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An overview of Flueggea leucopyrus: Physical attributes, Phytochemical composition, and Pharmacological activity.

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ABSTRACT: Natural medicines have been gaining popularity again recently because they are nontoxic. The quality and quantity of chemical constituents in medicinal plants determine their therapeutic efficacy. The misidentification of natural products or herbal medicines is the first step towards their misuse. The most frequent mistake is calling two or more completely distinct species by the same colloquial name. Pharmacognostic identification of medicinal plants, which is necessary to establish uniform standards for medicinal plants, can resolve the issues. Flueggea leucopyrus Willd (Phyllanthaceae), also referred to as "katupila" locally, is a plant that has been used extensively in complementary and alternative medicine for a long time. It has also been used extensively in traditional medicine.The present study would provide the helpful information on description, phytochemistry, physical characteristics and pharmacological activity of the plant.

Key words :Flueggea leucopyrus, nontoxic, therapeutic efficacy, pharmacological activity

I. INTRODUCTION

A shrub known as Flueggea leucopyrus Willd is found throughout Sri Lanka's dry zones. The traditional medical system has utilised F. leucopyrus leaves to treat cancer. In Ayurveda, Katupila (Flueggea leucopyrus) is also called Sharapunkha and Heen Katupila (Flueggea leucopyrus). It is also known by its scientific name, Flugguea leucopyrus. In addition, it goes by other names like Slihashatru, Kantapunka, Kantalu, Kalika, and so on. This plant is a member of the Euphorbiaceae genus. This plant can be found growing on sandy beaches up to 150 metres above sea level in many parts of South India. However, Flueggea leucopyrus, or katupila, is a remedy for a wide range of illnesses besides cancer. This plant, called a katupila (Flueggea leucopyrus), typically reaches a height of 3 to 4 feet. Its leaves are round and green in colour. The flowers resemble peppercorns in size and have a pale green colour. The tiny seeds resemble mustard seeds. Even though the plant is called Katupila (Flueggea leucopyrus), it does not have thorns that sharp. Understanding the relationship between a plant's phytoconstituents and bioactivity is important for the synthesis of compounds with particular therapeutic properties for a range of illnesses, including chronic diseases.3. More scientific research on medicinal plants is needed in order to better understand the potential of these remedies and to encourage the public to use them. This is especially true of the plants that have been used as traditional medicines and as folk medicine.[1]

In vitiated Pitta conditions, the plant is sweet, cooling, diuretic, aphrodisiac, and tonic, useful for burning sensations, strangury, seminal weakness, and general debility. The tribes use the paste from the leaves as an antiseptic and disinfectant to remove any unnecessary materials from body tissues without the need for surgery. Traditional medicine has utilised plant preparations to treat kidney stones, mental illness, diarrhoea, gonorrhoea, constipation, bowel complaints, cough, hay fever, and disinfections. The leaves are also applied to treat fibroids and piles. The roots are used to cure oedema and treat enlargement of the testicles.The entire plant is used to treat cancer in the foot sole. Additionally, it is used to treat liver hypertrophy, portal hypertension, and abdominal lumps. Tooth ache is treated with the bark of the stem.[2]

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PLANT PROFILE

Taxonomy

Kingdom	Plantae
Phylum	Tracheophyte
Class	Equisetopsida C.GARDH
Order	Malpighiales Juss.ex Bercht & J.Presl
Family	Phyllanthaceae
Genus	Flueggea
Species	Fluggea leucopyrus Wild

Common Names

English	• Spinous fluggea
Hindi	• Hartho • ऐंटा Ainta
Konkani	• Parpo
Malayalam	• Amboorippachila • Mulpulanji • Perimklavu • Vellamullaram • ചെരിംക്ലാവ് Cerimklaav
Marathi	• पांढरफळी Pandharphali
Other	• Bushweed • Cool Pot • Indian Snow Berry • Poolie • Pulanji • Thermacole Plant • White Honey Shrub
Sanskrit	• पान्डुफली Panduphali • भूरिफली Bhuriphali • श्वेतकम्बुज Shwetakambuja
Tamil	• Madhuppullaanthi • Vellaipoola • வறட்பூலா Varat-pula • ள்ளைப்பூலாஞ்சி Vellai-p-pulanci
Telugu	• పులుగుడు Pulugudu

Morphology

Field Tips
Branches arrested, stiff, thorn like.
Flower
Female flowers sub solitary, male flowers in clusters, greenish. Flowering from February-May.
Fruit
A capsule, white when ripe. Seed 1, globose. Fruiting from April-November.

