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PHYTOCHEMICAL ANALYSIS AND DETERMINATION OF ANTIBACTERIAL AND ANTIOXIDANT ACTIVITY OF *AEGLE MARMELOS*(VILVAM) LEAVES EXTRACT.

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REVIEW OF LITERATURE :

***AEGLE MARMELOS* – INTRODUCTION:**

India widely called as a botanical garden of the largest producer of medicinal plant. Plant as use in medicine Rich source pharmacological activity for treatment of various diseases. Natural medicinal plant are pollution free, no side effect, no toxic effect. Herbal medicine are use well liked Developing countries. *Bael* is economical herbal compound. *Bael* is a one of medicinal tree in thousand of Medicinal plant .*Bael (A. marmelos*) tree are a usually near by temple of lord shiva, *Bael* is also a sacred tree To Lord Shiva. The *bael* fruit is recognized as the 'RAMAYAN' period. The Bael tree is in the book ' CHARKASAMHITA '*Beal* is an ayurvedic medicinal plant. It is aromatic, and all parts of the tree are medicinally important, like fruit, Leaves, bark, roots, and seeds used in Ayurvedic for treating various diseases. *Bael* fruit has high nutritional Components like minerals: (phosphorous, potassium, calcium, magnesium, iron, copper, zinc), protein, Carbohydrates, vitamins(B1, B2, B3, C), and fatty acids. Phytochemicals in *Bael* fruit contain include coumarins, tannins, alkaloids, flavonoids, and carotenes. *Bael* fruit and leaves are used to treat dysentery diarrhoea, dyspepsia, oedema, vomiting, etc. It is important in food processing. In *a bael tree,* antioxidants, Phytochemicals and nutritional composition make the quality of Food. Various studies have shown many pharmacological activities, including anti-diarrheal, antioxidant, Antidiabetic, hepatoprotective, radioprotective, anticancer, and antiulcer activities in pharma products.(Rajasekaran ..,et al.,,2008).

HISTORICAL OF VILVAM TREE:

The MahaVilva tree is associated with Lord Shiva. Its trifoliate leaf or tripatra, is believed to symbolise The three functions of the Lord – creation, preservation and destruction – as well as His three eyes. The Offering of the leaves is a compulsory ritual while worshipping Lord Shiva all over India. It is commonly Called as Vilva tree. According to the Agni Purana, on any auspicious day in Bhadra, Shiva should be Worshipped with a day long fast and t he eating of Vilva leaves at night. The Padma Purana and the Brahma Purana says that Shiva once hid in the Vilva to escape conquering demons. The SkandaPurana holds that The Vilva grew from Parvati's perspiration, which fell to the ground while she performed penance. It also Says that the various incarnations of Parvati reside in each part of the tree. The Brihaddharma Purana relates how Lakshmi prayed to Shiva every day and offered him 10,000 lotus buds. One day she fell short by two buds. Remembering that Vishnu had compared her breasts to lotus buds, she decided to offer them Instead. She cut one off and offered it humbly. Before she could cut the other, Shiva, pleased with her Devotion, stopped her. Her cut breast became the fruit of the Vilva. The BhavishyaPurana says that after the samudramanthan, Lakshmi, who had just emerged from the ocean, rested in the Vilva. It was the ninth Bright day of Bhadra. Therefore, the Vilva is worshipped every year on that day. In Hinduism, the Lord Shiva is said to live under the Vilva tree. Lord Shiva is very much pleased by Offerings of leaves from the Vilva tree. Thus the brahmanas worshipped Lord Shiva by offering Vilva Leaves, for a period of one forthnight and satisfied Lord Shiva greatly. Its fruit, flowers and leaves are all Sacred to Shiva. Planting Vilva trees around home or temple is sanctifying, as it is worshiping a Linga With Vilva leaves and water. It is considered to be very auspicious and sacred to Hindus as its leaves and Wood are used as essential items of poojasamagri for worship of Lord Shiva. For this reason it is also Called Shivadurme. It is considered as an emblem of fertility. Because of this spiritual use, it is often Found in the garden of temples. Lakshmi, the goddess of fortune, is said to reside in the Vilva. Ancient Sanskrit texts refer to it as Vilva and the fruit of prosperity. Its leaves are an important offering to Shiva, for their trifoliate shape signifies Shiva's three eyes. Since they have a cooling effect, they are offered to the Shivalingam to soothe this hottempered deity. Even a fallen Vilva is never used as firewood, for fear of arousing Shiva's wrath. Its woodis used only in sacrificial fires. The tree is also sacred to the Jains. The 23rd Tirthankara, Bhagwan Parasnathji attained enlightenment under a Vilva tree. The Botanical name of Vilva *is Aegle marmelos (L.) Corr*. and the Synonym is Crataeva *marmelosLinn*. Genus *Aegle*, Species *marmelos*, belongs to the family *Rutaceae V*ernacular names are in English: Bengal quince, *Beal* fruit, Golden apple, Holy fruit, Indian quince, Stone apple. In Tamil : Aluvigam, Iyalbudi, Kuvilam, Mavilangai,Vilwam, Villuvam. In Telugu Vilvamu, Maluramu, Maredu, Sailushamu, Sandiliyamu, Sriphalamu. In Hindi : Bel, Bili, Sirphal, and Bela, InSanskritAdhararutha, Asholam, Atimangaliya, Vilva, Durarutha, Gandhaptra, Goharitaki, Hridyagandha, Kantakadhya, Kapitana, Sriphala, Lakshmiphala, Mahakapitthakya. InBengalVilva, Bel, In Gujarat Billi, In Kannada Bela, Vilva. In Malayalam Koovalam, Vilwam. In Orissa Belo (K.M.Nadkarani..,and et al .,1927).

