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Different Pharmacological Activities of EmblicaOfficinalis (Amla): A Review

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ABSTRACT: Emblica Officinalis is reported to possess Bioactive compounds like Tannins,Gallic Acid,Quarcetin, Ascorbic Acid, Ellagic Acid,Phyllembin,Emblicanin A&B which are confirmed to have different diverse Pharmacological Actvities.Emblica Officinalis Plant is reported to have diverse Pharmacological actions like Adaptogenic Activity, Hepatoprotective Activity, Anti-Bacterial Activity, Anti-Hyperlipidemia Activity, Hypolipidemic Activity, Anti-Atherogenic Activity, Immunostimulatory Activity, Anti-oxidant Activity, Anti-Tumor Activity,Anti-Microbial Activity,Chondroprotective Activity, Analgesic Activity, Anti-Inflammatory Activity & Anti-Diarreheal Activity. Emblica Officinalis plant is used in the treatments of various ailments. The diverse ailments like cancer, Atherosclerosis, Inflammation, Osteoporosis, Nuerological disorders, Hypertention and other infectious disorders.

KEYWORDS: Amla, Emblica Officinalis, PhyllanthusEmblica, Amlakai, Aonla, Pharmacological activities, Tradtional uses.

I. INTRODUCTION

PhyllanthusemblicaLinn., (Euphorbiaceae) Known as Indian gooseberry is a very highest source of vitamin C[1] found in Madhya Pradesh. It has Anti-viral,Anti-bacterial, Anti-proliferative, Anti-platelet, Anti-HIV &Hypolipidemic Properties [1]. These fruits containing high levels of vitamin-C, tannins,polyphenols,fibers,minerals, proteins & amino-acids[2]. Aonla is a rich source of ascorbic acid,polyphenol,flavonoid&tannnin.Aonla juice is used in the treatment against health disorders like gastric disorders,diabetes,skin problems, blood pressure & also lower down aging etc [3]. The ascorbic acid content of fresh amla fruit can range upto 950/100 gm which is said to highest among all fruits next only to Barbados cherry [4]. Phyllanthusemblica has been extensively used both as edible (tonic) plants &for its therapeutic potentials [5].

Taxonomic Postiton [6]:
Kingdom: Plantae
Division: Spermatophyta
Subdivision: Angiospermae
Class: Dicotyledonae
Natural Order: Geraniales
Family: Euphorbiaceae
Genus: Emblica
Species: EmblicaOfficinalisGaertn.

Vernacular Name [6]:
Arabic- Ambily,Amlaj
Assam-Amlaki,Amulki,Sohmyrlain
Bengal - Ambolati, Amla, Amalaki, Amlati, Amulati, Aunlah, Yeonlah
Bombay - Amla, Avala, Avalkati
Burma - Hziphyu, Shabju, Siphiyusi, Tasha, Zibyu, Ziphiyusi
Cambodia - Ngop
Canarese - Amalaka, Chattu, Dadi, Dhanya, Dhatri, Nelli, Sudhe
Central Provinces - Amla, Anla
Ceylon - Toppinelli
Chinese - An Mo Le
Cuttack - Alathanda
Deccan-Amla, owla, ownla
English- Emblicmyrobalan tree
Garo- Ambari
Gond- Aunri, Lalla, Milli, Nailli, Usir
Gujerati- Amli, Ambala, Ambri, Amla, Bhoza, Bhozaamalli
Hindi- Amalaci, Amla, Amlika, Aonla, Anuli, Anvurah, Anwerd
Khond-Durga
Kol- Miral
Kolami- Aura
Kurku- Aunre
Kwang Tung- YeouKanTse

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Lambadi- Ambala
Lepcha- Amlokung
Malayalam- Amalakam, Nelli
Marathi- Aonli,Avala, Arola
Nepal- Amla
North western- Amla, Aoula
Persian- Amelah
Punjab- Ambal, Ambli, Ambul,Amla, Aonla
Sanskrit- Adiphala, Akara, Amlaki, Amlika, Amrita,Dhatri,Tishya
Santal- Meral
Tamil- Indul, Kattunelli, Sirottam.

Emblica Officinalis Geartn. Has been used extensively as a nutraceutical in several diseases since it is known to boost immunity and offers numerous benefits such as Anti-Oxidant, Anti-Inflammatory and Anti-Aging effects [7],[8].