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Leaf Apices
Obtuse
Leaf arrangement
Alternate
Leaf Bases
Cuneate
Leaf Margins
Entire
Leaf Shapes
Elliptic
Leaf Types
Simple
Habit
An armed large shrub.

Description

- Erect, rigid, much branched shrubs up to 5 m tall; branchlets angular, slender, usually ending in sharp spines.
- Leaves alternate, obovate to elliptic, up to 2.5 x 1.5 cm, acute or cuneate at base, emarginated at apex.
- Male flowers in axillary fascicles, greenish yellow; female solitary. Perianth lobes 5.
- Stamens 5, free. Disc of 5 glands alternating with the stamens.
- Pistilode 3-fid. Fruits globose, ca 5 mm across, 3-celled, white when ripe.
- Seeds trigonous, smooth, pale brown.
- Flowering & Fruiting: May – September.[3]

Fig no1:Fruits of Flueggea leucopyrus Fig no 2:Flower of Flueggea leucopyrus

Fig no 3 :Whole plant of Flueggea leucopyrus

MEDICINAL BENEFITS OF KATUPILA (Flueggea leucopyrus)

Regarding its therapeutic qualities, katupila (Flueggea leucopyrus) has a bitter taste. Its qualities are sharp, woodsy, and brief. In addition, leaves from the katupila plant (Flueggea leucopyrus) are used to make a delectable porridge. You can also eat this Katupila (Flueggea leucopyrus) leaf with dhal in a curry. Moreover, thorns can be used to

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turn leaves into mallows. Flueggea leucopyrus, or katupila, tea is now available for purchase as a natural anti-cancer beverage.

- **To cancer:** The essence of the Katupila (Flueggea leucopyrus) tree panchanga is to drink it with honey. In this porridge, it is better to add curry leaves, two children, samanpichcha leaves and kuburu leaves.
- **For intestinal ulcers:** It is better to take the leaves of the thorn bush and the leaves of the tree stalks evenly and boil it in a pan and squeeze the juice and drink it with honey in the morning.
- **For uterine fibroids in women:** The fruit can be diluted by drinking the extract of Katupila (Flueggea leucopyrus) root and Pota vine juice with raw turmeric juice.
- **For hemorrhoids:** Take a handful of Katupila (Flueggea leucopyrus) leaves and half a handful of hemp leaves and grind it and drink it with buffalo milk.
- **For liver cancer and nuts:** Katupila (Flueggea leucopyrus) decoction with pepper powder is used in Ayurveda for this purpose.
- **For cancers of the lower back:** It is advisable to grind the leaves, bark, flowers and roots of the Katupila (Flueggea leucopyrus) tree with yellow salt.

Thus, katupila (Flueggea leucopyrus) is a herb with special qualities that can eradicate cancer, making it a popular cure in our nation and around the world. For this reason, the panchanga of this plant is used in both Hela Veda and Ayurveda to treat a variety of illnesses. Unfortunately, there isn't much research available on many medicinal plants, including this one. It is quite regrettable that the Katupila (Flueggea leucopyrus) plant, which has previously been demonstrated to have strong anti-cancer effects in Hela Wedaka, has not been the subject of formal research.

PHYSICAL CHARACTERISTICS OFFlueggea leucopyrusLEAVES

- **Determination of swelling index**

Introduce the specified quantity (1 gm) of the F. leucopyrus leaf powder, previously reduced to the required fineness and accurately weighed, into a 25-ml glass-stoppered measuring cylinder. The internal diameter of the cylinder should be about 16 mm, the length of the graduated portion about 125 mm, marked in 0.2 ml divisions from 0 to 25 ml in an upwards direction. Add 25 ml of water and shake the mixture thoroughly every 10 minutes for 1 hour. Allow to stand for 6 hours at room temperature. Measure the volume in ml occupied by the herbal material, including any sticky mucilage. Calculate the mean value of the individual determinations, related to 1 g of herbal material.

- **Determination of foaming index**

Reduce about 1 g of the herbal material to a coarse powder, weigh accurately and transfer to a 500-ml conical flask containing 100 ml of boiling water. Maintain at moderate boiling for 30 minutes. Cool and filter into a 100-ml volumetric flask and add sufficient water through the filter to dilute to volume. Pour the decoction into test-tubes and adjust the volume of the liquid with water to 10 ml. Stopper the tubes and shake them in a lengthwise motion for 15 seconds, two shakes per second. Allow to stand for 15 minutes and measure the height of the foam. The results are assessed as follows: If the height of the foam in tube is less than 1 cm, the foaming index is less than 100. If the height of the foam is more than 1 cm, the foaming index is over 1000. In this case repeat the determination using a new series of dilutions of the decoction in order to obtain a result. Calculate the foaming index using the following formula:

1000/a

Where, a = the volume in ml of the decoction used for preparing the dilution in the tube where foaming to a height of 1 cm is observed.

