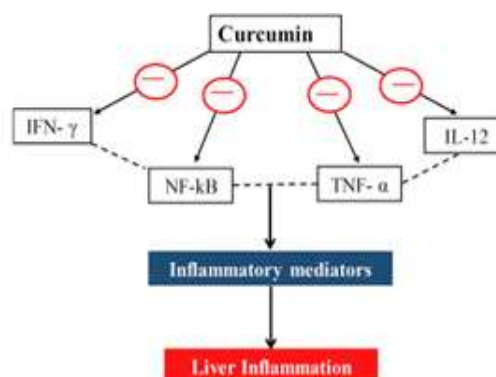
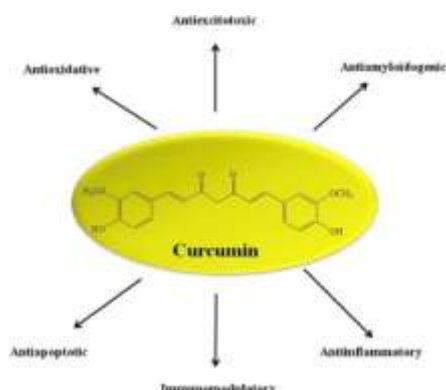
CULTIVATION AND COLLECTION –

Turmeric plant is a perennial herb, 60–90 cm high with a short stem and tufted leaves; the rhizomes, which are short and thick, constitute the turmeric of commerce. The crop requires a hot and moist climate, a liberal water supply and a well-drained soil. It thrives on any soil-loamy or alluvial, but the soil should be loose and friable. The field should be well prepared by ploughing and turning over to a depth of about 30 cm and liberally manured with farmyard and green manures. Sets or fingers of the previous crop with one or two buds are planted 7 cm deep at distance of 30–37 cm from April to August. The crop is ready for harvesting in about 9–10 months when the lower leaves turn yellow. The rhizomes are carefully dug up with hard picks, washed, and dried.



CURCUMA LONGA IN HEPATIC DISORDERS – PHARMACOLOGICAL ACTIVITY OF CURCUMA LONGA (TURMERIC)

Liver disease represents a group of disorders characterized by stages of progression from steatosis and hepatitis to cirrhosis and cancer. This diverse spectrum of hepatic diseases is markedly associated with the pathophysiology of the biliary system [9]. According to the pathological stages of hepatobiliary disease, the pharmacological activities of *C. longa* can be generally classified into hepatoprotective, antioxidant, antisteatotic and antilipidemic, anti-inflammatory, antifibrotic, antitumor, and cholagogue effects.

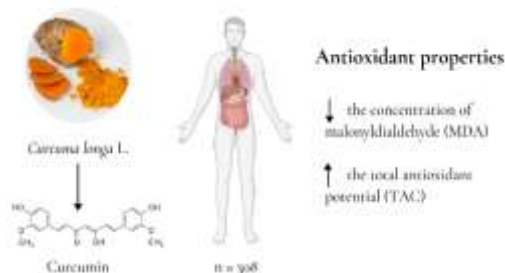


EFFECT OF CURCUMA LONGA WITH RESPECT TO LIVER AS A VITAL ORGAN – 1] HEPATOPROTECTIVE EFFECT –

C. longa exerted hepatoprotective properties against liver injury induced by heavy metals, such as lead and mercury and toxic pesticides, such as carbofuran and endosulfan, by lowering the serum levels of AST, ALT, ALP, gamma-glutamyl transpeptidase (GGT), and TB, improving hepatic protein synthesis, and preventing toxicity-induced weight loss in rats and chickens. Specifically, oral supplementation of *C. longa* (500 mg/kg daily for 28 days) led to a significant reduction of the elevated AST, ALT, and ALP in Wistar albino rats, which are abnormal markers associated with the hepatocellular damage. Treatment with *C. longa* attenuated a significant increase of lipid peroxidation (LPO) and elevated the level of glutathione (GSH), which suggest that the possible molecular mechanism of pharmacological effects of *C. longa* against lead-induced hepatotoxicity might be involved in reducing oxidative stress. In addition, the ethanol extract of the rhizomes of *C. longa* upregulated the expression of hepatic microsomal proteins that play a critical role in detoxification, which may contribute to its beneficial activity against HgCl₂-induced hepatotoxicity in SD rats. *C. longa* protected the liver from different factors, such as chemicals, drugs, alcohol, heavy metals, and pesticides, which may increase the risk of liver injury, by inhibiting apoptosis and the normalization of serological and histological changes.

