PHYSICOCHEMICAL & PHARMACOLOGICAL PROFILE OF (CARICA *PAPAYA & HIBISCUS ROSA-SINENSIS): -NUTRITIONAL & HEALTH BENEFITS.*

SANSKRITI[1] LUSHI KUMARI[2]LUXMI YEASMINE [3]

[1]Assistant professor, department of pharmacology school of pharmacy and research dev Bhoomi Uttarakhand University. Dehradun.

[2]Research Scholar, school of pharmacy & Research dev Bhoomi Uttarakhand university.

*CROSSPONDING AUTHOR: sopr.luxmi@dbuu.ac.in.

ORCID ID: -0009-006-94427823.

ABSTRACT

We demonstrated that leaves of *Hibiscus rosa- sinensis&* seed of *Carica papaya contain* various physicochemical properties. the chemical characteristic of oil extracted from papaya seed and hibiscus leaves are exempt lipid acid mg/gram (2.61)±(0.01), saponification number mg/gram (121.90)±(0.02), viscosity(57.355)±(.01), phenolics(61.45)±(3.25) flavonoid(53.28)±(1.93) .it contains several active compounds (quercetin-3,5-diglucoside,7-diglucoside,quercetin-3-sophorotridoside, cyaniding-3-sophoroside-5 glucoside, β-sitosterol, floated vitaminB9 ,.The chemical constituent of both *Hibiscus & papaya* are given several pharmacological effects like anti- tumour(flavonoid carotenoids),anti-fertility(ca*p*rine),anti-inflammatory(polyphenols& mucilage) .The nutritional & health benefits of *Hibiscus& carica* the study aims to assess its effects on oxidative stress, cardiovascular health, immune function and fatty liver *Carica papaya* is recognised for high concentration of vitamins A,C,E,This review will investigate its impact on fatty liver activity, digestive efficiency,& immune system support. The study seeks to provide a comprehensive understanding of how these two plants contribute to overall health and well-being through their unique nutritional, pharmacological, phytochemical and health benefits. (A.O, Mukhtar, kadam, *et al., 2016,2014 2009)*

Key word: - Nutritional, saponification, fatty acid, cardiovascular, β-sitosterol.

INTRODUCTION

The esteemed Indian system of medicine Ayurveda, Siddha, and Yunani, which use herbal & mineral in the formulation. (Carica *papaya seed*) portion of the fruits, weighing papaya seeds make up a significant portion of the fruits, weighing approximately (15%-20%) papaya seeds can yield (30-34%) oil, which has Nutritional & functional characteristics comparable to those of olive oil. A superior source of amino acids up to (24.91%) the fiber & sarcotesta in seed. (*Hibiscus rosa sinensis)* it is a medicinal herbal rich in antioxidant and vitamins proven to effectiveness in reducing the risk of liver and cardiovascular. An experimental method is used to assess the impact of the impact of a high-fat diet on lipid metabolism and liver. **(throat, yang, Eze, *et al,2009 2015,2016)*** According to the World Health Organization it is estimated that 31.8% of Indian population is affected a figure that has more than doubled since 1980.Globally around 39% of adult are impacted with the burden of NASH Significantly affecting approximately 1 in 4 individuals. It is a common liver condition marked by the buildup or excess fat found in liver cells of individuals who consume little to no alcohol. It is one of the most prevalent liver disorders globally, metabolic syndrome NAFLD encompasses a spectrum of liver condition, ranging from fatty liver (steatosis), which is generally being, to non-alcoholic steatohepatitis. (NASH)modification such as he rise in NAFLD case is closely linked to the global increase in obesity and type 2 diabetes, making it a significant public health concern. **(Gupta, Rinella, *et al.,2023,2016).*** Fig.1 Geographic variation in the daily energy availability per capita (kilocalories and in the prevalence of NAFLD is shown below.