The Vilva tree Is found all over India, from sub Himalayan forests, Bengal, Central and in Burma. This Is Tree occurs in the sub mountainous regions and plains almost throughout India. It is also cultivated Commonly throughout the country accenting to 1200 MSL(P.N.V.Karup,1977).
Taxonomic description, distribution, Pharmacognostical studies leading to establishment of correct identification of the raw drugs used and Propagation methods of Vilva were given by (V.KrishnanNambiar and et al..,2000).

In west Bengal, there are 13 types of fruits in *Aegle Marmelos*. Based on the fruits size and shape, the fruits were grouped under five categories (oval, flat, Spherical, oblong and pear shaped) and in each group three subgroups (small, medium, big) were Separated (D.K.Ghosh,and et al..,2001).

The deciduous, alternate leaves, borne singly or in 2's or 3's, are composed of 3 to 5 oval, pointed, Shallowly toothed leaflets 4-10 cm long, 2-5 cm wide, the terminal one with a long petiole. New foliage is Glossy and pinkish-maroon. Mature leaves emit a odor when bruised.(Chakraborty Manodeep and et al ,2012).

EXTRACTION OF VILVAM LEAVES AND THEIR USES:

Vilvam leaves are useful in jaundice and in the treatment of wounds. The extract of leaves is beneficial in the treatment of leucorrhoea, conjunctivitis and deafness. Fruits give feeling of freshness and energy. It is used as carminative and astringent. It finds good utility in thyroid related disorder. The other fine Therapeutic uses reported are cardiac stimulant, swollen joints, pregnancy trouble, typhoid and coma. The Dried powder of leaf is used in the treatment of irritable bowel syndrome.(P.C.Sharma and et al..,,2007).

Different organic extracts of the leaves of *A. marmelos* have been reported to possess alkaloids, cardiac glycosides, terpenoids, saponins, tannins, flavonoids and steroids. *Aegle marmelos* fruit pulp reported or the availability of steroids, terpenoids, flavonoids, phenolic compounds, lignin, fat and oil, insulin, Proteins, carbohydrates, alkaloids, cardiac glycosides and flavonoids.(S.Rajan and et al..,2011).

Aegle marmelos is commonly called *as Bael* in Hindi, Vilvam in Tamil and Bilva in Sanskrit. It belongs to the family *Rutaceae*.(V.N.Ariharan,2013).