2] ANTIOXIDANT EFFECT –

Although blood tests and image inspections of patients with liver diseases reveal normal ranges, oxidative damage is frequently observed in the liver. For example, serum AST or ALT levels were normal or slightly elevated in obese fatty liver patients. However, there was a definite change in the oxidative stress markers of hepatic tissue. Hence, the antioxidant effects of *C. longa* can play a crucial role in the management of hepatobiliary diseases because oxidative stress is closely associated with hepatic steatosis, inflammation process, cirrhosis, and tumorigenesis. *C. longa* might exhibit strong antioxidant activities against the precursors, causing oxidative stress in the liver, such as chemicals, carcinogens, alcohol, drugs, pesticides, heavy metals, and iron, and two molecular mechanisms can be involved in its action. First, *C. longa* could markedly prevent and inhibit the overproduction of free radicals and lipid peroxides in the hepatic and gall bladder tissue by mediating a significant amount of CYP2E1 expression.



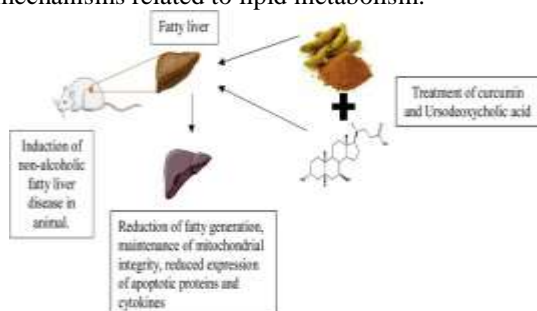
3] ANTISTEATOTIC AND ANTILIPIDEMIC EFFECTS –

The liver is in charge of lipid homeostasis by controlling the uptake and breakdown of dietary fatty acids for energy production, synthesizing de novo lipogenesis, or excretion from the liver.

C. longa decreased the levels of TG contents, total cholesterol, and low-density lipoprotein (LDL) in

the liver tissue. Regarding the antisteatotic effects of *C. longa*, its water extract at 250°C impeded the uptake of fatty acids into the liver by suppressing the mRNA expression of CD36 and fatty acid transport protein (FATP) in C57BL/6 mice.

C. longa can be developed as an important agent to treat fatty liver diseases, which account for a large portion of hepatobiliary diseases. In particular, the water extract of *C. longa* was found to exhibit strong antisteatotic and hypolipidemic effects, which were involved in the pharmacological mechanisms related to lipid metabolism.



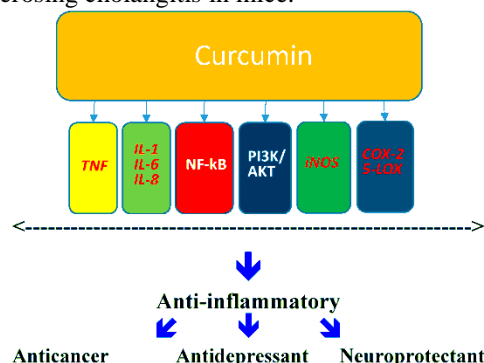
4] ANTI-INFLAMMATORY EFFECT –

Inflammation has a close interrelationship with oxidative stress and steatosis in the pathogenesis of hepatobiliary diseases. The management of inflammation is crucial in the treatment of hepatobiliary diseases because hepatitis can be regarded as a stage prior to the development of cirrhosis or cancer.