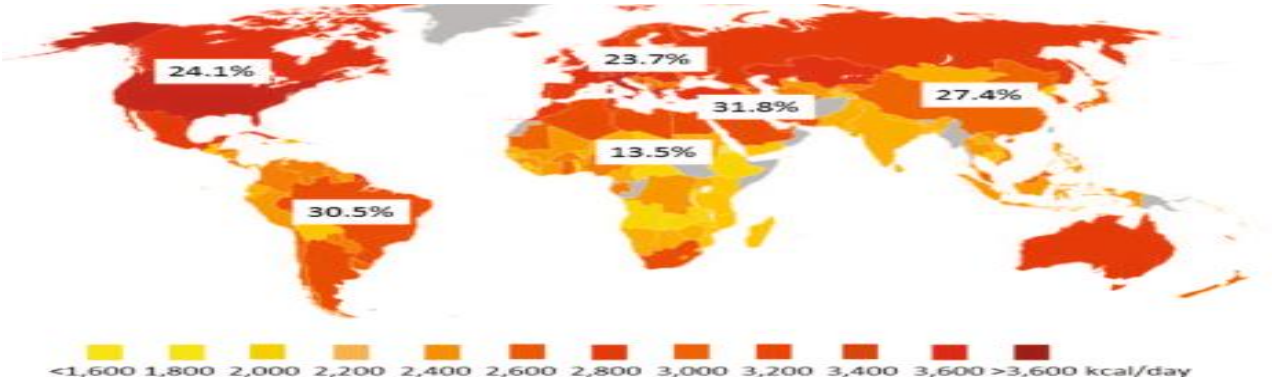

Fig.1 (a) NAFLD is shown.

Fig.1 (b) NORMAL LIVER.

Fig.1(c) FATTY LIVER.

ETIOLOGY

There are several reasons for fat accumulation increasing free fatty liver acids to the liver. Due to synthesis of free fatty liver acid, it decreases the oxidation of FFA and also decrease the very low-density lipoproteins.

1. Metabolic abnormality, such as issues with glycoside metabolism, e.g. :- (homocystinuria, and glycogen storage disorder,)
2. Alcohol consumption: - where alcohol transformed into acetaldehyde by the enzyme alcohol dehydrogenase and then to acetate by acetaldehyde dehydrogenase. The metabolism of alcohol also increases levels of NADH (nicotinamide adenine dinucleotide) leads to an imbalance in the NADH/NAD ratio.
3. Excessive use of oily food: - high intake of oily and fatty foods leads to an excess of dietary fats, leads to an excess of dietary fats, especially triglycerides, entering the bloodstream. When the liver processes these excess fats, it stores them as fat droplets within liver cells, leading to hepatic steatosis (fatty liver).
4. Irregular consumption of food: - irregular consumption of food, including inconsistent meal timings, overeating, and prolonged fasting, can contribute to the advancement and worsening of fatty liver disease, when the meals are skipped or eaten at unusual time, the livers' ability to metabolic imbalances.
5. Oxidative stress in the hepatocytes can activate: -oxidative stress plays a crucial role in the progression of fatty liver disease, particularly of fatty liver disease, particularly in the transition from simple steatosis (fat accumulation in the liver) to more severe forms like non-alcoholic steatohepatitis.
6. Nutritional status like malnutrion, overnutrion: - It can cause fatty liver due to impaired lipoprotein production, increased fat mobilization, reduced antioxidant defences, and mitochondrial dysfunction, leading to fat accumulation in liver. Or overnutrition can cause fatty liver through mechanism like insulin resistance, excess caloric and fat intake, increased de novo lipogenesis, health
7. issues like Wilson disease.: - a Wilson disease is an uncommon rare genetic condition that causes an abnormal buildup of copper in the body, the condition, which affects the liver, brain, & other essential organs, the condition is caused by mutation ATP7B gene, which is responsible for regulating copper transport and excretion from the body. **(Gupta *et al.,2023)***