II. CHRACTERISTICS:

1. MacroscoicalChatacters [9],[10]:

The Indian gooseberry are compact, fleshy, six seeded drupes. The fruits are globular in shape, Varies from green to yellow colour, the tender fruits shows green colour whereas after maturity they shows greenish to yellowish ting colouration. The mature and middle stage fruit has smooth and dull surface. There are six longitudinally furrows running from top to base in all 3 stages. In mature stage two depressions were found, one at base which indicates the scar of pedical and one at top which indicate the scar / of style; both depressions are found in middle stage also but the % of depression will be less compare to mature fruits. But scars ofpedical and style are found in tender stage without depressions. On drying the fruits they splits longitudinally along the running furrows, when compared with tender fruit, and the mature fruits splits first. Endocarp will be attached with fibrous vascular strand of mesocarp which can be seen when mesocarp is cut and endocarp is exposed.Odour characteristic, taste of tender fruit is very bitter, middle is bitter, sour and astringent and the mature fruit will be slightly bitter, sour and astringent followed by a sweetish feeling.

Small/Tender stage fruits

Middle stage fruits

Mature stage fruits

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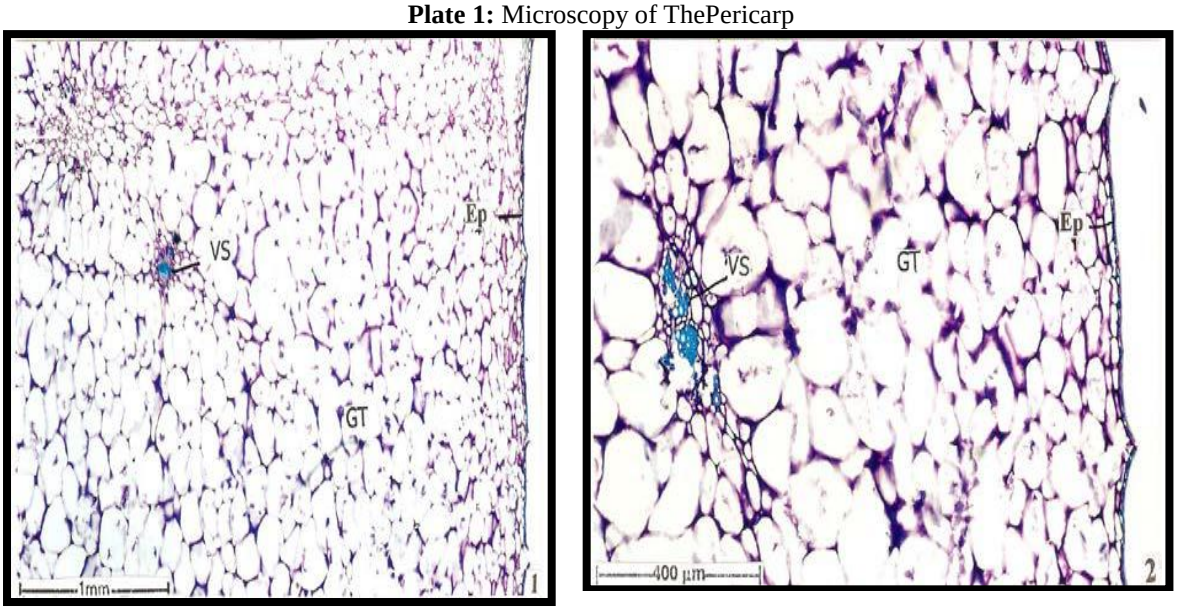
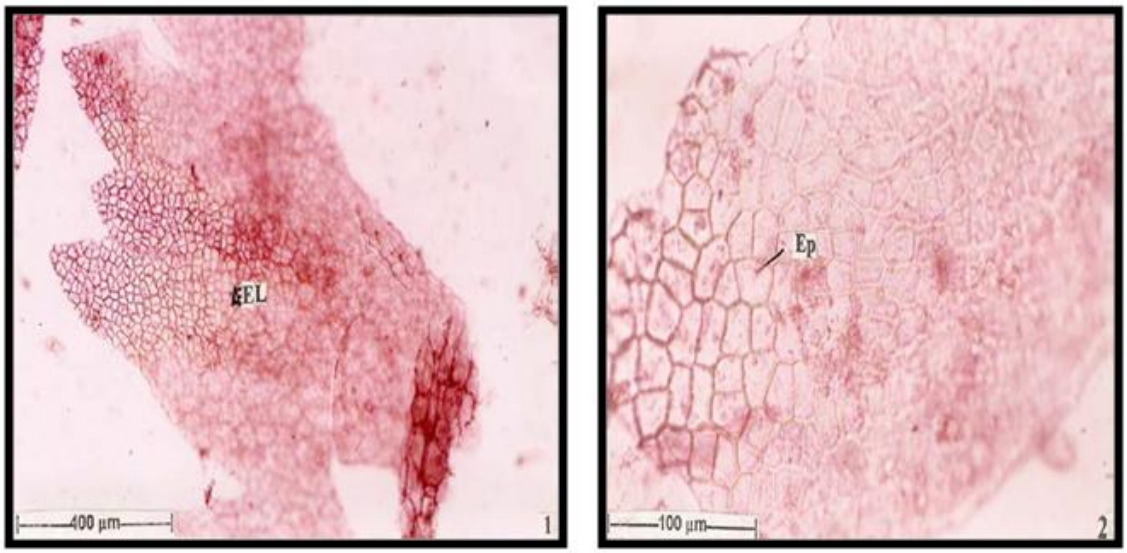
2. Microscopical Characters [11]:

Plate 1: Microscopy of ThePericarp



T.S of the pericarp under low magnification Enlarged pericarp tissues
Ep: Epidermis; GT: Ground Tissue; VS: Vascular Strand

Plate 2: Fragment of TheEpicarp



Cells under low magnification Enlarged cells showing cell wall structure
Ep: Epidermal Cells

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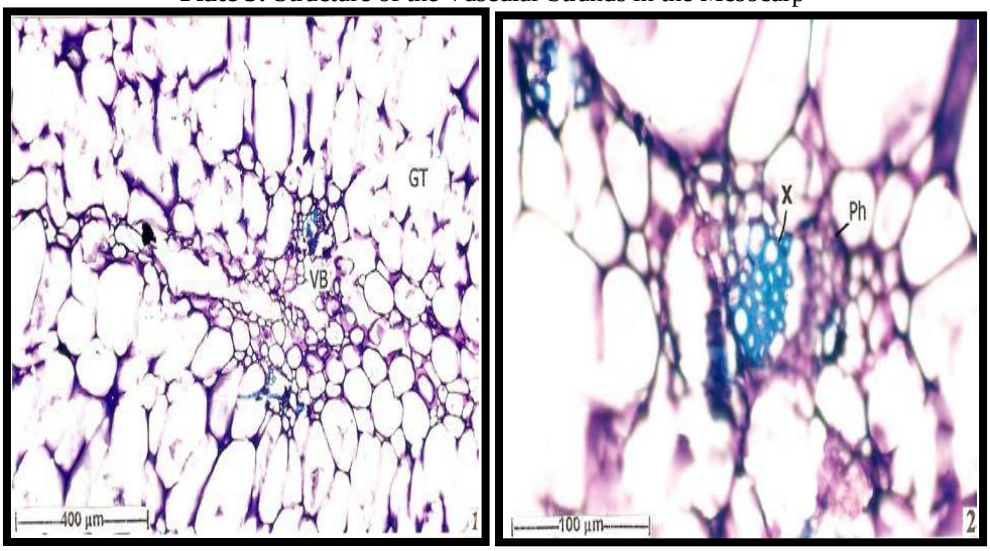
Plate 3: Structure of the Vascular Strands in the Mesocarp



Vascular strand and the ground tissue Enlarged vascular strand showing xylem andpholem
GT: Ground Tissue; Ph: Phloem; VB: Vascular Bundle; X: Xylem

The present study therefore draws attention to the importance of correct identification of the microscopical characters of drugs for quality control in basic research and drug production, especially for raw materials sold by traditional herbalists.

III. DIFFERENT PHARMACOLOGICAL ACTIVITY:

1. Adaptogenic Activity [12]:

The plant has been explored for diverse pharmacological actions, here it is planned to screen fruit extract for adaptogenic activity. wistar rats were subjected to acute physical stress (forced swimming endurance stress) to guage the antistress potential of the extract. Stimulation of hypothalamus pituitary adrenal axis in stressful condition alters plasma glucose, triglyceride,cholesterol, SGPT and SGOT. There is also alteration in locomotor movement and blood cell counts. Pretreatment with extract significantly ameliorated the stress induced variations in these biochemical levels and blood cell counts in acute stress model.