The anti-inflammatory effects of *C. longa* were mainly elucidated by a significant reduction in hepatic and serum levels of tumour necrosis factor- α (TNF- α), which was elevated by drugs, ethanol, MCD diet, and TAA. *C. longa* markedly decreased the hepatic interleukin-6 (IL-6) value in C57BL/6 mice administered alcohol and an MCD diet [39], which are models that demonstrate the important role of IL-6 in the development of alcoholic or non-alcoholic fatty liver into cirrhosis or cancer. *C. longa* improved the major hallmark of the inflammation-associated histological findings, such as periportal inflammatory cell infiltration, hepatic vascular congestion, F4/80-positive macrophages, and mononuclear cellular infiltration. *C. longa* were mainly based on the decrease in inflammatory cytokine production by the inhibition of lipid peroxidation through its antioxidant actions.

C. longa might exhibit strong anti-inflammatory effects against inflammatory reactions in the liver. However, its efficacy should be investigated in experimental models that mimic cholangitis or

cholecystitis because curcumin alleviated sclerosing cholangitis in mice.



5] CHOLAGOGUE EFFECT –

Cholestasis, a condition involving a decrease in bile flow, is caused by multiple factors, including infection, alcohol, drugs, tumour, and autoimmunity. Cholestasis can cause damage to organelles and cell membranes in hepatocytes and dysfunction in the hepatobiliary system, eventually resulting in symptom manifestation, such as jaundice, xanthoma, and itch. Although antibiotics/antivirals and immunosuppressants are used to treat infectious cholestasis and autoimmune cholestasis, respectively, ursodeoxycholic acid (UDCA) is currently recommended as the primary therapeutic drug to improve clinical symptoms and bile flow.

C. longa elevated the total amounts of bile acids and bile secretion by activating the bile excretion pump in a concentration-dependent manner. In particular, the water extract of the radix of *C. longa* increased the level of serum total bile acids by UDP-glucuronyl transferase activity for cholesterol excretion from the liver in high-fat diet rat models. This result is accompanied by the increased TG discharge to stool and decreased serum lipid contents.

Curcuma longa exhibited cholagogic effects by increasing the production and secretion of total bile acids in high-fat diet-induced rats. However, there are no animal models induced by bile duct ligation or related to liver cirrhosis for evaluating the efficacy of *C. longa*. Therefore, different models stimulated by drugs, alcohol, autoimmune inflammation, viral infections, etc., are required to assess the pharmacological effects of *C. longa* in the treatment of cholestasis-induced dysfunctions.

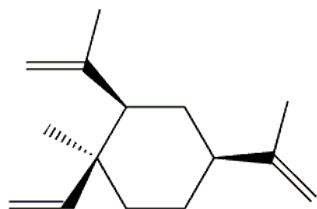


PHARMACOLOGICAL ACTIVE COMPOUNDS ISOLATED FROM CURCUMA LONGA DERIVATIVES –

1] β -Elemene

β -Elemene is a sesquiterpene compound extracted from the herb *Curcuma Rhizoma* and is used in traditional Chinese medicine (TCM) to treat several types of cancer, with no reported severe adverse effects. β -elemene can inhibit cell proliferation, arrest the cell cycle, and induce cell apoptosis. beta-elemene might be one of the key active constituents of *C. longa* for the treatment of hepatobiliary diseases because it exerted inhibitory effects against liver injury, inflammation, and fibrosis.

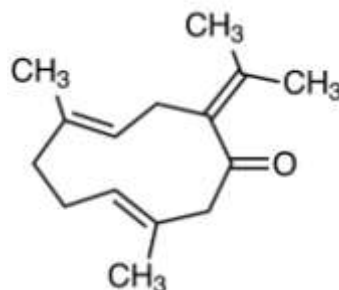
STRUCTURE –



2] Germacrone –

Germacrone belongs to the volatile sesquiterpene family from *C. longa*. The pharmacological activities of germacrone in hepatobiliary diseases can be classified into two categories, namely, hepatoprotective and anticancer effects. germacrone is expected to not only possess hepatoprotective effects but also anticancer effects. germacrone exhibited the induction of apoptosis similar to the control group in the normal liver cell line, LO2 cells, and significantly induced the apoptosis of HepG2 cells. These findings suggest that germacrone displays less toxic hepatoprotective effects and has strengths as it is only toxic to tumor cells.