It is indigenous to India and is used in folk medicines. The Ayurvedic Practitioners were used almost all of their parts but the greatest medicinal value ascribed to its Leaves(V.N.Ariharanand ,2014).
Vilvam is a perennial tree found wild in the sub Himalaya tract, Central and South India. *Aegle Marmelos* is a medium sized armed deciduous tree grows up to height of 9-10 meters with straight, sharp, Axillary thorns and yellowish brown shallowly furrowed corky bark. The leaves are trifoliate alternate, Leaflets are ovate to lanceolate with pellucid – punctuate aromatic oil glands.(V.Krishnan and et al..,2013).

The lateral leaves are subssile and the terminal one is long petioled. The flowers are greenish white sweet scented presenting the axillary panicles. The fruits are Globus woody berry with yellowish ring, seeds numerous embedded in orange brown sweet gummy pulp. The leaves are used as astringent, laxative, febrifuge and expectorant. The leaves are useful in opthalamia, inflammations, catarrh, diabetic and asthmatic Complaints(V.N.Ariharan and et al.,2013).

The leaves are used for the heart and brain disorders. The confection called ilakam is made of fruit is used to treat tuberculosis and losofappetite . J.Raamachandran ,2008).

The increasing global interest in the medicinal Potential of plants during the last few decades is therefore quite logical. Antibiotics since their Introduction are one of the most important weapons in fighting against bacterial infections and have Largely benefited human beings(J.A.Callow,1983).

Many pathogenic organisms are developing plasmid-mediated resistance to the prevailing drugs. Hence, there is a need for novel natural compounds that can be obtained from the plants or microorganisms. Plants, in particular, have been a source of inspiration for Novel drug compounds since days immemorable. Plants serve as a reservoir of effective chemotheraputants and provide valuable sources of natural products in the control of several bacterial Diseases.(S.M.Jachak and et al ..,2007).

Many studies indicate that plants contain bio-active compounds such as peptides, glycosides, Alkaloids, saponins,terpenoids, flavonoids etc., with antimicrobial activity against bacterial, fungal and Viral infections(I.Janathan and et al.. ,2003).
Since time immemorial man has used various parts of plants in the treatment and prevention of many ailment(Chah,2006).

Historically all medicinal preparations were derived from plants, whether in the simple form of plant parts or in the More complex form of crude extracts of different kind of plants. Today a substantial number of drugs are developed From plants which are active against a number of diseases. *Aegle marmelos* is one of the most important medicinal Plants used to cure most of the common ailments. *Aegle marmelos Linn*. Is commonly called as *Bael* in Hindi, Vilvam in Tamil and Bilva in Sanskrit. It belongs to the family *Rutaceae*. It is indigenous to India and is used in folk Medicines. The Ayurvedic practitioners use almost all of their parts but the greatest medicinal value ascribed to its Fruits(M.Ayyanar and et al 2009).
Vilvam is a perennial tree, wild in the sub Himalaya tract, Central and South India. *Aegle marmelos* is a medium sized armed deciduous tree grows up to a height of 9-10 meters with straight, sharp, axillary thorns and Yellowish brown shallowly furrowed corky bark. The leaves are trifoliate alternate, leaflets are ovate to lanceolate With pellucid – punctuate aromatic oil glands(M.Ramiladevi and et al ,2011).

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The leaves are used for the heart and brain disorders. The confection called ilakam is Made of fruit is used to treat tuberculosis and loss of appétit (GuribFakim,2006).

Stress is produced during normal metabolic process in the body as well as induced by a variety of environmental and chemical factors which cause generation of various Reactive free radicals and subsequent damage to macromolecules like DNA, Proteins and Lipids could be cured by Vilvam. No specific scientific evaluation of antioxidant activity *of Aegle marmelos* fruit pulp has been reported so Far. Therefore, it was thought worth while to evaluate antioxidant activity of *Aegle marmelos* fruit pulp to confirm its folk medicinal claim. Many naturally occurring products have been reported to contain large amount of antioxidant Compounds other than vitamin C, E and carotenoid(R.Agarwal and et al ..,2009).

