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Regulation of Chronic Kidney Disease By Polyherbal Syrup:"Boerhaavia diffusa L, Tribulus terrestris, & Butea mono sperma"

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Abstract:
Kidney is major organ for exogenous , this process occurs in the nephrons, the functional units of the kidneys. Drug induced nephrotoxicity is more common. Some of the common nephrotoxic drugs include aminoglycosides, sulphonamides, NSAIDs, anti-cancer drugs which further leads to acute kidney injury. *Boerhaaviadiffusa* L. This medicinal plant contains phytochemical constituents such as flavonoids, alkaloids, steroids, tri terpenoids, lipids, lignins, carbohydrates, proteins and glycoproteins. Ayurvedic literature indicates that punarnava also helps the normal kidneys functioning by illustrating its diuretic and possible nephroprotective effects against nephrotoxicity. Tribulusterrestris one of the most significant medicinal herbs that has been utilized historically for a variety of medical purposes is linn. It has diuretic properties and can help with gonorrhea and dysuria. An essential part of a human's regular physiology is the kidney,Its botanical name is Buteamonosperma. Palash flower has been traditionally used as a diuretic agent, promoting increased urine production. Diuretics can help improve kidney function by increasing the elimination of waste products and excess fluids from the body.
Method: The first step involves extracting bioactive compounds from medicinal herbs. Common extraction methods include maceration, percolation, or Soxhlet extraction using suitable solvents such as ethanol, water, or a combination of both. The extract obtained should be standardized to ensure consistent potency and efficacy.
Result: Nephroprotective effects of *Boerhaavia diffusa L, tribulus terrestris, & butea mono sperma* crude extract against various drug induced nephrotoxicity models and have suggested *polyherbs* to be an effective plant based therapeutic for amelioration of renal damage
Keywords:-Nephroprotective, Punarnava, (Boerhaavia diffusa), Gokhru (Tribulus terrestris), Palash (butea mono sperma), Antioxidant, Phytochemical, Immunomodulation.

INTRODUCTION:-

1.1Nephrotoxicity:-Kidney nephrotoxicity refers to the toxicity or damage to the kidneys caused by various substances or conditions. It can result from exposure to certain medications, chemicals, or environmental toxins, and can lead to impaired kidney function or acute kidney injury[01]. Here's a detailed overview:

Causes of Nephrotoxicity:-

A.) Medications:

1. **Antibiotics**: Certain antibiotics, like aminoglycosides (e.g., gentamicin) and vancomycin, can be nephrotoxic, especially at high doses or with prolonged use.
2. **Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)**: Drugs like ibuprofen and naproxen can impair kidney function, particularly in individuals with pre-existing kidney conditions or dehydration.

3. **Chemotherapy Agents**: Some cancer drugs, such as cisplatin and methotrexate, can cause nephrotoxicity as a side effect.
4. **Contrast Agents**: Used in imaging studies (e.g., CT scans), certain contrast dyes can cause contrast-induced nephropathy.

B) **Chemicals and Toxins**:

1. **Heavy Metals**: Exposure to metals like mercury, lead, or cadmium can lead to kidney damage.
2. **Industrial Chemicals**: Solvents and certain industrial chemicals can be nephrotoxic.
3. **Herbal Supplements**: Some herbal remedies and supplements, such as those containing aristolochic acid, have been associated with kidney damage.[02]

C) **Infections**: Certain bacterial or viral infections can produce toxins that affect kidney function, leading to nephrotoxicity.

D) **Dehydration and Hypovolemia**: Conditions leading to severe dehydration or low blood volume can cause ischemia (reduced blood flow) to the kidneys, making them more susceptible to damage from other toxins.[03]

Mechanisms of Nephrotoxicity:

1. **Direct Cellular Toxicity**: Toxins can directly damage renal tubular cells, leading to cell death and impaired kidney function.
2. **Inflammatory Responses**: Some toxins induce an inflammatory response, which can further damage kidney tissues and impair function.
3. **Obstruction**: Crystals or cellular debris from toxic agents can obstruct renal tubules, leading to increased pressure and subsequent kidney damage.
4. **Vascular Damage**: Toxins may damage the blood vessels supplying the kidneys, leading to reduced blood flow and kidney ischemia.[04]

Symptoms of Nephrotoxicity:

- **Reduced Urine Output**: Decreased production of urine or changes in urine volume.
- **Swelling**: Edema (fluid retention) in extremities or other parts of the body.
- **Fatigue and Weakness**: Generalized fatigue or weakness due to impaired kidney function.
- **Nausea and Vomiting**: Gastrointestinal symptoms can occur with worsening kidney function.
- **Changes in Urine Color**: Dark or cloudy urine, or the presence of blood or protein.[05]

Diagnosis:

1. **Blood Tests**: To measure serum creatinine and blood urea nitrogen (BUN), which are markers of kidney function.
2. **Urinalysis**: To detect abnormalities such as protein, blood, or casts in the urine.
3. **Imaging Studies**: Ultrasound or CT scans can help assess kidney structure and rule out obstruction.
4. **Biopsy**: In some cases, a kidney biopsy may be necessary to assess the extent of damage and identify the cause.[06]

Treatment and Management:

1. **Discontinuation of the Offending Agent**: The first step is to stop exposure to the toxic substance or medication causing the nephrotoxicity.
2. **Supportive Care**: Includes hydration to support kidney function and prevent dehydration, and medications to manage symptoms and complications.
3. **Monitoring**: Regular monitoring of kidney function through blood tests and urine analysis to assess recovery or progression.