- **Water solubility index (WSI) and Water absorption index (WAI)**

Take 2.5 g of plant powder in a 50-mL centrifuge tube and add 30 mL of distilled water to it at 30 °C and stir intermittently for 30 min. Then centrifuge for 10 min at 5100 × g. Pour the supernatant carefully into a Petri dish and then allow both supernatant and pellet to dry overnight .

WSI = Amount of the solid in the dried supernatant / Weight of plant powder

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WAI = Weight of dry solid / Weight of plant powder

- **Bulk density**

It is the ratio of given mass of powder and its bulk volume. It is determined by transferring an accurately weighed amount of powder sample to the graduated cylinder with the aid of a funnel. The initial volume was noted. The ratio of weight of the volume it occupied was calculated
Bulk density=W/V0 g/ml
Where, W = mass of the powder,
V0 = untapped volume

- **Tapped density**

It is measured by transferring a known quantity (2g) of powder into a graduated cylinder and tapping it for a specific number of times. The initial volume was noted. The graduated cylinder was tapped continuously for a period of 10-15 min. The density can be determined as the ratio of mass of the powder to the tapped volume.
Tapped volume= W/Vf g/ml
Where, W = mass of the powder,
Vf = tapped volume.

- **Compressibility index**

It is the propensity of the powder to be compressed. Based on the apparent bulk density and tapped density the percentage compressibility of the powder can be determined using the following formula.
Compressibility index = [(v0-vf)/v0] x 100
or
% Compressibility = [(tapped density – bulk density)] / tapped density] x 100
Where, v0 = tapped density
Vf = bulk density

- **Hausner ratio**

It indicates the flow properties of the powder. The ratio of tapped density to the bulk density of the powder is called Hausner ratio
Hausner ratio= Tapped density/bulk density

- **Angle of repose**

The internal angle between the surface of the pile of powder and the horizontal surface is known as the angle of repose. The powder is passed through funnel fixed to a burette at s height of 4 cm. A graph paper is placed below the funnel on the table. The height and the radius of the pile were measured . Angle of repose of the powder was calculated using the formula
Angle of repose= $\tan^{-1}(h/r)$
Where, h=height of the pile,
r = radius of the pile

- **Determination of pH range**

The powder sample of Flueggea leucopyrus was weighed to about 5g and immersed in 100 ml of water in a beaker. The beaker was closed with aluminum foil and left behind for 24 hours in room temperature. Later the supernatant solution was decanted into another beaker and the pH of the formulation was determined using a calibrated pH meter.[4]

Result

Test	Results
Swelling index	0.8cm
Foaming index	Less than 100
Water solubility index	14.8±0.8
Water absorption index	10.9±0.2
Bulk density (g/ml)	0.66
Tapped density(g/ml)	0.80
Hausners ratio	1.21
Compressibility index (%)	15.5
Angle of repose (^{0})	26.7
pH value	5.9

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PRELIMINARY PHYTOCHEMICAL SCREENING

Phytochemical screening of petroleum ether, chloroform and methanol extracts were done by standard procedure.

Results

Table no 1: Preliminary Phytochemical screening of different extracts of aerial parts of Flueggea leucopyrus Willd

Metabolites	Pet.Ether	Chloroform	Methanol
Alakaloid	-	-	+
Steroid	+	+	+
Phenol	+	+	+
Flavonoid	-	-	-
Saponin	+	+	-
Tannin	-	-	+
Anthraquinone	-	-	-
Terpenoid	-	-	-
Catechin	-	-	+
Carbohydrate	-	-	-
Cardiac glycoside	+	+	+
Coumarin glycoside	-	-	-

Petroleum ether extracts showed four metabolites such as steroid, saponin, phenol and cardiac glycoside. Chloroform extracts confirmed the presence of steroid, saponin, phenol and cardiac glycoside. Methanol extracts showed more bioactive compounds such as alkaloids, steroids, phenol, tannin, catechin and cardiac glycoside.[2]