PATHOPHYSIOLOGY OF FATTY LIVER

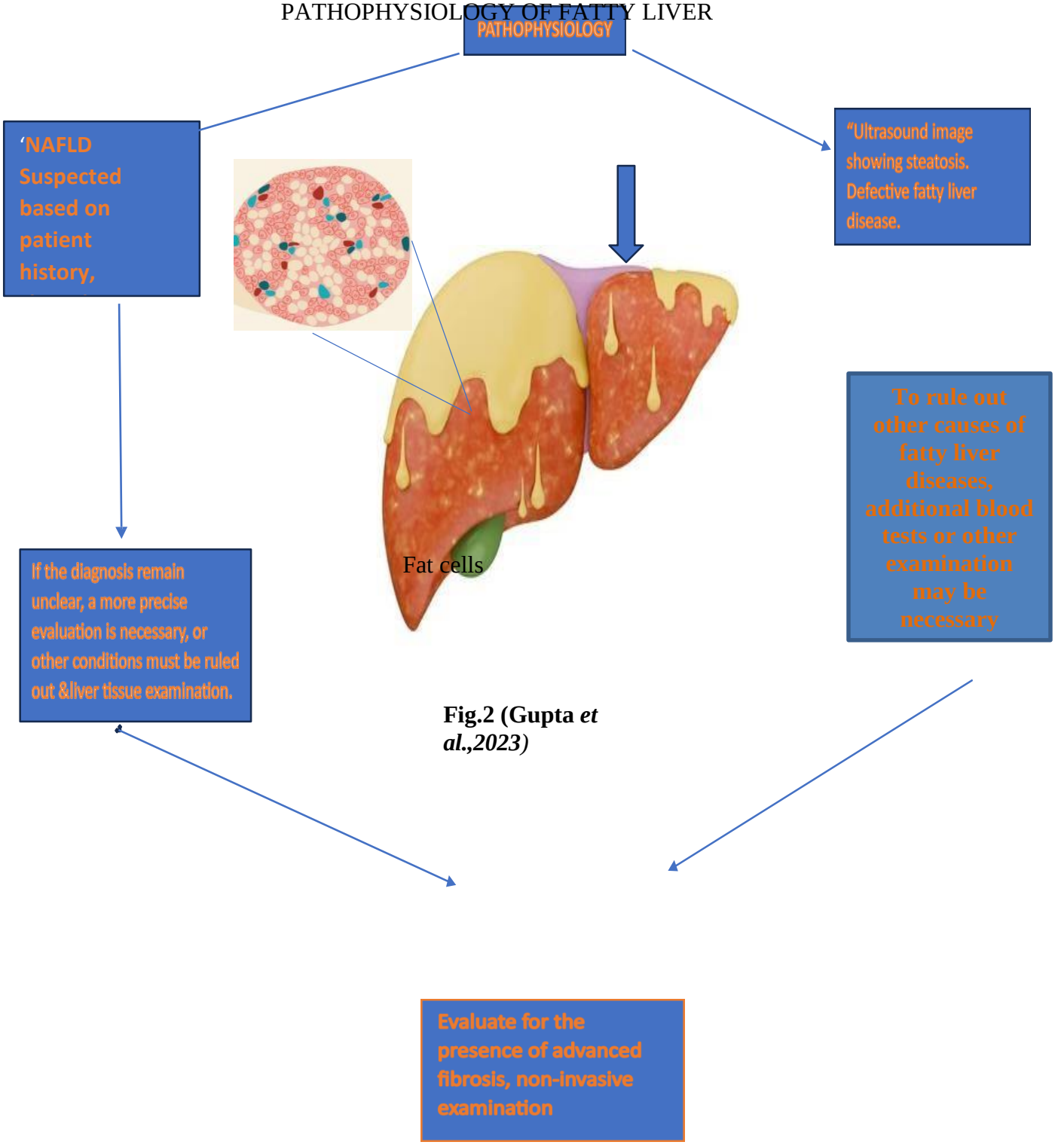

Fig.2 (Gupta *et al.,2023*)

TYPE'S OF FATTY LIVER DISEASE.

1. NON-ALCOHOLIC FATTY LIVER DISEASE

- METABOLIC SYNDROME: - NAFLD is a condition related to the accumulation with components of metabolic syndrome which encompasses condition including obesity, insulin resistance, type 2 diabetes, and dyslipidemia. Flammarion, and liver damage.
- DIET AND LIFESTYLE: -A diet rich in fast foods, sugars & calories, along with sedentary lifestyle, increases the risk of fat accumulation in the liver.
- GENETICS: -Certain genetic factors can predispose individual to NAFLD, making some people more susceptible to the condition. **(Gupta *et al.,2023)***

2. ALCOHOLIC FATTY LIVER DISEASE

- CHRONIC ALCOHOL CONSUMPTION: -The primary cause of AFLD is excessive alcohol intake. Alcohol metabolism in the liver generates toxic byproducts that can lead to fat accumulation that affect inflammation, and liver damage
- GENETIC PREDISPOSITION: -some individual may have genetic variation that effect alcohol metabolism, making them more susceptible to developing AFLD ever with lower levels of alcohol consumption.
- NUTRITION: - Poor nutritional status, often seen in heavy drinkers, can exacerbate liver damage and fat accumulation. **(Gupta *et al.,2023)***