4. **Dialysis**: In severe cases where kidney function is significantly impaired, dialysis may be required to perform the filtering functions of the kidneys.
5. **Addressing Underlying Conditions**: Managing any pre-existing conditions or risk factors that contribute to nephrotoxicity.[07]

Prevention:

- **Use Medications Wisely**: Only use medications as prescribed and be cautious with dosage.
- **Monitor Kidney Function**: Regular monitoring for individuals at risk, especially when using potentially nephrotoxic drugs.
- **Stay Hydrated**: Adequate hydration is essential, particularly when taking medications or undergoing treatments that may impact kidney function.[08]

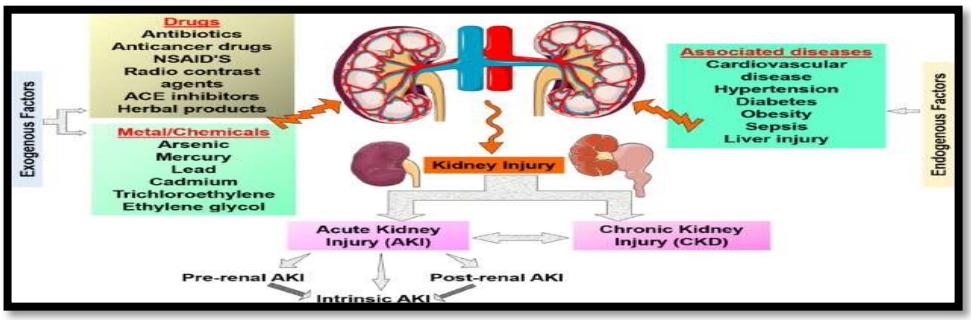

Fig 1.1: Mecahnism of Drug Induced Nephrotoxicity

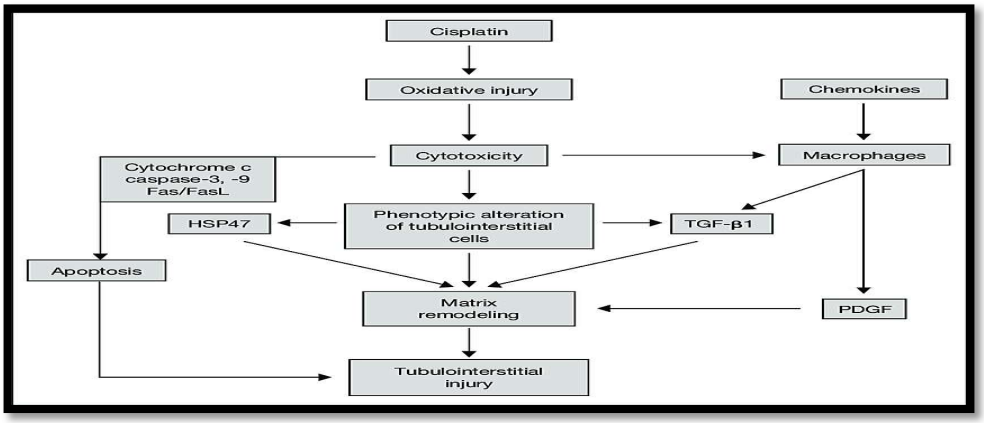

Figure 1.2: Schematic Illustration of Drug Nephrotoxicity

1.3 Boerhaviadiffusa (Punarnava):- Punarnava (Boerhaviadiffusa) is a plant commonly used in traditional medicine, particularly in Ayurveda, for its various health benefits. Its name, derived from Sanskrit, means "that which renews the body" or "the one that rejuvenates." It has been traditionally used to support kidney health and address various urinary and renal issues, including nephrotoxicity.[09]

- Protective effects on kidney:-Punarnava is known for its potential nephroprotective properties. It contains several bioactive compounds, including alkaloids, flavonoids, and saponins, which may help protect kidney tissues from damage. These compounds are believed to:
- **Reduce Oxidative Stress**: Punarnava has antioxidant properties that can help reduce oxidative stress, a common factor in nephrotoxicity.

- **Improve Renal Function**: Studies suggest that Punarnava may improve renal function by supporting the regeneration of kidney cells and enhancing the elimination of toxins.[10]

Anti inflammatory activity:-Punarnava has anti-inflammatory effects that can help reduce inflammation in the kidneys. Inflammation is a common response to nephrotoxicity and can exacerbate kidney damage. By mitigating inflammation, Punarnava may contribute to kidney health and recovery.