PHARMACOLOGICAL ACTIVITY

Anti-oxidant assays

1. DPPH free radical scavenging assay

This assay is based on the ability of DPPH, a stable free radical, to decolorize in the presence of antioxidants. This is a direct and reliable method for determining radical scavenging action of plant extracts. Original DPPH solution is purple colour and it changed to yellow when plant secondary metabolites reduced it by donating electrons as hydrogen radical.The variation of percentage inhibition of DPPH free radical with the concentration of crude extracts of F.leucopyrus and ascorbic acid was recorded. According to that it exhibits concentration dependent DPPH free radical scavenging activity. IC50 is the concentration of plant extract where the response is reduced by half. The IC50 values were calculated for the extract and the standard by probit analysis using SPSS. Accordingly, plant extract and ascorbic acid gave the IC50 values of 402.58±3.97 µg/mL and 92.66±1.44 µg/Ml respectively, showing that moderate free radical scavenging activity of F.leucopyrus.

2. FRAP reducing assay

The FRAP assay treats the antioxidants contained in the samples as the reductants in a redox-linked colorimetric reaction and the value reflects the reducing power of the antioxidants (in whichantioxidant reacts with Fe3+ TPTZ and produce a coloured Fe2+ TPTZ complex. The formed Fe2+ TPTZ complex was measured using standard curve prepared with FeSO4.7H2O as given in Figure -5 in which y as the absorbance measured at 593 nm and x as the concentration of leave FeSO4.7H2O with the equation of $y = 0.0027x - 0.0547$, $R^2 = 0.9845$. The leaves showed FRAP value of148.65±11.91 µg/mL whereas ascorbic acid, the standard showed as 364.70±2.14 µg/mL. The results of FRAP assay further supports the moderate anti-oxidant capacity of the leaves.[1]

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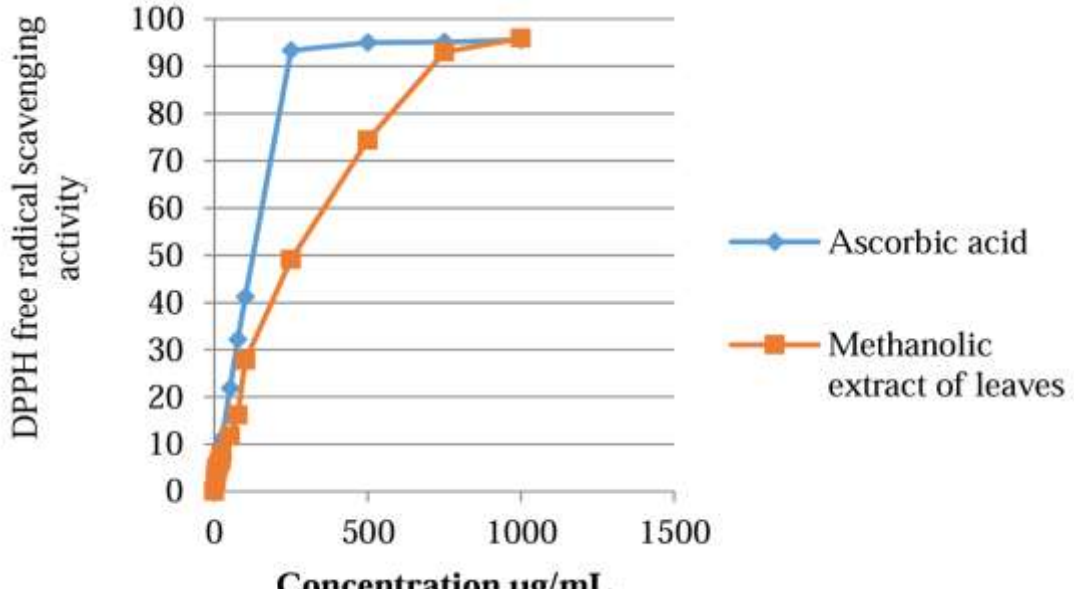