ANTI- OXIDANT ACTIVITY:

These antioxidants play a vital role in delaying, intercepting or preventing oxidative reactions catalyzed by free radical. Antioxidant activity of medicinal plants might be due to the presence of phenolic compounds such as flavonoids, Phenolic acids and phenolic diterpine(McCan MC,1992).

Synthetic Antioxidants like butylatedhydroxy anisole (BHA) butylatedhydroxy toluene (BHT), tertiarybutylatedHydroxyquinone and gallic acid esters have been suspected to be carcinogenic. Hence, strong limitations have been Placed on their use and there is a trend to replace them with naturally occurring antioxidants(V.N.Ariharan and et al.,2013).

Moreover, these Synthetic antioxidants also show low solubility and moderate antioxidant activity(V . Krishnan Nambiyar,2000).

Hence, search for natural antioxidant has greatly been increased in the recent scenario. The *Aegle marmelos* contains more of natural antioxidant in the leaves and the fruit pulp. Because of this specific property the Vilva is used in the treatment and Preventive of all common ailment of mankind (V.N.Ariharan and et al.,2014).

FTIR (FOURIER TRANSFORM INFRAREDS SPECTROSCOPY) ANALYSIS:

The three traits of Vilvam is subjected to FT-IR studies. Fourier transform infrared spectrometry is a physico-chemical analytical technique that does not resolve the Concentrations of individual metabolites but provides a snapshot of the metabolic composition of a tissue at a given time(Griffiths and et al.,1986).

FTIR can be employed to determine the structure of unknown composition and the intensity of the absorption spectra associated with molecular composition or content of the chemical Group(Surewicz.Wk and et al.,1993).

The FT-IR method measures the vibrations of bonds within chemical functional groups and generates a Spectrum that can be regarded as a biochemical or metabolic “fingerprint” of the sample. By attaining IR spectra From plant samples, it might possible to detect the minor changes of primary and secondary metabolites (McCann Mc ,1992).

At Present, particularly in phytochemistry, FTIR has been exercised to identify the concrete structure of certain plant Secondary metabolites(Yang.J,2002). But, on pharmacognosy FTIR is still a new tool to characterize and identify the Commercial components from the adulterant. FT-IR method has been successfully utilized in the characterization of Bacterial, fungal and higher plant(Helm.D,1991).

FT-IR is one of the most widely used methods to identify the Chemical constituents and elucidate the compounds structures, and has been used as a requisite method to identify Medicines in Pharmacopoeia of many countries(Goodacre.R,2000)

Aegle marmelos belonging to family *Rutaceae*, is commonly Known as *Bael* in indigenous systems of medicine and has been regarded to possess various medicinal properties. *The Bael* is one of the sacred trees of the Hindus. Leaves are offered in prayers to Shiva and Parvathi since ancient times(Rajasekaran.C.,2008).
Bael is a deciduous sacred tree, associated with Gods having useful medicinal properties, especially as a cooling agent. This tree is popular in Shiva and Vishnu temples and it can be grown in every house. Its leaves are trifoliate symbolizing. The Thrimurthies-Brahma, Vishnu, Shiva, with spear shaped Leaflets resembling Thrisoolam the weapon of Lord Shiva. Many legends, stories and myths are associated with this tree. The leaflets are given to devotees as prasadam in Shiva Temples and as Tulasi in Vishnu temples. In India flowering occurs in April and May soon after the new leaves appear and The fruit ripens In 10 to 11 months from bloom March to June of the following year.(C.Orwa,2009).

The tree has no exacting cultural Requirements, doing well with a minimum of fertilizer and Irrigation. The spacing in orchards 6-9 m between trees. Seedlings begin to bear in 6 to 7 years, vegetatively Propagated trees in 5 years. Full production is reached in 15 Years. Normally, the fruit is harvested

when yellowish-green and kept for 8 days while it loses its green tint. Then the stem readily separates from the fruit. A tree may yield as many as 800 fruits in a season(Sharma GN,2005).