1. **Diuretics effect**: -Punarnava is known to have diuretic properties, which can be beneficial in managing fluid balance and promoting the excretion of waste products through the urine. This can be particularly useful in conditions where kidney function is compromised. Renal support effect: In Ayurveda, Punarnava is used to support renal health and manage conditions such as:[11]

- **Kidney Stones**: It is used to help dissolve and expel kidney stones.
- **Edema**: Its diuretic properties can help manage fluid retention and swelling.
- **General Kidney Weakness**: It is believed to strengthen and rejuvenate the kidneys.

Punarnava in kidney health is well-established, scientific research is still evolving. Some studies have shown promising results:

- **Research on Rats**: Animal studies have indicated that Punarnava extracts may reduce kidney damage induced by nephrotoxic agents and support renal function recovery.
- **Human Studies**: Clinical studies in humans are limited but suggest that Punarnava may be effective in managing certain renal conditions and improving kidney health.[12]

2.Usage and Dosage:

- **Powder**: Often mixed with water or honey.
- **Capsules/Tablets**: Standardized forms available as supplements.
- **Extracts**: Concentrated forms used for specific therapeutic purposes.

3.Safety and Considerations:

- **Interactions**: Punarnava may interact with other medications or treatments, so it's essential to consult with a healthcare provider before starting any new supplement.
- **Pregnancy and Lactation**: Safety during pregnancy and lactation is not well-established, so it's advisable to avoid use or consult a healthcare professional if pregnant or breastfeeding.
- **Allergic Reactions**: Rarely, some individuals may experience allergic reactions or gastrointestinal discomfort.[13]

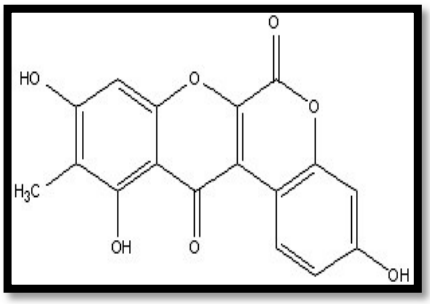

Fig 1.3: Punarnava PlantFig 1.4: Structure of Punarnava chemical constituent

Chemical constituents:

Punarnava (Boerhaviadiffusa) contains a variety of chemical constituents that contribute to its medicinal properties. These compounds include alkaloids, flavonoids, saponins, and other phytochemicals. Here's a breakdown of some of the key chemical constituents found in Punarnava:[14]

1. Alkaloids

- Punarnavine: A major alkaloid found in Punarnava, known for its potential diuretic and anti-inflammatory properties.
- Boerhavine: Another alkaloid that may contribute to the herb's therapeutic effects, particularly in supporting renal health.

2. Flavonoids

- Quercetin: A well-known flavonoid with antioxidant and anti-inflammatory properties, which may help protect the kidneys from oxidative stress.
- Kaempferol: Another flavonoid present in Punarnava, which has been studied for its antioxidant and anti-inflammatory effects.

3. Saponins

- B-sitosterol: A type of saponin with potential antioxidant properties that may support kidney function and overall health.
- Boerhavioside: A saponin that can contribute to the diuretic and anti-inflammatory effects of Punarnava.

4. Phenolic Compounds

- Tannins: These compounds have astringent properties and may contribute to the herb's ability to reduce inflammation and support renal health.
- Phenolic Acids: Compounds like caffeic acid and ferulic acid, which have antioxidant properties.

5. Glycosides

- Stigmasterol Glycoside: Found in Punarnava, this compound may have potential health benefits related to lipid metabolism and anti-inflammatory effects.

6. Essential Oils

- Volatile Oils: These can contribute to the herb's overall therapeutic effects, including its anti-inflammatory and diuretic properties.

7. Other Compounds

- Resins and Tannins: Contribute to the herb's astringent and antimicrobial properties.
- Steroidal Compounds: Such as β-sitosterol, which may have a role in reducing inflammation and supporting kidney function.

Pharmacological Effects:

1. Diuretic Effect: Many of the compounds in Punarnava, particularly the alkaloids and saponins, are believed to contribute to its diuretic properties, helping to manage fluid balance and support kidney function.
2. Anti-inflammatory Effect: Flavonoids and phenolic compounds have anti-inflammatory properties that can help reduce inflammation in the kidneys.
3. Antioxidant Effect: The presence of flavonoids, alkaloids, and phenolic compounds contribute to its antioxidant activity, which helps protect kidney cells from oxidative damage. **[**15]

2.1 *Tribulus terrestris* (Gokharu) :