Table no 2: Concentration depend inhibition of DPPH

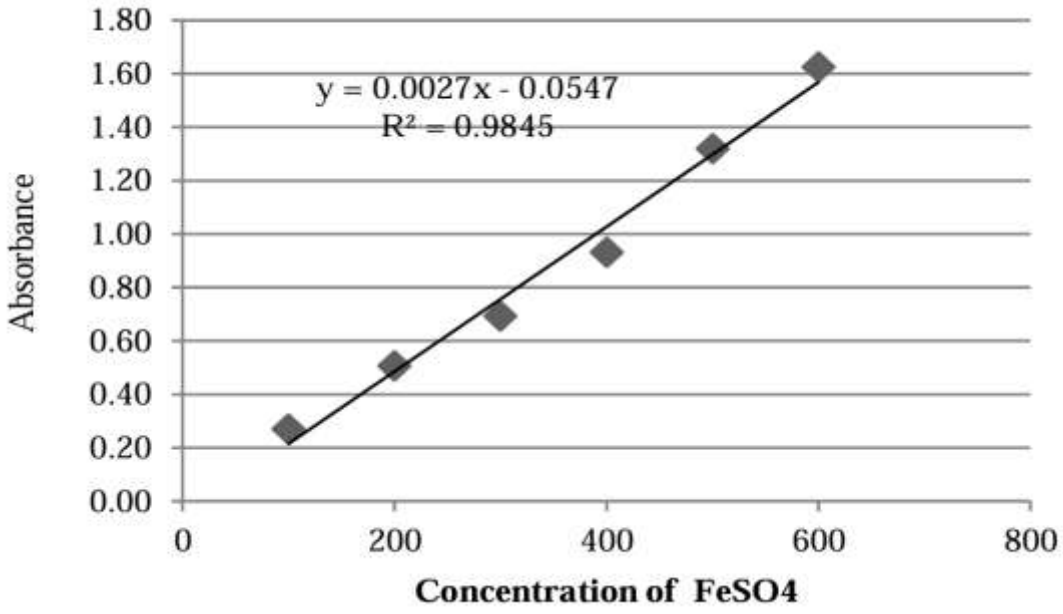

Table no 3: Standard curve of FeSO4

Anti-proliferative activity

1. MTT assay

Metabolically active cells reduce MTT (3, 4, 5-(dimethylthiazol-2-yl) 2-5-diphenyl tetrazolium bromide) to its purple colored formazan product and MTT assay was used to determine cytotoxicty of the AEFLL. The cells were treated with different concentrations of the extract and incubated for 24 hours at 37°C as described above. The culture medium was replaced with fresh medium and MTT assay was performed. The purple color product was measured at 570 nm.

Percentage cell viability = [1-Absorbance of treated cells/Absorbance of untreated cells]*100

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The net absorbance from the wells of the untreated cells (negative control) was taken as the 100% viability. Positive control was performed with camptothecin (5 mM, 20 µl).

Result

The cell viability after 24 hour treatment with the AEFLL was determined by MTT reduction assay. A dose response curve for the percentage of viable cells was obtained against the concentration. The EC50 value obtained for the mean of the four independent sample preparations was 506.80 ± 72.93 µg/mL. Positive control (camptothecin) showed 76.07 ± 1.72% growth inhibition at the concentration (5 mM, 20 µL) used.

2. LDH leakage assay

Lactate dehydrogenase is a cytosolic enzyme, which is released in to the surrounding culture medium upon cell lysis and used to assay cytotoxicity. The lactate dehydrogenase assay was performed to determine the rate of reduction of pyruvate to lactate by the enzyme Lactate Dehydrogenase. The NADH that remained in the mixture was used to calculate the enzyme activity. The cells were treated with different concentrations of the AEFLL and incubated for 24 hours as described previously. The LDH activity of the cell lysate and the culture supernatant of the cells which were treated with the plant extracts, were measured according to manufacturer's instructions (Randox LDH assay kit). Negative control and positive control with camptothecin (5 mM, 20 µl) were also carried out along with the experiment to measure the LDH leakage. The absorbance was measured at 340 nm at intervals of 15 seconds for 1.5 minutes using an air blank. The rate of decline in NADH (gradient) concentration was used to calculate the LDH activity in the supernatant and the lysate.

Percentage cytotoxicity = [1−LDH activity of the supernatant/Total LDH activity]* 100

The total LDH activity is equal to the sum of the LDH activity obtained for the culture supernatant and cell lysate.

Result

A dose dependent increase in LDH release to the culture media was observed at concentrations up to 600 µg/mL and a decline of LDH release was shown over 700 µg/mL. Further it was observed that there was a decrease of enzyme activity in culture media as well as in the lysate at higher concentrations. The mean EC50 of the percentage cytotoxicity over 24 hour exposure to the plant extract was 254.52 ± 42.92 µg/mL. The percentage LDH found in the supernatant of negative control and the positive control with camptothecin were 24.62 ± 6.21 and 50.51 ± 7.67% respectively. The data indicate that, compared to the negative control, there is no significant increase ($p > 0.05$) in LDH release at a concentration of 100 µg/mL.[6]

Antifungal assay

The dried fruit materials were pulverized into fine powder using a grinder (mixer). About 40gm of powdered fruit was extracted successively with 200 ml of hexane (62-66°C), chloroform (60-62°C) and methanol (56-60°C) in Soxhlet extractor until the extract was clear.