2. Hepatoprotective Activity [13]:

The study was undertaken to hepatoprotective activity of fruit extract of Emblica Officinalis on carbon tetrachloride induced hepatotoxicity on albino rats. The required amount of fresh fruits of Emblica Officinalis were collected and prepared by percolation method using 90% of ethyl alcohol. Oral toxicity was performed as per OECD 423 guidelines. All the animals used for experiment were kept under observation for daily food intake and body weight were measured after 7 days. The drugs were administered to the animals in the dose of 200 mg/kg/body weights by means of an intra gastric feeding tube. The experiment was carried out for the period of 14 days.

3. Anti-Bacterial Activity [14]:

The aim of the present study was to evaluate the antibacterial activity of aqueous Phyllanthusemblica fruit extract (APE) against eight pathogenic cultures and its application in green synthesis of silver nanoparticles. APE was screened for the presence of phytochemicals and its antibacterial activity was evaluated by agar well diffusion assay. The minimum inhibitory concentration (MIC) quantified by both macro dilutiontechnique and minimum bactericidal concentration (MBC) was determined. The zone of inhibition (ZOE) for APE was found to be in range of 10.7-21.3 mm, for varying concentrations. The MIC values were in the range of 12.5%-50% (v/v) and the MBC values indicated that a concentration of 50% (v/v) APE could kill 75% (6/8) test cultures
.

4. Anti-Hyperlipidemia,Hypolipidemic and Anti-AtherogenicActiviy [15]:

The present study was aimed to evaluate hypolipidemic and Anti-Atherogenic activity of fruit of Emblica Officinalis in high fat albino rats. For study of Anti-Hyperlipidemic, hypolipidemic, antiatherogenic activity. 5 groups of 6 animals in

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each received normal saline, E.Officinalis powder, high fat diet, High fat diet plus E.officinalis powder both and Atorvastatin respectively for 8 weeks. At the end of the study blood samples of the animals were sent for the estimation of the lipid profile and effects of test drug studied by comparing levels of Total cholesterol, Triglycerides, HDL, LDL, and atherogenic index.

5.Anlagesic Effect [16]:

The present study investigated whether E.Officinalis extracts exhibit analgesic effect in the plantar incision (PI) and spared nerve injury (SNI) pain-model rats. There evaluated the mechanical withdrawl threshold (MWT) using von Frey filaments, and pain-related behavior was determined after surgery based on ultrasonic vocalization. The group treated with E.Officinalis extracts at 300 mg/kg had significantly increased MWT values at 6 h and 24 h after the PI, and had a significantly reduced number 22-27 kHZ USVs at 6 h and 24 h after PI. Moreover, after 15 days of continous treatment with E.Officinalis extracts, the treated group showed significantly alleviated SNI-induced hypersensitivity and reduced pro-inflammatory cytokine levels.

6.Anti-Inflammatory Activity [17]:

The present study investigated the Anti-Inflammatory activity of hydroalcoholic extract of Emblica Officinalis (HAEEO). Acute inflammation in rats was induced by the subplantar injection of carragenan, histamine, serotonin and prostaglandin E2 and chronic inflammation eas induced by the cotton pellet granuloma.Intraperitoneal administration of HAEEO at all the tested doses (300, 500 and 700 mg/kg) significantly ($P< 0.001$) inhibited rat paw edema against all pathogenic agents and also reduced granuloma formation. Additionally in paw tissue the antioxidant activity of HAEEO was also measured and it was found that HAEEO significantly ($P< 0.001$) increased giutathione, superoxide dismutase and catalase activity and subsequently reduced lipid peroxidation evidenced by reduced malondialdehyde. Taken all together the results indicated that HAEEO possessed potent anti-inflammatory activity and it may hold therapeutic promise in the management of acute and chronic inflammatory activity.

7. Anti-Microbial and Anti-Oxidant Activity [18], [19]:

The present study was carried out to evaluate the in-vitro antimicrobial and anti-oxidant activity of Emblica Officinalis juice powder. The antimicrobial activity was assessed against gram positive and gram negative bacteria by agar well diffusion method. The antioxidant activity of powder was determined in vitro using hydrogen peroxide scavenging activity method. The amount of total phenolic content was also determined by FolinCiocalteaumethod. The result of the study revealed antibacterial and antioxidant activity.