About 20 species of the Zygophyllaceae family's genus Tribulus may be found worldwide; three of these species—*Tribuluscistoides*, *Tribulusterrestris*, and *Tribulusalatus*—are frequently found in India .Greek doctors classify it as either bushmi (wild) or bushmi (cultivated). The former is primarily found in forests; its

prickly branches run along the ground and emerge at the leaf-leaf junction[16]. When masticated, the dew on its leaves tastes bland and tart (Tursh). BustaniGokhru has broad, thorny leaves, branches that are dispersed across the ground, and tiny, yellowish blooms that are found in damp regions and next to canals. Stems are slender on the lower side and hairy and thick on the superior side. The fruit is similar to the previous variety in that it is hard, prickly, and has tiny, white granules .*Tribulus terrestris*, Linn. is a plant whose fruit, leaves, stem, and root are used medicinally .The fruits range in color from green to grey or yellow, with a taste that is somewhat acidic and a subtly aromatic scent. On the other hand, the roots have a light brown hue, a sweetish-astringent flavor, and a fragrant smell.[17]

Fig.1.5:- GokhruPowder **Fig.1.6:-Gokhru Plant**

T. terrestris is used in Ayurvedic multi-herbal formulations, which have strong adaptogenic effects. It was discovered that the multi-herbal preparation reversed stress-induced paradigms. Antimicrobial activity of Tribulusterrestris: Depending on the plant portion used and its origin, T. terrestris has different levels of bacterial activity. While T. terrestris from Yeman has no discernible antibacterial action against any of the reference bacteria, the ethanolic extract of the fruit and leaves of the Indian herb exhibits activity against S. aureus and E. coli. The same herb, which is grown in Iran, possesses antibacterial properties in its methanolic extract. The herb's spiro -saponins are said to be responsible for the activity. [18]

Table-01

Language	*Tribulus terrestris*	*Pedalium murex* [16]
English	Calotrops fruits [17], calthrops, small caltrops [18,19], Land caltrops, puncture vine [13]	Large Caltrops
Hindi	Gokhru [20,21], Gokshri, Burrokhur	Bara Gokhru, Fareed buti, Dakshini Gokshur
Sanskrit	Shvadanstra, Traikantaka, Gokshuru, Bahkanataka	Brihata Gokshur
Arabic	Khask, Kharakhusk, Zufratulajooz [14], Hamasulameer, Kohuj	kHasake-Kabir
Urdu	Gokharu	Gokharu
Marathi	Sarate, Gokharu, Lahanogokharu, Sarala, Sharatte, Lahangokhru	Mothe Gokharu
Bengali	Gokshura, Gokhri, Gokhru, Gokhura, Gokshra, Gokhuri	Bad gokhru
Gujarati	Nahannagokharu, Mithagokhru, Betagokhru	Oobha Gokhru, Mhyota Gokhru, Kadawa Gokhru
Punjab	Gokhrudesi, Lotak, Kurkundai	Gokru Kalan

2.2 Nephroprotective role of Gokhru:

Gokhru (Tribulusterrestris), also known as **puncture vine**, is a plant used in traditional medicine systems like Ayurveda and Traditional Chinese Medicine for its various health benefits. It is known for its potential nephroprotective properties, which means it can help protect the kidneys from damage.[19]

Antioxidant Properties: Free Radical Scavenging: Gokhru contains compounds like saponins, flavonoids, and alkaloids that exhibit antioxidant properties. These compounds help neutralize free radicals and reduce oxidative stress, which is a significant factor in kidney damage.**Reduction of Lipid Peroxidation**: The antioxidants in Gokhru can help reduce lipid peroxidation, a process that can damage cell membranes and contribute to kidney injury.

Anti inflammatory effect: Reduction of Inflammation: Gokhru has been shown to have anti-inflammatory effects that can help mitigate inflammation in the kidneys. Chronic inflammation is a common pathway for kidney damage and dysfunction. **Cytokine Modulation**: Some studies suggest that Gokhru can modulate inflammatory cytokines, reducing their levels and thereby minimizing kidney inflammation.[20]

Diuretics action: Enhanced Urine Production: Gokhru has natural diuretic properties, which can help in promoting the elimination of excess fluids and waste products from the body. This can be beneficial in managing conditions like edema and preventing fluid overload that could stress the kidneys. **Improved Renal Function**: By supporting the removal of toxins and excess fluids, Gokhru helps in maintaining optimal kidney function.

Renal tissue protection: Preventing Cellular Damage: Gokhru may help protect renal cells from damage caused by various nephrotoxins, such as those from medications, environmental pollutants, or infections. **Support for Kidney Repair**: The herb may support the regeneration of damaged kidney tissues and enhance overall kidney health.

Regulation of B.P.: Managing Hypertension: By aiding in fluid balance and potentially influencing vascular health, Gokhru may help in controlling blood pressure. High blood pressure is a significant risk factor for kidney damage and chronic kidney disease.