ORIGIN AND DISTRIBUTION:

The *bael* tree has its origin from eastern ghats and central India. It is native to India and is found growing wild in sub-himalayan tracts from Jhelum eastwards to West Bengal, in central and south India. *Bael* is found growing along foothills of Himalayas, Bihar, Chhattisgarh, Uttaranchal, Jharkhand and Madhya Pradesh. It is also grown in some Egyptian gardens in Surinam and Trinidad(Lambole VB,2010).

Food*: Aegle marmelos* fruits may be cut in half, or the soft Types broken open, and the pulp, dressed with palm sugar,Eaten for breakfast, as is a common practice in Indonesia. The Pulp is often processed as nectar. Beating the seeded pulp Together with milk and sugar makes a popular drink called Sherbet in India. A beverage is also made by combining *bael* fruit pulp with that of tamarind .Mature but still unripe fruits are made into jam, with the Addition of citric acid. Confection, bael fruit toffee, is Prepared by combining the pulp with sugar, glucose, skim Milk powder and hydrogenated fat. Indian food technologists View the prospects for expanded *bael* fruit processing as highly promising.the young leaves and shoots are eaten as a vegetable in Thailand and used to season food in Indonesia. They are said To reduce the appetite. An infusion of the flowers is a cooling Drink.Fodder: The leaves and twigs are lopped for fodder.Timber: The wood is strongly aromatic when freshly cut. It Is gray-white, hard, but not durable; has been used for carts And construction, though it is inclined to warp and crack During curing. It is best utilized for carving, small-scale Turnery, tool and knife handles, pestles and combs, taking a Fine polish.Gum or Resins: The gum enveloping the seeds is most Abundant in wild fruits and especially when they are unripe. It Is commonly used as a household glue and is employed as an Adhesive by jewelers. Sometimes it is resorted to as a soapsubstitute. It is mixed with lime plaster for waterproofing Wells and is added to cement when building walls. Artists add It to their watercolors, and it may be applied as a protective Coating on paintings.Tannin or dyestuff: There is as much as 9% tannin in the Pulp of wild fruits, less in the cultivated types. The rindContains up to 20%. Tannin is also present in the leaves. The Rind of the unripe fruit is employed in tanning and also yields A yellow dye for calico and silk fabrics.

Essential oil: Essential oil: The essential oil of the leaves contains dlimonene, 56% a-d-phellandrene, cineol, citronellal, citral,17% pcyrnene, 5% cumin aldehyde. The limonene-rich oil Has been distilled from the rind for scenting hair oil.Poison: The leaves are said to cause abortion and sterility in Women. The bark is used as a fish poison in the Celebes.Tannin ingested frequently and in quantity over a long period Of time is antinutrient and carcinogenic. Leaf extract from A. Marmelos has been found to have insecticidal activity against The brown plant hopper (NilaparvatalugensStal), anImportant pest of rice plant in Asia.Medicine: A decoction of the unripe fruit, with fennel and Ginger, is prescribed in cases of hemorrhoids. It has been Surmised that the psoralen in the pulp increases tolerance of Sunlight and aids in the maintaining of normal skin color. It is Employed in the treatment of leucoderma. Marmelosin Derived from the pulp is given as a laxative and diuretic. In large doses it lowers the rate of respiration, depresses heart Action and causes sleepiness. For medicinal use the young Fruits, while still tender, are commonly sliced horizontally And sun-dried and sold in local markets. They are much Exported to Malaysia and Europe. Because of the astringency Especially of the wild fruits the unripe bael is most prized as Means of halting diarrhea and dysentery which are prevalent In India in the summer months.Other products: The fruit pulp has detergent action and has Been used for washing clothes. The shell of hard fruits has been fashioned into pill- and snuff boxes, sometimes Decorated with gold and silver. A cologne is obtained by Distillation from the flowers. In the Hindu culture, the leaves Are indispensable offerings to the 'Lord Shiva'.REPORTED PHARMACOLOGICAL ACTIVITIES .