The paper disc diffusion method was used to determine the antifungal activity of the extracts . Sterile discs were impregnated with 60 µl of each extract at concentration of 100 mg/3ml. A 100 µl of fungal culture/spore was spread onto the surface of potato dextrose agar medium. Immediately, fungal extract discs and positive and negative control discs were placed onto the surface of the potato dextrose agar plate by using sterile forceps. Amphotericin - B (100 units/disc), Clotrimazole (10 mcg/disc), Ketoconazole (10 mcg/disc) were used as positive control. Paper disc treated with 50% methanol was used as negative controls. The plates were incubated at 30o C for 48-72 hrs. The millimeter of inhibition zone around each of the disc was measured at the end of the incubation time. Experiments were performed in triplicate and the antifungal activity was expressed as the average of millimeters of the inhibition zone produced by the test extracts.

Result

The antifungal activity of hexane extract showed maximum inhibition zone of 22.3 mm against A. niger, 14.3 mm against A. fumigateus and 8.3 mm against A. flavus. Hexane extract showed an effective antifungal activity when compared with control antifungal agent (Amphotericin-B (16.3 mm, 12 mm and 12.3 mm) and Clotrimazole (20.3 mm, 25.6 mm and 25.3 mm) Aspergillus niger, Aspergillus fumigateus and Aspergillus flavus respective strains). Chloroform extract displayed refusal anti-fungal activity against all the tested plant pathogenic fungi.

The methanol extract showed significant antifungal activity against A. fumigateus (23.3 mm), A. flavus (17.3 mm) and A. niger (16 mm)

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were documented. Methanolic extract showed an effective antifungal activity when compared with control antifungal agent (Amphotericin-B 12 mm, 12.3 mm, 16.3 mm). Methanolic extract exhibit significant antifungal activity and the result also near to the zone produced by the (Clotrimazole 25.6 mm, 25.3mm, 20.3 mm and Ketoconazole 29.6 mm, 26.3 mm, 24.6 mm) control antifungal agents. There was absence of zone production by the methanolic control. Among the three extracts, the methanol extract showed potent antifungal activity by inhibiting the growth of all the tested plant pathogenic fungi.[7]

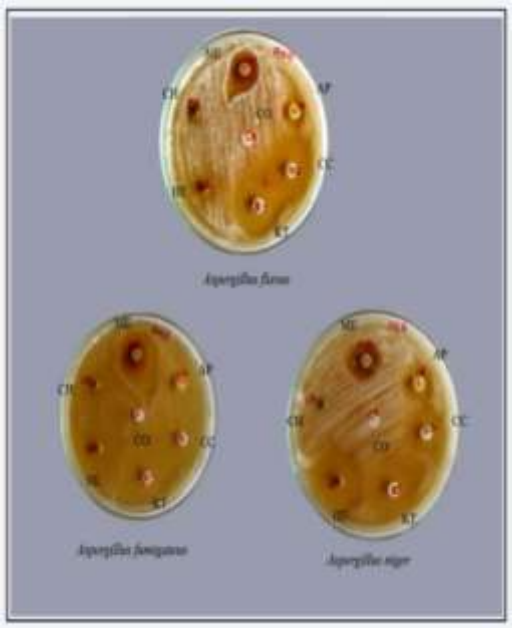

Fig no 4 : Effect of F. leucopyrus fruit extraction on Aspergillus fungus by disc diffusion method. HE-Hexane, CH-Chloroform, ME-Methanol, AP-Amphotericin, CC-Clotrimazole, KT-Ketoconazole, CO-Negative control.

Anti-Diabetic Activity

1. In Vitro α-Amylase Inhibitory Activity.

Inhibition of α-amylase activity by the aqueous extract of Flueggea leucopyrus Willd was carried out. α-Amylase (5 U/mL, 1.0 mL) was mixed with plant extract (0.025–4.0 mg/mL, 1.0 mL) and phosphate buffer (20 mM, pH 6.9, 1.0 mL) and incubated at 32°C for 10 minutes. Corn starch (1% w/v in 20 mM phosphate buffer, pH 6.9) 1.0 mL was added to the reaction mixture and incubated again for 10 minutes at 32°C. After adding 1.0 mL of DNS reagent (96 mM 3,5-dinitrosalicylic acid, 5.31 M sodium potassium tartrate in 2N NaOH) to each reaction mixture tubes were incubated at 85°C for 5 minutes. After incubation, reaction mixtures were cooled down to room temperature, and volume of each tube was brought up to 10.0 mL with deionized water, and the absorbance of the orange colour was measured at 540 nm using UV/Vis spectrometer Control was prepared without the extract, whereas the control blank did not contain both the extract and the enzyme. Test blanks were prepared with each concentration of the extract without the enzyme.Percentage inhibition (I%) of α-amylase was determined as follows;