Clinical Animal Studies: Research on animal models has shown that Gokhru can reduce markers of kidney damage and improve kidney function in cases of induced nephrotoxicity. **Human Studies**: While more clinical trials are needed, some studies suggest that Gokhru has potential benefits in managing kidney health and preventing damage.[21]

2.3 Nephroprotective function:

The fundamental benefit of medicinal plants is their abundance in antioxidants, which are mostly found in the form of carotenoids, ascorbic acid, and phenolic compounds (flavonoids, phenolic acids, tocopherols, and tocotrienols). By lowering lipid peroxidation and raising endogenous antioxidant levels, these compounds protect the kidneys from injury.Consequently, it is crucial to supplement with antioxidants produced from medicinal plants in order to reduce the free radical pathologies associated with CKD [22]. Nonetheless, research indicates that natural whole foods, as opposed to individual antioxidants or their mixtures, are more able to prevent or treat renal The ability of medicinal herbs to reduce inflammation is a key mechanism of nephroprotection. Through the modulation of inflammatory processes, substances present in medicinal plants, such as resveratrol and curcumin, have demonstrated promising effects in nephroprotection [23]. Furthermore, it's possible that additional pharmacologic properties, like diuresis, immunomodulation, decreased proteinuria, and activation of renal repair mechanisms, could impede the advancement of kidney-related diseases into later stages of the disease. Nephroprotection is greatly enhanced by the antioxidant, anti-inflammatory, and diuretic qualities of polyphenols present in medicinal plants [24].

3.1-*Butea mono sperma*: (Palash)

Palash, also known as Flame of the Forest, Its botanical name is Buteamonosperma. It has Anti-inflammatory,Antimicrobial, Antioxidant, Wound Healing, Anti-diabetic, Anti-cancer etc.[25]

Chemical Constituents present :

1. **Flavonoids:** Flavonoids are abundant in Palash flowers and contribute to their antioxidant properties. Examples include:

- Butein
- Isobutrin
- Isobutein
- Butein-diglucoside

2. **Chalcones**: These compounds are characteristic of Palash flowers and have various biological activities. Examples include:[26]

- Chalconaringenin
- Isoliquiritigenin
- Butin

3. **Tannins:** Palash flowers contain tannins, which contribute to their astringent properties and may have antimicrobial effects.
4. **Sterols:** Sterols are lipid-like compounds found in plants and have potential health benefits. Examples include β-sitosterol and stigmasterol.
5. **Saponins:** These compounds have detergent-like properties and may contribute to the medicinal properties of Palash flowers.
6. **Glycosides:** Palash flowers may contain various glycosides, which can have diverse pharmacological activities.
7. **Alkaloids:** While not as abundant as in some other plant species, Palash flowers may contain trace amounts of alkaloids.
8. **Phenolic compounds**: Phenolic compounds contribute to the antioxidant properties of Palash flowers and may have other health benefits.
9. **Carotenoids**: These compounds are responsible for the vibrant orange to red color of Palash flowers and may have antioxidant properties.
10. **Essential oils**: Palash flowers may contain small amounts of essential oils, which can contribute to their aroma and may have therapeutic effects[27].

Chemical Test:

1. **Flavonoids and Chalcones: Shinoda Test**: Prepare a solution of Palash flower extract in ethanol. Add a few drops of concentrated hydrochloric acid followed by a piece of magnesium ribbon. A pink to red coloration indicates the presence of flavonoids and chalcones.
2. **Saponins:** Froth Test: Shake a solution of Palash flower extract vigorously with water. The formation of a stable froth indicates saponins.
3. **Phenolic Compounds:** Ferric Chloride Test: Prepare a solution of Palash flower extract in water. Add a few drops of 5% ferric chloride solution. Formation of a blue, green, or purple coloration indicates the presence of phenolic compounds.
4. **Carotenoids:** Xanthoproteic Test: Dissolve Palash flower extract in concentrated nitric acid. Formation of a yellow coloration indicates the presence of carotenoids.[28]

Extraction of Active Compounds: The first step involves extracting bioactive compounds from Palash flowers. Common extraction methods include maceration, percolation, or Soxhlet extraction using suitable solvents such as ethanol, water, or a combination of both. The extract obtained should be standardized to ensure consistent potency and efficacy.[29]

1. **Standardization and Quality Control**: It's essential to standardize the Palash flower extract to ensure consistent levels of bioactive compounds from batch to batch. Quality control measures should be implemented to assess the purity, potency, and safety of the formulation.
2. **Clinical Evaluation**: Before introducing the formulated product to the market, it's advisable to conduct preclinical and clinical studies to evaluate its safety, efficacy, and pharmacokinetic profile. Clinical trials should be designed to assess the effects of the Palash flower formulation on kidney function parameters in individuals with renal disorders.
3. **Regulatory Compliance**: Ensure compliance with regulatory guidelines and requirements governing the manufacturing, labeling, and marketing of herbal products. Obtain necessary approvals and certifications from regulatory authorities before commercialization.[30]

Pharmacological effects:

1. **Nephroprotective Effects**: Studies have examined the potential nephroprotective effects of Palash flower extracts in animal models of kidney injury or renal disorders. These studies typically evaluate parameters such as renal function, histopathological changes in the kidneys, oxidative stress markers, and inflammatory markers.[31]
2. **Diuretic Effects**: Some animal studies have explored the diuretic effects of Palash flower extracts, which could have implications for kidney function and fluid balance. These studies typically assess urine volume, electrolyte excretion, and other parameters related to renal function.
3. **Hepato protective Effects**: Although not directly related to kidney function, some animal studies have examined the hepatoprotective effects of Palash flower extracts, which could indirectly benefit overall health and potentially influence kidney function.[32]

Palash flower extracts for specific therapeutic indications, including kidney-related disorders. Analytical tests for Palash flower formulations typically involve assessing various parameters such as phytochemical composition, purity, stability, and physical characteristics.