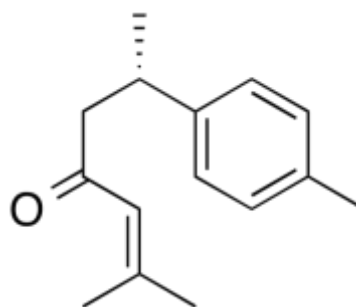
STRUCTURE –



3] Aromatic Turmerone –

Aromatic turmerone was introduced as a representative active compound of *C. longa* with curcumin r-turmerone exhibited hepatoprotective, anticancer, and cholagogic effects against hepatobiliary diseases. Ar-turmerone improved the ethanol-induced reduction in the cell viability of hepatocytes isolated from SD male rats. aromatic-turmerone enhanced the immune system by elevating the number of monocytes in peripheral blood and exhibited antiangiogenic effects on HMEC-1 cells, zebrafish, and matrixgel plug mice. Hence, further in-depth and extensive studies need to be performed to demonstrate its potential as an antitumor drug against hepatobiliary cancer.

STRUCTURE –



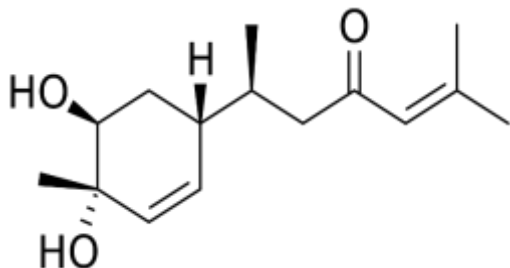
4] Bisacurone –

Bisacurone is more separated from the rhizomes of *C. longa* than its radix. bisacurone is more effective at promoting bile secretion and produced more total bile acids than curcuminoids and ar-turmerone in Wistar rats. A significant decrease in the ALT level in rat serum, which was increased by ethanol administration, was observed after a single intake of bisacurone.

bisacurone might exhibit hepatoprotective effects on liver injury induced by ethanol intake and

cholestasis. Also its efficacy could be stronger than that of curcuminoids and aromatic-turmerone.

STRUCTURE -



USE OF CURCUMA LONGA IN TREATMENT OF VARIOUS HEPATIC DISORDERS -

TYPES OF HEPATIC DISORDERS

SR NO	TYPE OF DISORDER
1	Cirrhosis
2	Liver Cancer
3	Wilson Disease
4	Fatty Liver Disease
5	Hepatitis A, B and C

USE OF TURMERIC IN TREATMENT OF VARIOUS LIVER/HEPATIC DISORDERS -

1] CIRRHOSIS -



Cirrhosis, also known as liver cirrhosis or hepatic cirrhosis, and end-stage liver disease, is the impaired liver function caused by the formation of scar tissue known as fibrosis due to damage caused by liver disease. Damage causes tissue repair and subsequent formation of scar tissue, which over time can replace normal functioning tissue, leading to the impaired liver function of cirrhosis

USE OF TURMERIC IN TREATMENT OF CIRRHOSIS -

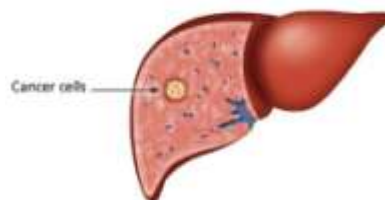
Curcumin is the main ingredient in turmeric, an active ingredient that is able to eliminate the effects of leptin, which is the main cause of cirrhosis. In addition, turmeric also helps to benefit bile from which to support the liver detoxification process,

prevent fat build-up in the body and restore liver function.

Therefore, one of the most popular herbal remedies for fatty liver treatment is turmeric

Every day you should only use from 2 – 4 grams of turmeric, mixed with warm water to drink. The best time to drink turmeric juice is in the morning, this is the time to help the body absorb the nutrients in turmeric that help improve fatty liver status. Treat fatty liver with turmeric and honey. In honey, there are many antioxidants that prevent cancer and have antibacterial properties that are very good for your health.