Antibacterial activity: Antimicrobial activity of different Leaf extracts such as Petroleum ether, Dichloromethane, Chloroform, Ethanol and Aqueous extract of Aegle marmelos Leaves were tested against selected Gram positive and Gram Negative bacteria. Results depict that phytochemical extracts Of Aegle marmelos exhibited significant anti-bacterial Activity. However, the inhibitory activity was found to be Both organism and solvent dependent. Ethanol and Chloroform leaf extracts of Aegelmarmelos were found to be More active towards the bacterial species tested. Further, the Aqueous leaf extract was moderately active followed by Dichloromethane extract. However, petroleum ether extract Was not effective against any of the organisms tested. Growth Of Lactobacillus bulgaris and Bacillus cereus was not Inhibited by any of the tested leaf extracts of Aegle Marmelos(Rajasekaran.C,Meignanam.E ,2008).

Antihistaminic activity: Skimmianine is a quinoline alkaloid Isolated from the roots of Aegle marmelos. In the study the Effects of skimmianine on the histamine release from rat mast Cells are tested. The study was performed by using two cell Lines, rat basophilic leukemia (RBL-2H3) cell line, and ratPeritoneal mast cells (RPMCs) DNP24-BSA, thapsigargin, Ionomycin, compound 48/80 were used as inducers for Histamine release from rat mast cell. Skimmianine markedly Inhibited the histamine release from RBL-2H3 cells induced By DNP24-BSA, thapsigargin and ionomycin(Nugroho AE ,Riyanto .S ,2010).

Anti-inflammatory, antipyretic and analgesic activity: The serial extracts of the leaves of Aegle marmelos were Investigated for anti-inflammatory property. The analgesic And antipyretic properties were also evaluated. The most of The extracts derived from the plant Aegle marmelos caused a Significant inhibition of the carrageenan induced paw oedema and cotton-pellet granuloma in rats. The extracts also Produced marked analgesic activity by reduction the early and late phases of paw licking in mice. A significant Reduction in hyperpyrexia in rats was also produced by the Most of the extracts. This study was established antiinflammatory, antinociceptive and antipyretic activities of the Leaves of Aegle marmelos(Rao CV.Analgies,2003).

Hepatoprotective activity: The experiments were performed With four groups of animals. The experimental animals were Administered with 30% ethyl alcohol for a period of 40 days And the fine crude plant leaves powder was fed to animals for Next 21 days. The observed values of TBARS (Thiobarbituric Acid reactive substances) in healthy, alcohol intoxicated and Herbal drug treated animals were 123.35, 235.68 and 141.85 Mg/g tissue respectively. The results were compared with the Standard herbal drug silymarin (133.04 µg/g tissue). The Experimental results indicate that, the Aegle marmelos leaves Have excellent hepatoprotective effect.(Singanan.V,2007).

Insecticidal activity: Experiments were carried out to Determine the potential of using essential oil from leaves of Aegle marmelos to control insect infestation of stored gram From Callosobruchuschinensis (L.) (Bruchidae) and wheat From Rhyzoperthadominica (F.) (Bostrychidae), Sitophilus Oryzae (L.) (Curculionidae) and Triboliumcastaneum (Herbst) (Tenebrionidae). After introducing the test insects, Stored gram and whea samples were fumigated with essential Oil of Aegle marmelos at 500 µg/mL (ppm). The oil Significantly enhanced feeding deterrence in insects and Reduced the grain damage as well as weight loss in fumigated Gram and wheat samples infested with all insects except T. Castaneum. The essential oil at different doses significantly Reduced oviposition and adult emergence of C. chinensis in Treated cowpea seeds. The oil protected stored gram from C. Chinensis and wheat from R. dominica and S. oryzae for two Years. Limonene (88 %) was found to be the major Component in the oil through GC-MS analysis. Regression Analysis of data on individuals in treated cowpea confirmed That significant reduction of oviposition and adult emergence Of C. chinensis decreased with increase in doses. The findings Emphasize the efficacy of Aegle marmelos oil as fumigant Against insect infestations of stored grains and strengthen the Possibility of using it as an alternative to synthetic chemicals For preserving stored grains(Kumar R,2008).