8.Immunostimulatory Activity [20]:

Investigate the immunological efficacy of the anti-aging effects of P. emblica infusion in a BALB/c mice model.And to verify the safety for the consumption of P. emblica infusion in BALB/c mice. For in-vitro studies,splenocytes were isolated from mice and examined in comparison with the human umbilical endothelial cells, fibroblasts and YAC-1 (mouse lymphoma) cells for proliferative activity upon the exposure to P.Emblica infusion. For in-vivo studies, mice were orally administered with P.Emblica infusion at a dose range of 0,50,100,200 mg/kg B/W for 14 days. After the treatments, splenocytes isolated from these mice examined for proliferative and NK cell activities.

9. Anti-Oxidant and Anti-Tumor Activity [21],[22]:

The present study was designed to investigate the antioxidant and anti-tumor activity of PhyllanthusEmblica. Antioxidant potential of the edible plant was evaluated in-vitro by DPPH (1, 1 diphenyl,2picrylhydrazyl) scavenging assay and FRAP assay method. The % decrease of DPPH standard solution was recorded 71.5% for PhyllanthusEmblica. The cytotoxic effect was determined against the cancer cell lines HT-29 using the MTT assay.In conclusion PhyllanthusEmblica possess more potential cytotoxic activity against HT-29 cell lines.

10. Anti-Diarrheal Potential [23]:

The anti-diarrheal potential of the methanol extract of the fruit of Emblica Officinalis Gaertnwas evaluated using several experimental models of diarrhea in wistar albino rats. The methanol extract produced a significant reduction in gastrointestinal motility in charcoal meal tests in rats. It also significantly inhibited PGE2-induced enter pooling as compared to control animals. The results indicate

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the methanol extract of Emblica Officinalis possesses significant anti-diarrheal activity due to its inhibitory effect on both gastrointestinal propulsion and fluid secretion.

11. Chondroprotective Activity [24]:

This study measured the chondroprotective potential of P.Emblica fruits in vitro. They used aqueous extracts of unprocessed P.Emblica fruit powder (powder A) and the powder obtained after hot water extraction and drying of powder A (powder B). Chondroprotection was measured in 3 different assay systems. Type-1 there tested the effects of both fruit powders on the activities of the enzymes hyaluronidase and collagenase. Type-2 an In-vitro model of cartilage degradation was set-up with explants cultures of articular knee cartilage from osteoarthritis patients. Aqueous extracts of both fruit powders significantly inhibited the activities of hyaluronidase and collagenase type 2 in-vitro. Type-3 in the explant model of cartilage matrix damage, extracts of glucosamine sulphate and powder B (0.05 mg/ml) exhibited statistically significant long-term chondroprotective activity in cartilage explants from 50% of the patients tested. This result is important since glucosamine sulphate is the leading nutraceutical for osteoarthritis.

12.Anti-UlcerogenicActivity [25]:

Emblica Officinalis significantlyreduce the symptoms such as blenching, fullness, heart burn, nausea and vomiting in ulcer and dyspepsia patients. The dry powder and the aqueous extract show pro-kinetic effect.The dry powder used in lower dose show pro-kinetic effects where as in the peak acids out-put of the patients.

13.InDyslipidemia [26]:

The study was aimed at standardization of Amalakichoorna as food supplement keeping in view of its active constituents responsible for its hypolipidemic action. The powder microscopic study, Thin layer chromatography (TLC), High performance Thin layer chromatography (HPTLC), Fingerprinting and Densitogram profiling revealed that the test drug Amalakichoorna was as per the standards mentioned as per the ayurvedicpharmacopeial drugs. In HPTLC fingerprinting profile the $\mathbf{R_f}$value 0.41 light green under 254 nm is as per the standards indicating presence of Gallic acid, which is a product on hydrolysis of Emblicanin A and of the spot at 0.36 is nearest value to the standard $\mathbf{R_f}$ value correspond to ascorbic acid.

IV. CONCLUSION

Conclude that Amla prevents innumerable health diseases and disorders as it contains essential nutrients with highest quality of vitamin B, besides having strong antioxidant and biological properties. It is also used as a possible food additive or in nutraceutical and biological industries. It extracts and herbal formulations decipted potential for therapeutic benefits on a similar line shown by standard drugs against various diseases.

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