2] LIVER CANCER -



Liver cancer (also known as hepatic cancer, primary hepatic cancer, or primary hepatic malignancy) is cancer that starts in the liver. Liver cancer can be primary (starts in liver) or secondary (meaning cancer which has spread from elsewhere to the liver, known as liver metastasis). Liver metastasis is more common than that which starts in the liver. Liver cancer is increasing globally

USE OF TURMERIC IN TREATMENT OF LIVER CANCER

Small studies among people with cancer show that turmeric can help improve quality of life. people use turmeric-based topical cream had reduced skin irritation caused by chemotherapy. A mouthwash containing curcumin reduced mouth swelling. Turmeric can also help lower pain in some breast cancer patients with joint problems.

Turmeric reduces inflammation, which is at the root of many diseases, including cancer. Animal and lab studies show that turmeric can help prevent cancer growth and kill certain cancer cells.

3] WILSON DISEASE -



Wilson disease (WD) is an autosomal recessive disorder of copper metabolism with pathological copper accumulation in different organs/tissues (mainly, liver and brain) with secondary organ damage and clinical symptoms related to this injury (mainly, hepatic, neurologic and psychiatric disorders). WD is caused by mutations in the ATP7B gene that encodes the copper-transporting P-type ATPase, ATP7B, which is located mainly in the trans-Golgi network of hepatocytes and is involved in copper transport in the circulation and biliary excretion. Thus, according to WD pathogenesis, WD starts from liver

USE OF TURMERIC TO TREAT WILSON DISEASE

Curcumin has been lauded several times for its exceptional antioxidant properties. It can effectively scavenge any excess reactive oxygen species present in the body. Additionally, curcumin can also neutralize reactive nitrogen species that are just as bad for the liver. Curcumin increases the production of glutathione in the body while at the same time it suppresses the lipid peroxidation process. All of this helps in toning down the severity of the symptoms of Wilson's disease especially since patient's suffering from it often show a reduced level of glutathione and higher oxidative stress.

Curcumin is good at excess chelating copper from the body. This happens because curcumin exhibits very high binding affinities with copper. Since the underlying cause of Wilson's disease is an excess of copper in various parts of the body, the chelating property of curcumin is beneficial in deconstructing and removing copper deposits all over the body. This is particularly good for the liver since the stress on it reduces considerably as a result of reduced copper deposition.

The anti-inflammatory qualities of curcumin can prove to be very useful in reducing the harshness of the symptoms experienced by patients of Wilson's disease. Regular consumption of curcumin can target the abdominal pain and the chronic fatigue. Curcumin acts on the pro-inflammatory mechanisms of the body and suppresses it to alleviate physical malaise.

4] FATTY LIVER DISEASE –



Fatty liver disease is a common condition caused by the storage of extra fat in the liver. Most people have no symptoms, and it doesn't cause serious problems for them. In some cases, though, it can lead to liver damage. The good news is you can often prevent or even reverse fatty liver disease with lifestyle changes.

USE OF TURMERIC TO TREAT FATTY LIVER DISEASE (HOME REMEDY)

In traditional medicine, tangerine peel is also known as bare skin, has a moderate, spicy taste. This is a medicinal herb that is used to treat conditions such as bronchitis, to help you break off quickly, while people who are motion sick can also smell tangerine peel to reduce discomfort. About the effects of tangerine peel on fatty liver, thanks to the glycoside contained in the tangerine peel help the coronary arteries to expand, increase blood circulation and help reduce excess fat in the liver.

For this remedy you need to prepare the following ingredients:

Fresh turmeric: 3 tubers

Tangerine peel: 3gr

Method 1: You bring fresh turmeric and tangerine peel into the pot, add the braised water for about 10 – 15 minutes to boil the water, then turn down the heat for a while and then turn off the heat.

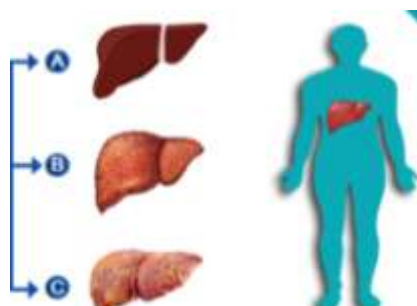
This water should be used daily, twice a day, continuously for a long time to achieve the best results.