Here's an outline of some common analytical tests along with a suggested graph:

1. Identification of Phytochemical Constituents: High-performance liquid chromatography (HPLC), GC-MS, LC. For example, flavonoids, phenolics, and other bioactive compounds can be analyzed using these techniques.

   Graph: A chromatogram showing the peaks corresponding to identified phytochemical compounds along with their retention times or mass spectra intensity.[33]
2. Total Phenolic and Flavonoid Content: Spectrophotometric assays such as the Folin-Ciocalteu method and aluminum chloride colorimetric assay can be employed to determine the total phenolic and flavonoid content in Palash flower formulations, respectively.
3. Graph: Bar chart comparing.
4. Antioxidant Activity: Palash flower formulations.

   Graph: A dose-response curve showing the percentage inhibition of DPPH radicals or the antioxidant capacity (in Trolox equivalent antioxidant capacity, TEAC) of Palash flower formulations at different concentrations.[34]
5. Moisture Content: The moisture content of Palash flower formulations can be determined using gravimetric methods such as loss on drying (LOD) or Karl Fischer titration.

   Graph: Bar chart comparing the moisture content (%) of different Palash flower formulations.
6. Particle Size Analysis: Particle size distribution and morphology of Palash flower extracts or powders can be determined using techniques like laser diffraction or microscopy.

Graph: Particle size distribution histogram showing the frequency (%) of particles within different size ranges.

7. Stability Studies: Accelerated stability testing can be performed to assess the stability of Palash flower formulations under various conditions (e.g., temperature, humidity) over time.[35]

Palash flower (Butea mono sperma) extract has been investigated for its potential pharmacological properties, including its effects on kidney function. Palash flower extract may have nephroprotective effects, further research, particularly clinical trials in humans, is needed to confirm its efficacy and safety for regulating kidney serum protein and creatinine levels. That said, here's a theoretical outline of the potential role of Palash flower extract in a pharmaceutical syrup formulation aimed at regulating kidney serum protein and creatinine:[36]

1. Nephroprotective Properties: Palash flower extract contains bioactive compounds with antioxidant, anti-inflammatory, and nephroprotective properties.
2. Regulation of Serum Protein Levels: Abnormalities in serum protein levels, such as hypo-albuminemia (low albumin levels), may occur in kidney disease due to impaired filtration and loss of proteins through the urine. Palash flower extract may help regulate serum protein levels by preserving kidney function and reducing proteinuria (excessive protein loss in the urine).[37]
3. Modulation of Creatinine Levels: Elevated serum creatinine levels may indicate impaired kidney function. Palash flower extract may help regulate creatinine levels by supporting renal function and enhancing creatinine clearance.
4. Pharmaceutical Syrup Formulation: A pharmaceutical syrup formulation containing Palash flower extract can be developed for oral administration. The formulation may include standardized Palash flower extract along with suitable excipients to enhance stability, palatability, and bioavailability.[38]
5. Dosage and Administration: The dosage of Palash flower extract in the syrup formulation should be determined based on preclinical and clinical studies evaluating its efficacy and safety. The syrup can be administered orally, with the dosage and frequency adjusted according to individual patient characteristics and response to treatment.
6. Clinical Evaluation: Clinical trials should be conducted to evaluate the efficacy and safety of the Palash flower extract syrup formulation in patients with kidney disorders, particularly those with abnormalities in serum protein and creatinine levels. Parameters such as serum protein levels, serum creatinine levels, proteinuria, and renal function should be monitored during the trial.[39]
7. Regulatory Considerations: The development and marketing of the Palash flower extract syrup formulation should comply with regulatory guidelines and requirements for pharmaceutical products. This includes conducting preclinical studies, clinical trials, and obtaining regulatory approvals from health authorities.[40]

4.1 MATERIAL AND METHODOLOGY:

Table:2 Ingredients list

S. NO.	INGREDIENT	QUANTITY
01	GOKHARU	10GM
02	PUNARNAVA	10GM
03	PALASH	03GM
04	ETHENOL	250ML

05	**DEXTROSE**	**66.6GM**
06	**ETHYL PARABEN**	**0.5ML**
07	**METHYL PARABEN**	**0.5GM**

Method of preparation of herbal syrup:

Step-01- Extraction of medicinal herb:

1. First wt. all above herbs powder at given quantity.
2. After this, 250ml ethanol has to be taken by using the measuring cylinder.
3. Mixed all the ingredients.
4. This mixed solution transferred to a the round bottom flask
5. Then started distillation extraction procedure.
6. After that leave for extraction for 48 hours
7. We got the extracted liquid.
8. This extraction has to be filtered and then cool.[41]