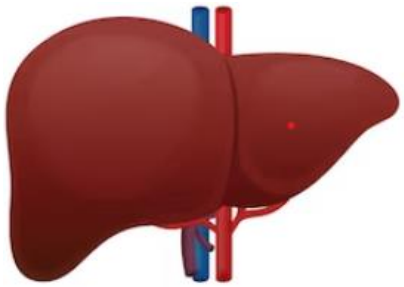

Fig.3 (a) Normal liver

Fig.3 (b) Alcoholic

Fig.3 (c) Non-Alcoholic

PLANT PROFILE OF *HIBISCUS ROSA- SINENSIS.*

Hibiscus rosa- sinensis belongs to the Malvaceae family, which is recognized for its significant medicinal value. The characteristic of plants is quite distinctive. For example, their roots are usually cylindrical5-15cm leaves are simple 5petals of red colour**.(Zahoor *et al.,2024).***

TAXONOMICAL CLASSIFICATION
Kingdom -Plantae
Division -Magnoliophyte
Class -Magnoliopsida
Order -Malvales
Family -Malvaceae
Genus -Hibiscus L. Rose mallow
Species-Hibiscus rosa sinensis
Synonym – China rose. **(Ahmed *et al., 2024).***

Fig.4(a) Hibiscus r

Hibiscus species there are over 30 different species of hibiscus some are given below in figure.

Fig.4 (b) Blue river hibiscus.

Fig.4(c) Luna red hibiscus

Fig.4 (d) Hula girl hibiscus

Fig.4(e) Blue chiffon

Fig.4(f) Anne Arundel.

Hibiscus syriacus *Hibiscus moscheutos.***(Times of agriculture, ISIN 2382-6344)**

1. VERNACULAR NAME

a. English-Chinese Hibiscus.
b. Bengali- Orru, Jiwa, Oba,
c. Hindi- Odhul, Gurhal, Arahul, Rudra Puspa,
d. Malayalam- Himba Rathi, Ayamparatii, Chebarathi.
e. Oriya- Mondaro

f. Tamil- Sapattuu, Semparutti,
g. Mar- Jasavanda, Jassvandi
h. Gujrat-Jasvua, jasunt.
i. Punjab-Jasum, Jaipushpa, Gurhal,
j. Kan- Dasavala. **(Sathe *et al.*,2009).**

2. GEOGRAPHICAL DISTRIBUTION: -

It is widely distributed in China. Japan this plant originated from tropical Asia. It was commonly believed to have originated in south China. Hibiscus in Southeast Asia particularly in regions like southern China and is native to tropical and subtropical. **(Jadhav *et al., 2009).***

3. NUTRITIONAL AND HEALTH BENEFIT.

Incorporating hibiscus inti your diet, often through teas or supplements, can offer these health benefits, through its consulting with healthcare provider is important, especially if you have underlying health conditions or fatty liver, pregnant. **(Jadhav *et al., 2009)***

4. CULTIVATION AND COLLECTION

The tropical and subtropical climates. It requires warm temperature, typically between 60°F and 90°F (15°CTO 32°C). It is sensitive to frost and should be protected from cold weather. Soil should be rich in organic matter. If the soil is too alkaline, the plant may develop chlorosis. fertilize every 2to4 week during the growing season (spring and summer). **(Jadhav *et al., 2009*)**

5. PHYSICOCHEMICAL CHARACTERISTICS OF HIBISCUS.

PARAMETER	VALUE
Ash value	7.75%
Extract value	2.80%
Swelling index	2.5%
Drying	0.53%.

Table.1 (**Al -Snafi *et al.,2018)***

6. DIFFRENT NUTRACEUTICAL PRODUCT LIST ON *HIBISCUS ROSA-SINENSIS.*

PRODUCT NAME. (BRAND)	FORMULATION TYPE.
MERLION NATURALS (HIBISCUS). KRISHNAS HERBAL & AYURVEDA. BULK SUPPLEMENTS.COM. ALVIA. ACTIZEET. PURE NATURAL. SHUDHEE. FIRE BREW RENAWAL. BIO ORGANIC. HIBISCUS HYDROSOL. NAT HABIT. ALLUS. IDUKKI. GRAMA.	FOODSUPPLIMENT (TABLET). POWDER. HIBISCUSPOWDEREXTRACT. HIBISCUS OIL. ESSENTIAL OIL. HAIRHERBALPOWDER. HIBISCUS TEA. TONIC. HAIRMASK NUTRI-CONDITIONER. HIBISCUS GEL. SKINCLEANSE. SHAMPOO BAR.