Hypoglycemic and Antioxidant activity: The hypoglycemic And antioxidant effect of aqueous extract of Aegle marmelos Leaves (AEAM) carried out by using male albino rats.Glucose, urea and glutathione-S-transferase (GST) in plasma, Glutathione (GSH) and malondialdehyde (MDA) levels in Erythrocytes were estimated in all the groups at the end of Four weeks. There was a decrease in blood glucose at the end Of four weeks in group treated with AEAM , however it did Not reach the control levels. There was an increase in Erythrocyte GSH and a decrease in MDA in group treated With AEAM as compared to diabetic rats. The plasma GST Levels were raised in diabetic rats when compared to controls. In the group treated with AEAM, there was a decrease in GST as compared to diabetic rats. Owing to hypoglycemic And antioxidant properties, AEAM may be useful in the longTerm management of diabetes(Upadhya .S,2004).

Immunomodulatory activity: The immunomodulatory Action of methanolic extract of Aegle marmelos fruit (MEAM) in experimental model of immunity was carried out By neutrophil adhesion test and carbon clearance assay,Whereas, humoral immunity was analysed by mice lethality Test and indirect haemagglutination assay. MEAM dose was Selected by Stair case method (up and down) and Administered at 100 and 500 mg/kg orally. The Ocimum Sanctum (OSC, 100 mg/kg, p.o) was used as standard. MEAM at 100 and 500 mg/kg produced significant increases In adhesion of neutrophils and an increase in phagocytic Index in carbon clearance assay. Both high and low doses of MEAM significantly prevented the mortality induced by Bovine Pasteurellamultocida in mice. Treatment of animals With MEAM and OSC significantly increased the circulating Antibody titre in indirect haemagglunation test. Among the Different doses, low one was more effective in cellular Immunity models than the high. However, all the doses Exhibited similar protection in humoral immunity procedures. From the above findings, it is concluded that MEAM Possesses potential for augmenting immune activity by Cellular and humoral mediated mechanisms more at low dose (100 mg/kg) than high dose (500 mg/kg)(Patel .P,2010).

Myocardial infarction: The effect of Aegle marmelos leaf Extract (AMLE) and alphatocopherol on plasma lipids, lipid Peroxides and marker enzymes in rats with isoproterenol (ISO) induced myocardial infarction was carried out. Rats Were pre-treated orally for 35 days with different doses of an Aqueous AMLE (50 mg/ kg, 100 mg/kg and 200 mg/kg) prior To ISO-induced myocardial infarction. The effects on creatine Kinase, lactate dehydrogenase, plasma thiobarbituric acid Reactive substances, lipid hydroperoxides, serum lipids and Lipoproteins were studied. Pretreatment with AMLE at doses Of 100 mg/kg and 200 mg/kg body weight for 35 days Showed a significant effect on the activities of marker Enzymes, lipid peroxides, lipids, lipoproteins and antioxidant Enzymes in ISO-treated rats. The effect of AMLE 200 mg/kg Was found to be equal to the effect of alpha-tocopherol 60 Mg/kg(Rajadurai.M,2005).

Testicular activity: The aqueous extract of leaf of Aegle Marmelos at the dose 50 mg/100 g body weight resulted a Significant diminution in the activities of key testicular Steroidogenic enzymes along with low levels of plasma Testosterone and relative wet weights of sex organs in respect To control without any significant alteration in general body Growth. Germ cells numbers in different generation of Seminiferous epithelial cell cycle were diminished Significantly after the treatment of the above extract. The Above mentioned dose did not exhibit any toxicity in liver And kidney. Therefore, it may be predicted that the aqueous Extract of leaf of Aegle marmelos has a potent antitesticular Effect at a specific dose(Das UK,2006).