Step-02-Preparation for simple syrup:

9. Take 66.6gm of dextrose powder.
10. Then add on the 35ml water, then mixed together.
11. After 12hrs formulation of simple sugar syrup solution .
12. Add herbal extraction as per ratio.
13. Then added preservatives Methyl paraben [42]

Fig-1.7. Gokharu powder

Fig.-1.8 Dried stem of Punarnava

Fig.-1.9 Dried flower powder of Palash

Fig-1.10 Mixture of Herbs and Ethenol

Mix solution:

Fig-1.11. Simple syrup

Fig-1.12 Extraction Procedure

Fig-1.13 Herbal extraction

Fig-1.14 Final Herbal syrup

Fig-1.15. Empty specific Gravity bottle

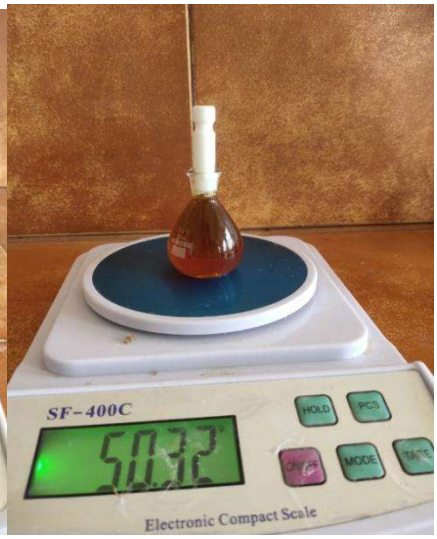

Fig-1.16. Density Test

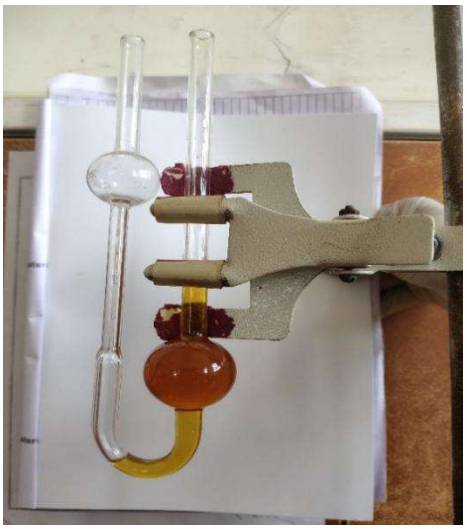

Fig-1.17. Viscosity Test

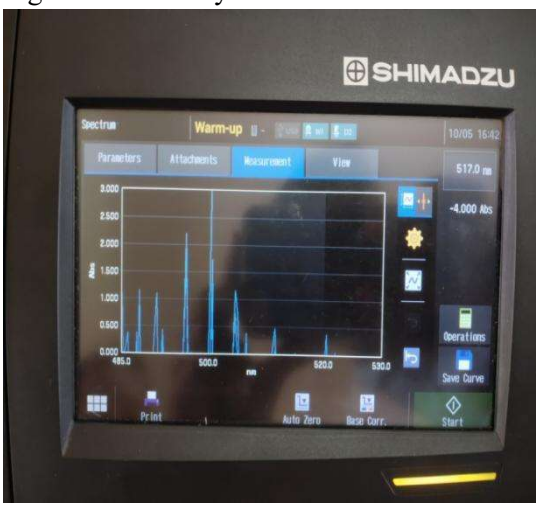

Fig-1.18. UV Absorbance

Result for evaluation parameter:

Table:3

S.no.	Parameters	Standard value	Value
1.	Density	3.3gm/ml	1.1gm/ml
2.	Viscosity	10.85 cps	12.98 cps
3.	UV absorbance	517nm	520nm

Flavanoid Tests of sample :

Table:4

Test	Observation	Inference
1. Shinoda test	Positive	Flavonoid present
2. Alkali reagent test	Positive	Flavonoid present
3. Sulphuric acid test	Positive	Flavonoid present
4. Lead acetate test	Positive	Flavonoid present

Alkaloids Test of Standard Compound :

Table-5

Test	Observation	Inference
1. Mayers Test	Negative	Alkaloid Absent
2. Wagner's Test	Negative	Alkaloid Absent
3. Hager's Test	Negative	Alkaloid Absent
4. Dragndorffs Test	Negative	Alkaloid Absent

Fig-1.19. Flavonoid Test

Fig-1.20. Alkaloid Test

CONCLUSION:

Nephroprotective effects of *Boerhaavia diffusa L, tribulus terrestris, & butea mono sperma* crude extract against various drug induced nephrotoxicity models and have suggested *poly herbs* to be an effective plant based therapeutic for amelioration of renal damage.[43] However, the specific mechanisms governing these therapeutic effects and similarities and or differences in their mode of action under both in vivo and in vitro conditions are yet to be studied in detail. Additionally, isolation and purification of new bioactive compounds with therapeutic properties have to be further explored in order to utilize the medicinal properties

of *poly herbs* to the fullest.[44] Punarnava is a valuable herb in traditional medicine with potential benefits for kidney health and management of nephrotoxicity. While traditional uses are well-documented, more research is needed to fully understand its efficacy and mechanisms. As with any herbal remedy, it's important to use it under the guidance of a qualified healthcare provider, especially when dealing with conditions like nephrotoxicity. [45] Punarnava's diverse chemical profile underpins its traditional use in renal health and other therapeutic applications. The synergy of these compounds contributes to the herb's effectiveness in promoting kidney function and managing nephrotoxicity. However, while the chemical constituents offer insights into its potential benefits, further research is needed to fully understand their interactions and therapeutic efficacy.[46] Gokhru (Tribulus terrestris) demonstrates potential nephroprotective effects through its antioxidant, anti-inflammatory, and diuretic properties. It may help protect the kidneys from damage and support overall renal health. However, while traditional use and preliminary research support these benefits, further clinical studies are needed to fully understand its efficacy and safety.[47] As always, it's best to use Gokhru under the guidance of a qualified healthcare professional, particularly if you have existing kidney conditions or are on other treatments. Palash flower (Buteamonosperma) shows potential nephroprotective properties due to its antioxidant, anti-inflammatory, and diuretic effects. While traditional uses support its benefits, more scientific research is needed to fully validate its efficacy in protecting kidney health. [48] As always, it is important to use Palash flower under the guidance of a qualified healthcare professional, particularly if you have existing kidney conditions or are using other medications.

Fig-1.21 Os drug dose t.i.d.

Fig-1.22 Section division for organs effect

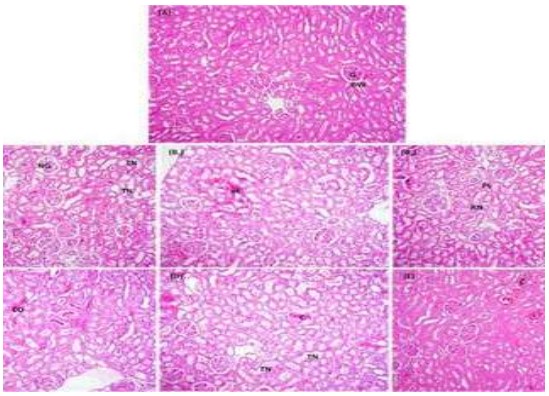

Fig-1.23- TS of ckd infected kidney

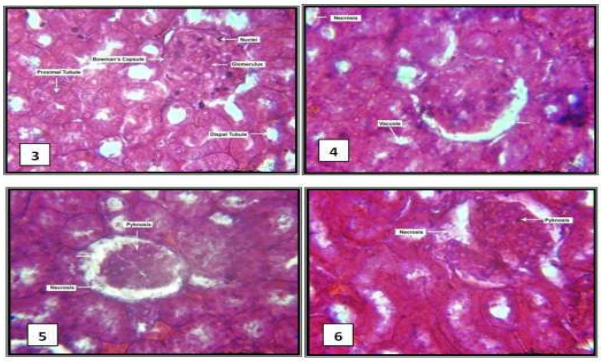

Fig-1.24- TS of after taking herbal formulation os.

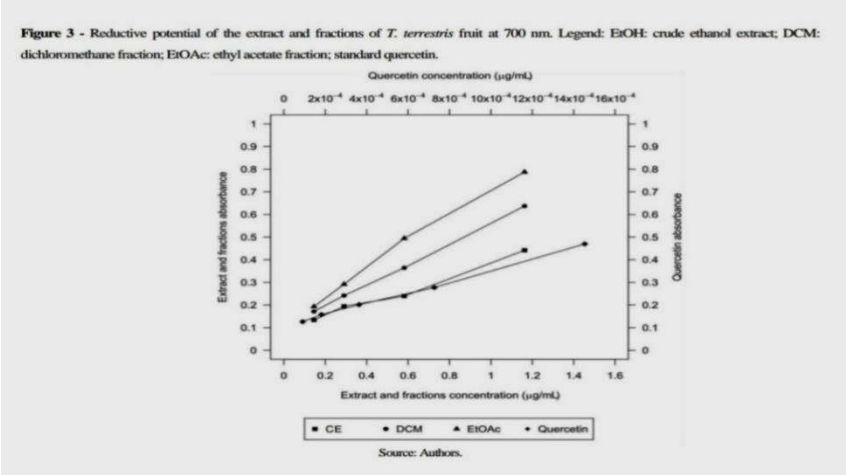

Fig-1.25 Gf

Boerhaavia diffusa L, tribulus terrestris, &butea mono sperma can be considered a life-saver for individuals with chronic kidney disease.[49] Its rejuvenating effects on damaged kidney cells make it a valuable addition to Ayurvedic treatment options for CKD patients. Remember that Ayurvedic practices should always be discussed with a qualified healthcare professional to ensure safe and effective use.[50]

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