Table.2

7. CHEMICAL CONSTITUENT& NEUTRITIONAL COMPOSITION OF *HIBISCUS PARTS.*

PART OF THE PLANT	CHEMICAL CONSTITUENT & NUTRITIONAL COMPOSITION.
LEAVES & STEAM	B- Sitosterol, stigmasterol, taraxeryl acetate, calcium, fats Fiber, carbohydrate phosphorous,
ROOTS	Glycosides, carbohydrate, sterols, phenolic, tennis triterpenoids saponins, mucilage & flavonoids
AQUEOUS EXTRAXT	Carotin, malvalic acid, riboflavin, quercetin, glycoside, margaric acid & lauric acid
FLOWER	Vitamin c, flavonoid, fat, protein, Fiber, carbohydrates, calcium, iron, vitamin B_2, vitamin B_3, vitamin B_1
ETHANOLIC EXTRACT	n-Hexadecenoic acid, Heptanoic acid, 2-ethyle-trans-(2-Ethylcyclopentlyl), (1S-(1α,3a α,4β,6a α)- Squalene, 2R-Acetoxymethy1-13,3, - trimethyl 1-4t-(3-methyle1-2 buten-1-yl)-1cyclohexanol.

Table.3

(Jalal.et.al.,2024

PLANT PROFILE OF *CARICA PAPA SEEDS.*

The papaya plant can reach up to 5-10 meters (16-33) feet in height. Leaves which can up to 70cm (28 inches) in

diameter Fruits. size and shape of the seeds are small, about 4-6 mm in diameter colour of seeds are dark brown and black. **(Sharma *et al., 2022)***

1. TAXONOMICAL CLASSIFICATION

Kingdom- plantae

Subkingdom –Tracheobionta Super division-Spermatophyta Division-Magnoliophyta Class-Magnoliopsida
Subclass-Dilleniidae Order-Violales
Family-Caricaceae Genus-*Carica L.*
Species-*Carica papaya*, (**Raja *et al., 2022)***

Fig.5(a)*Caricapapa*

2. VERNACULAR NAME.

Brazil-Mamao

France-papaya, papayer Vietnam- Du du
New Zealand-papaw India-papita
Brazil-Mamao

France-papaya, papaye Vietnam- Du du Zealand-papaw
South Asia and east indies- kapaya., (**Raja *et al., 2022)***

3. GEOGRAPHICAL DISTRIBUTION; - The plant is widely distributed in India, Australia west Indies, France New

Gujrat, Tamilnadan, chine Temperature between 21°c to 33°c rainfall and irrigation21000-2000mm. central America and northern south America, Mexico, America, Africa, pacific islands, Caribbeans, **(Raja *et al., 2022)***

4. NUTRITIONAL AND HEALTH BENEFITS.

Carica papaya seed generally use in ayurvedic medicine like carminative, antifungal antibacterial Diuretics. Vitamin c is an excellent source of vitamin c which is essential for immune function,
Vitamin E Antioxidant potassium for fluid balance. Improve digestion, support gut health. Anti-inflammatory, eye health, heart health low in calories, fast wound healing and tissue repair **(Raja *et al.,2022).***

5.CULTIVATED AND NATURALIZED REGIONS: Tropical and subtropical regions due to its high adaptability to tropical and subtropical climates, papaya is now Cultivated around the, it thrives in warm, frost- free climates and is commonly grown in papaya requires a warm climate with temperatures between 60°F and 90°F (15°C TO 32°C). It is sensitive to forest and prefers well- drained soil with a ph between 6.0 and 6.5., **(Raja *et al., 2022)***

6. SOME SPECIES RELATED TO CARICA PAPAYA.

Fig.5(b) ***Carica stipulate*** **.Fig.5(c)*****Vasconcellea goudotiana*** **.Fig*****5(d)Carica candicans.*** ***Fig.5(e) Carica pubescens.*** ***Fig.5(f)Carica quercifolia.***