Cardiotonic activity: Fresh fruit juice of Aegle marmelos Plant with different dilutions were used for cardiotonic Activity. The activity was tested by using isolated frog heart Assembly. The present preliminary studies confirm the better Cardiotonic activity of Aegle marmelos than digoxin. Further Studies can confirm the reduced toxicity & this will be the Advantage of Aegle marmelos over digitalis(Dama Gy,2010).

Anxiolytic and Antidepressant activity: The objective of The study was to evaluate the anxiolytic and antidepressant Activities of methanol extract of Aegle marmelos (MEAM) Leaves as well as its interaction with conventional anxiolytic And antidepressant drugs using elevated plus maze and tail Suspension test in mice. Albino mice were treated with MEAM (75, 150 and 300 mg/kg, po), imipramine (20 mg/kg, Po), fluoxetine (20 mg/kg, po), and combination of sub effective dose of AM with imipramine or fluoxetine. Effects Were observed on (a) time spent on (b) number of entries into number of stretch attend posture (d) number of head dips In arms of elevated plus maze and on duration of immobility In tail suspension test. Antidepressant activity of MEAM(150 mg/kg, po) was significantly decreased by prazosin, Haloperidol and baclofen. MEAM showed insignificant effect On locomotor activity of mice. It is concluded that MEAM Possess potential anxiolytic and antidepressant activities and It enhances the anxiolytic and antidepressant activities of Imipramine and fluoxetine(Kothari.S and et al..,2010).

Wound healing activity: Effect of topical and intraperitoneal Administration of methanolic extract of Aegle marmelos Ointment and injection was studied respectively on two types Of wound models i.e. the excision and the incision wound Models in rats. Both the injection and the ointment of the Methanolic extract of Aegle marmelos produced a significant Response in both of the wound type tested. In the excision Model the extract treated wounds were found to epithelialize Faster and the rate of wound contration was higher, as Compared to control wounds. The extract facilitated the Healing process as evidenced by increase in the tensile Strength in the incision model. The results were also Comparable to those of a standard drug nitrofurazone(Jaswanth.A,2000).

Anticonvulsant activity: The anticonvulsant effect of Ethanolic extract from the leaves of Aegle marmelos on Maximal electroshock (MES) or pentylenetetrazole (PTZ) in Male mice examined in this study.(Sankari.M.,2010).

FTIR can be employed to determine the structure of unknown composition And the intensity of the absorption spectra associated with molecular composition content of the chemical Group(Daniel M.,2006).

The FT-IR method measures the vibrations of bonds within chemical functional groups and generates a Spectrum that can be regarded as a biochemical or metabolic "fingerprint" of the sample. By attaining IR spectra From plant samples, it might possible to detect the minor changes of primary and secondary metabolites(Sivaraj R and et al..,2011).

At Present, particularly in phytochemistry, FTIR has been exercised to identify the concrete structure of certain plant Secondary metabolites(Kirtikar KR and et al.,1995).
But, on pharmacognosy FTIR is still a new tool to characterize and identify the Commercial components from the adulterant. FT-IR method has been successfully utilized in the characterization of Bacterial, fungal and higher plant(Goodacre R and et al.,2000).

FT-IR is one of the most widely used methods to identify the Chemical constituents and elucidate the compounds structures, and has been used as a requisite method to identify Medicines in Pharmacopoeia of many countries.

This study provided a comprehensive analysis of the phytochemical constituents of Aegle marmelos leaves, identifying compounds such as alkaloids, flavonoids, and tannins. The research highlighted the leaves' potential medicinal properties, including antimicrobial and antioxidant activities.(S. S. Mishra and et al.., 2011).

Investigating the hypoglycemic effect of Aegle marmelos leaf extracts, this study demonstrated significant blood glucose-lowering activity in diabetic subjects, suggesting the leaves' potential as a natural antidiabetic agent.(P. K. Karunanayake and et al..,2013).

The study evaluated the antimicrobial efficacy of Aegle marmelos leaf extracts against various bacterial and fungal strains. Results showed notable inhibitory effects, particularly against pathogens responsible for gastrointestinal infections.(N. K. Singh and et al..,2017).

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