$$I\% = (AC - ACB) - (AT - ATB)/(AC - ACB) \times 100$$

where AC is the absorbance of the control, ACB is the absorbance of the control blank, AT is the absorbance of the test, and ATB is the absorbance of the test blank. Acarbose (10–400 µg/mL) a commercially available α-amylase inhibitory drug was used as the positive control.

Result

Phytochemicals have been proven to possess the ability to inhibit starch hydrolyzing enzymes and thereby restrain glucose release from starch and its subsequent absorption. Due to this reason, the interest to search for new therapeutic drugs of plant origin has increased over recent times . Kinetic studies on plant extracts have revealed that the inhibition of α-amylase by phytochemicals occur via uncompetitive, noncompetitive, or competitive mechanisms . During the α-amylase inhibitory assay, FLAE exhibited an increased inhibition on the enzyme activity with the increasing concentrations upon the introduction to the starchenzyme mixture as shown in. Hence, the conversion of starch to glucose is inhibited in the reaction media, and the enzyme activity is blocked by FLAE in a concentrationdependent manner. At 400 µg/mL concentration, FLAE exhibited its highest inhibitory activity of 90%, and the percentage inhibition varied from 29%–90% throughout the series of concentrations (2.5–400 µg/mL) of FLAE. The overall results obtained for the in vitro α-amylase inhibitory assay indicates that FLAE possesses a considerable.

Inhibitory activity, and the potency is as good as the standard drug acarbose. Acarbose is the standard non-insulinotropic glycoside inhibitor drug in the market, and it competitively inhibits the conversion of oligosaccharides to monosaccharides

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by α-glucosidases present in the brush border membrane of the small intestine due to structural similarity with natural oligosaccharides . According to the literature, it is reported that acarbose has adverse effects in the gastrointestinal tract, such as diarrhea and flatulence, due to extreme inhibition of the enzymes upon consumption . Also, it is reported that the use of acarbose together with dietary control may lead to hepatitis and also extreme inhibition of pancreatic glycosidases will eventually lead to digestive disorders followed by abnormal bacterial fermentation in the colon . Plant-based remedies are sort to combat diseases due to its lack or minimal toxic effects. Therefore, FLAE could be identified as a potential α-amylase inhibitor with considerably good inhibitory activity.

2. In Vitro Protein Glycation Inhibition.

In vitro inhibitory activity of fructose induced protein glycation was determined according to a previously published method with slight modifications. Briefly, fructose (1000 mM, in 200 mM, phosphate buffer pH 7.4) 4.0 mL was incubated with 5.0 mL of BSA (20 mg/mL, in 200 mM phosphate buffer, pH 7.4), 1.0 mL of FLAE (final concentration: 15.6–500 µg/mL), and 10 mL of phosphate buffer (200 mM, pH 7.4) at room temperature for one week. A control was prepared using only BSA and fructose in order to induce the formation of the AGEs and to compare the inhibitory activity of the extract. Control blank was prepared using only BSA, whereas sample blanks were prepared only with the plant extract with respective concentrations. The total volume of the tubes was brought up to 20.0 mL with buffer. The fluorescence emission of each mixture was measured with the excitation and emission wavelengths at 355 nm and 440 nm, respectively, using fluorescence spectrometer. The percentage inhibition of fluorescent AGE formation (I%) was calculated using the following equation;

$$I\% = (FC - FCB) - (FS - FSB)/(FC - FCB) \times 100$$

where FC is the fluorescence intensity of the control, FCB is the fluorescence intensity of the control blank, FS is the fluorescence intensity of the sample, and FSB is the fluorescence intensity of the sample blank. Aminoguanidine (1.25, 0.75 and 0.25 mg/mL) was used as the positive control.