4. DIFFERENT NEUTRACEUTICAL PRODUCT ON *CARICA PAPAYA.*

PRODUCT NAME. (BRANDS)	FORMULATION TYPE.
LIFE AVEDA. BIXA BOTANICAL. ZANDU. BULK SUPLIMENT.	HEALTH SUPPLEMENT. PAPAYA EXTRACT CAPSULES.
SCHWABE (CARICA PAPAYA MT). VENKY. BIZPRESSIONS. BIOTIQUE.	PAPAYA LEAF EXTRACT TABLET. PAPAYA FRUIT SUPPLIMENT. TONIC.
VEDIC LINE. NUTRI GLOW. NYLE. GIOVANNI.	THROMB BEAT.
VEDIC LINE.	PAPAYA SEED EXTRACT. TAN REMOVAL FACE WASH. FACE CREAM.
CITRUS NUTRACEUTICAL.	HAIR SPA. DAMAGE REPAIR. CONDITIONER.
	GEL, SERUM, LOTION, SUPPLIMENTS.

Table.4

5. CHEMICAL CONSTITUTION & NUTRITIONAL COMPOSITION OF PAPAYA.

PART	CONSTITUENTS
FRUIT	Carbohydrates, minerals, calcium, phosphorus, iron, vitamin c, thiamine, riboflavin, niacin, and carotene, amino acid, citric acids ,6-dimethyl-3, 6 expoxy-7 octen-2-ol, benzylisothiocynate, cis and trans2,
JUICE	N-butyric, N-hexanoic & n-octanoic acid, palmitic, stearic, oleic acids, lipids myristic, palmitic.
SEED	Benzyl glucosinolate, glucotropacolin, benzyl thiourea, β—sitosterol., myrosin & caricin.
ROOT	Arposide& myrosin.

Table.5 (**Raja *et al., 2022)***

4. PHYSICOCHEMICAL CHARACTERISTIC OF PAPAYA.

PARAMETER	VALUE.
Iodin value (g/100g)	52.44 ± 0.02
value(mg/g)	9.27 ± 0.01
Specific gravity	0.920 ± 0.01
Viscosity(cp)	57.355 ± 0.O1
Refractive index	1.462 ±O.O1
Oil yield (%)	40.00 ± 0.02
Saponification value(mg/g)	121.90±0.02.(Aladekoyi,Gbenga,et.al,.2016)

Table.6

PHARMACOLOGICAL ACTIVITY OF *HIBISCOUS ROSA -SINENSIS.*

HYPOLIPEMIC ACTIVITY.

The ethanolic extract of roots when gives at a dose of 500g/bw to male rats which caused inhibitory effect of hepatic steatosis .(**Zahoor.*et al.,2024)***

ANALGESIC ACTIVITY.

Analgesic activity of carica papaya typically focus on evaluating its potential to reduce pain in experimental models. These studies aim to explore and confirm the traditional use of papaya in pain relief, as well as to understand the mechanisms involved.

Studies may investigate how *Carica papaya* exerts its analgesic effects. This can involve exploring its influence on pain pathways, such as the inhibition of cyclooxygenase (COX) enzymes or modulation of inflammatory mediators.

There is bioactive compounds like flavonoids alkaloids, and papain in the extract is often linked to the observed analgesic effects. (**Al- Sanfi Jadhav, *et.al.,2018 ,2009.)***

ANTI-HYPERTENSIVE: -

The antihypertensive activity of *carica papaya has* been explored in pharmacological studies to evaluate its potential in lowering blood

pressure it is traditional used in some cultures for managing high blood pressure, and modern research aims to scientifically validate these uses and understand the mechanism involved. Vasodilation: *carica papaya extracts* of the smooth muscle in blood vessels, leading to reduced vascular resistance and lower blood pressure. **.(Kalam *et.al.,2024)***

ANTI-FERTILITY: -

It has been investigated through various pharmacological studies aiming to understand its potential use as a natural contraceptive. Both male and female antifertility effect have been explored, utilizing different parts of the components of a plant including seeds, leaves, and latex these studies are significant for developing affordable and accessible fertility control methods especially in regions with limited access to conventional contraceptives. **.(Kalam, Jadhav *et.al.,2024,2009)***

ANTI- DIARRHEAL: -

The antidiarrheal activity of it it has been investigated in pharmacological studies to assess its effectiveness in managing diarrheal, a condition characterized by frequent, loose, or watery bowel movements. Diarrheal can be

ANTI- INFLAMMATORY: -

The ant- inflammatory activity of *carica papaya* has been extensively studied in pharmacological research to understand its potential in managing inflammation – related condition a biological response occur in reaction to harmful stimuli like pathogen, damage, and toxic agents., or irritants and play a critical role in various disease, including arthritis, cardiovascular diseases, and certain cancer. .(**Kalam *et.al.,2024)*.**

PHARMACOLOGICAL ACTIVITY OF CARICA PAPAYA.