Method 2: Use turmeric starch

You can use the dried tangerine peel to puree and mix well with turmeric starch to save. This is how this will save you a lot of time.

Each time you use just use this mixture with about 50ml of warm water to dissolve and use.

5] HEPATITIS A , B, C –



Hepatitis is an inflammation of the liver. The condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. Hepatitis viruses are the most common cause of hepatitis in the world but other infections, toxic substances (e.g. alcohol, certain drugs), and autoimmune diseases can also cause hepatitis.

Hepatitis A virus (HAV) is present in the faeces of infected persons and is most often transmitted through consumption of contaminated water or food. Certain sex practices can also spread HAV. Infections are in many cases mild, with most people making a full recovery and remaining immune from further HAV infections. However, HAV infections can also be severe and life threatening. Most people in areas of the world with poor sanitation have been infected with this virus. Safe and effective vaccines are available to prevent HAV.

Hepatitis B virus (HBV) is transmitted through exposure to infective blood, semen, and other body fluids. HBV can be transmitted from infected mothers to infants at the time of birth or from family member to infant in early childhood. Transmission may also occur through transfusions of HBV-contaminated blood and blood products, contaminated injections during medical procedures, and through injection drug use. HBV also poses a risk to healthcare workers who sustain accidental needle stick injuries while caring for infected-HBV patients. Safe and effective vaccines are available to prevent HBV.

Hepatitis C virus (HCV) is mostly transmitted through exposure to infective blood. This may happen through transfusions of HCV-contaminated blood and blood products, contaminated injections during medical procedures, and through injection drug use. Sexual transmission is also possible, but is much less common. There is no vaccine for HCV.

USE OF TURMERIC TO TREAT HEPATITIS A , B , C

Curcumin extracted from curcuma root contains mainly three components, including curcumin not less than 70 % demethoxy curcumin not less than 10-20 %, and didemethoxy curcumin not less than 5-10 %. It is prepared into oral preparation for treating hepatitis , especially chronic persisting and active hepatitis.

Curcumin is used for the treatment of the application of hepatitis , it is characterized in that the class flavochrome total extract that extraction separation goes out from plant *RhizomaCurcumaeLongae* (curcuma Longa L) rhizome, wherein comprise three monomeric compounds, i.e. curcumin, demethoxycurcumin, bisdemethoxycurcumin Contain above-claimed cpd monomer or total extract, make oral agents, be used for the treatment of the medicine of hepatitis .

II. CONCLUSION –

There are numerous etiological factors able to elicit chronic liver inflammation that could lead to hepatic fibrosis and cirrhosis, including metabolic, infectious and autoimmune diseases. Despite the availability of etiologic-specific treatments for several liver diseases, no drugs or medications are currently approved for the regression of hepatic fibrosis and cirrhosis, which represent the final consequences of chronic liver injury. The interest in anti-fibrotic therapeutic or preventive agents has recently risen due to the availability of a new class of DAA against HCV. Whereas the clinical efficacy of these brand new medications has been widely demonstrated in eradicating HCV infection little is known about their effects on liver fibrosis and a significant histological improvement of cirrhosis with antiviral agents is probably unfeasible.

Curcumin is a natural compound easily extractable from turmeric and is widely used in middle-eastern diets. Several studies have uncovered its role in the modulation of many biological mechanisms involved in liver injury.

The available data make curcumin a promising phytotherapy in chronic hepatitis and a potential therapeutic agent for regression of liver fibrosis and cirrhosis, especially in the setting of HCV infection, which could be easily eradicated with many direct-acting antivirals. Even though results from studies conducted so far are encouraging, several critical issues still must be overcome before curcumin may become available in clinical practice. The above-mentioned poor

bioavailability of curcumin is a critical limiting factor which affects the drug pharmacodynamics, and then the use of a novel drug delivery system for curcumin must be considered when testing its clinical effects.

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