Result

Formation of AGEs was observed after a week of incubation of BSA and fructose in buffer solutions at room temperature by measuring the augmentation of fluorescent intensity in BSA glycated with fructose. The fluorescent intensity increased considerably throughout the period, and the introduction of FLAE (15.6–250 µg/mL) to the reaction mixtures demonstrated a drastic reduction in the fluorescent intensity of the mixtures . It is significant that the FLAE showed 98% inhibitory potential toward AGE formation at a concentration of 250 µg/mL added to the solutions as Similar to the effect of FLAE, aminoguanidine (250 µg/mL and 750 µg/mL) also exhibited a significant reduction in fluorescent AGEs formation when introduced to BSA-fructose medium. Percentage inhibition of AGE at 250 µg/mL and 750 µg/mL was 95% and 99%, respectively.[7]

Anthelmintic Activity

Earth worms each of average length of 6 cm was placed in petri dishes containing 2 ml of various drug concentrations 0.6mg/ml, 0.8mg/ml, 1 mg/ml, 10mg/ml and 20mg/ml of solutions. Albendazole solution (10mg/ml) was used as reference standard drug and distilled water as control. The worms were observed for the motility after incubating at 37ºC. This was done after pouring the petri dishes content in the wash basin and allowing the worms to move freely. By tapping the end of each worm with the index finger and applying a bit of pressure, the worms that were alive would show motility and those dead were non motile. The motile worms were returned to the respective petri dishes containing drug solutions and the incubation process was carried out again. In the control, the worms were viable for at least twelve days, which is similar to the findings reported earlier. The time taken for paralysis, motility activity of any sort, death time of worms were observed and recorded after ascertaining that the worms neither moved when shaken vigorously nor when dipped in warm water.[8]

Result

Fifteen earthworms were collected and immediately transferred to petridishes containing water. Each petridishes were named as batch no 1,2,3,4,5,6 and 7 with various concentrations of albendazole and extracts. The results of anthelmintic activity of drugs and extracts, based on time of paralysis and time of death.

The effect of the drug Albendazole at concentration 10mg/ml had more time of death (16.42 min) compared to F.leucopyrus leaves extract 10mg/ml (6.01 min). The time taken for

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paralysis in F.leucopyrus leaves extract at concentration 10mg/ml was less (5.01 min) as compared to Albendazole (15.23 min)

S.NO		Albendazole	AFFL				
1	Concentration (mg/ml)	10	0.6	0.8	1	10	20
2	Time taken for paralysis (min)	15.23	18.23	15.07	13.34	5.04	2.24
3	Time taken for death (min)	16.42	19.34	16.02	14.23	6.03	3.02

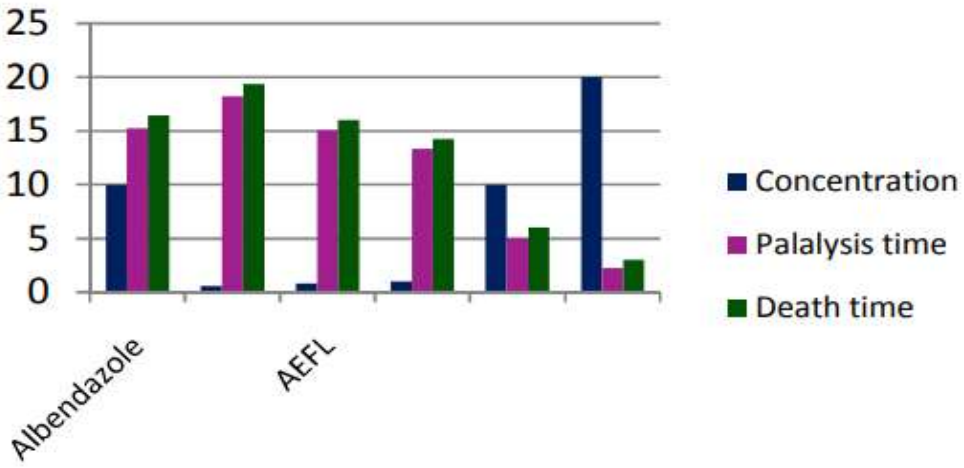

Fig no 4 : Anthelmintic activityof Fleuggealeucopyrus using Earth worms

II. CONCLUSION

This article provides a current overview of the pharmacognosy, phytochemistry, and pharmacology of F. leucopyrus, a valuable medicinal plant belonging to the Phyllanthaceae family. Botanical descriptions obtained from various sources facilitate our ability to identify plants physically. The review's findings show great promise for Flueggealeucopyrus potential application as a multifunctional medicinal substance. To fully understand the medicinal significance of this plant, more thorough research on the isolation of photochemical and pharmacological studies is still required. Thus, the purpose of this review is to encourage current research in this area so that more studies of this plant can be conducted. We do believe that this plant will be very beneficial for planned drug development in the near future.

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