ANTI- INFLAMMATORY: -

The ant- inflammatory activity of *carica papaya* has been extensively studied in pharmacological research to understand its potential in managing inflammation – related condition is a biological response to harmful stimuli, such as pathogens, damaged cells, or irritants and play a critical role in various disease, including arthritis, cardiovascular diseases, and certain cancer. .(**Tanya Sharma,pooja G.Singh,**
et.al.,2022,2020.)

ANTI-FUNGAL ACTIVITY; -

The ant-fungal activity of it has been explored in various pharmacological studies, focusing on its potential to inhibit the growth of fungi and trat fungal infections. These studies are significant given the increasing resistance of fungi to conventional antifungal agent and the need for new, effective treatments especially from natural sources**.(Tanya Sharma *et.al.,2022)***

ANTI-PLASMODIAL ACTIVITY.

Pharmacological studies investigating the ant plasmodial (antimalarial) activity of *carica papaya* focus on its potential to inhibit or kill plasmodium species, the parasites responsible for malaria. These studies are essential in exploring alternative or complementary
treatments for malaria, especially in regions where drug resistance is a concern the plant material is typically dried and extracted using solvents like ethanol, methanol, water, or other organic solvents to obtain the active components.

ANTI- BACTERIAL ACTIVITY:

It has been explored in various pharmacological studies, highlighting its potential as a natural remedy for bacterial infections the seeds most commonly studied for antibacterial properties.

Leaves and fruits are also examined for their antibacterial effects that benzyl isothiocyanate found predominantly in papaya seeds this compound is known for its potent antibacterial effects including anti-microbial.
(Tanya Sharma ,khan JA *et.al.,2022,2012.)*

HYOLIPIDEMIC ACTIVITY: -

It showing the promising hypolipemic effects due to its active compound like flavonoids and phenolic acids. research supports its potential to lower cholesterol and triglyceride levels while improving overall lipid profiles while result are encouraging, further clinical research is needed to validate its safety and effectiveness is extended use.

ANTI-PARASITIC ACTIVITY: -

It has been investigated for its capacity to treat different parasitic infection here a summary of its anti-parasitic effects based on available research less commonly studied but also explored for their bioactive compounds. Disruption of parasite metabolism hibiscus extracts may induce oxidative stress in parasites, leading to their death.

CENTRAL NERVOUS EFFECTS: -It may offer protection to neurons and support cognitive function. Some studies suggest that the anti – inflammatory properties properties of hibiscus extracts can help protect Neurone from damage resulting from oxidative stress inflammation some research indicate that of hibiscus extract might help guard brain cells against harm resulting from oxidative stress and inflammation

ANTI – HAEMOLYTIC EFFECTS: -

It refers to its potential to prevent or reduce the destruction of red blood cells (hemolysis) leaves often studied for their potential anti- haemolytic properties flower also examined for their effects on red blood cells, seeds occasionally researched for related properties phenolic compound including chlorogenic acid which may help protect red blood cells from oxidative damage.

ANTI-CYTOTOXIC EFFECT: -

It refers to the quality of being toxic of cells, leading to cell damage or death anti- cytotoxic effects involve protecting cells from damage or death caused by toxic substances such as quercetin and kaempferol, known for their antioxidant trait that defends cells against damage. it exhibits protective effects against cytotoxicity due to its inflammatory &oxidant qualities. (**Sathe, Sharma *et al.,2022,2009)*.**

CONCLUSION

The current review reveals that there is the tremendous scope of hibiscus and papaya flower and seed in disease management like fattyliver, menorrhagia, wounds, burn, antioxidant, it contains of vitamins minerals, enzymes, and flavonoids, all of which possess biological and therapeutic properties. This is most versatile plant having been used for both medicinal and domestic purposes. both exhibits a wide range of beneficial pharmacological activities, indicating that future phytochemical, clinical, and advanced research on this medicinal plant should be conducted for the betterment of humanity.

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