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Review Paper

A Review On: Herbal Uses of Carissa Carandas

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ABSTRACT

Carissa carandas Linn. (family: Apocynaceae) is a well-known tropical plant in India that is known as Karvand/Karanda. [1] This native berry fruit is prized for both its superior nutritional worth and its distinct sour flavor. The dearth of knowledge shows how underappreciated and ignored the fruit is in spite of its enormous nutritional potential. [2] The purpose of the study was to investigate the potential uses of fresh, dried fruit and leaf in Ayurvedic medicine for treating a wide range of illnesses. [18] Traditionally, the entire plant, including the fruit, root, and leaf, was used to treat a wide range of illnesses.[3] It has a number of phytochemical components, such as flavonoids, tannins, alkaloids, and glycosides, that fall into the terpenoid group.[18] These plants' leaves have been utilized in traditional medicine. [3] The largest concentration of vitamin C and phenolic content is found in fresh karvand berries, which can strengthen the immune system and promote general health.[7] Thus, the leaf and fruit extract of Carissa carandas plants will be able to control a lot more diseases in the future, particularly those related to diabetes, asthma, dermatology, etc. [18].

INTRODUCTION

Carissa carandas is a prickly, evergreen shrub that is a member of the Apocynaceae family, also referred to as karonda. Its tiny, berry-shaped fruits are used as a spice or addition to a variety of pickles in northern India.[13] Native to the region, karonda is a berry fruit prized for both its high nutritional content and distinct sour flavor. The largest concentrations of vitamin C, total phenolic content, and anthocyanins are found in fresh karonda berries, which can strengthen the immune system and promote general health.[2] Because ripe karonda fruit has a high pectin content, it is also utilized to make products that are highly sought after on the global market, such as jelly, jam, squash, syrup, tarts, and chutney. Karonda bushes are sometimes planted as decorative plants because of their lovely cherry-like fruits, but they are also good for hedging in residential gardens.[4] The species has been utilized as a traditional medicinal herb throughout thousands of years in the Ayurvedic, Unani, and homeopathic system of

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medicine. The entire plant and its components have historically been used to cure a range of illnesses. Its roots are used to aid in digestion, while its fruits are consumed to treat liver malfunction, break fever, and prevent blood from spoiling. Due to their high iron and vitamin C content, fruits are used in traditional medicine to treat biliaryness, anemia, and as an astringent and antiscorbutic. Its roots act as a stomachic, vermifuge, itch cure, and insect repellant, while its decoction of leaves is used to treat fever, diarrhea, and earaches.[4] The plant has historically been used to cure a variety of illnesses and conditions, including scabies, intestinal worms, pruritus, biliousness, and as an anthelmintic and antiscorbutic. The analgesic, anti-inflammatory, antipyretic, cardio tonic, and histamine-releasing biological actions are noteworthy. To promote safe and efficient herbal remedies to treat a variety of ailments, this review was produced to provide a thorough evaluation of the literature on phytochemistry, traditional, and biologically assessed medicinal uses of C. carandas. [10]

Plant Description:

The scientific classification of plant is-

1.Classification [12]

Kingdom: Plantae
Class: Angiosperms
Sub-class: Eudicots
Superorder: Asterids
Order: Gentianales
Family: Apocynaceae
Genus: Carissa
Species: Carandas

2.Vernacular names [5]

- **Maharashtra**: Karavanda and Karanda
- **Andhra Pradesh:** Kalivi, Kalli, and Vaka
- **Bengal:** Karamacha
- **Gujarat**: Karmarda
- **Karnataka**: Garji, Karekayi and Kavali
- **Himachal Pradesh:** Karondhu and Garna
- **Hindi:** Karunda
- **Sanskrit:** Avighna and Karamarda
- **Tamil Nadu:** Kalachedi and Kalakkay

Morphology:

1.Plant:

The thorny, medium-sized shrub Karonda bark of mature stems is grayish brown, while that of juvenile shoots is greenish white. The spines are straight and measure 1-3 cm in length. Sometimes these are branched as well.[9]

Fig 1: Whole plant, shrub

2. Height: two to four meters

3. Wood: incredibly tough;

4. Bark: The bark is greyish brown on older stems and greenish white on young shoots.[9] Its stem is rich in white latex, and its branches have sharp spines.[4] The bark is thick, velvety, smooth, and gray on the outside, with a scarlet inner. [10]

-Microscopic analysis reveals a wide area of stratified cork with lenticels; the secondary cortex is composed of long, thin-walled parenchymatous

cells that contain stone cells; cortical fibers are found alone or sporadically in pairs or threes; secondary phloem containing calcium oxalate crystals is present; and starch grains are scattered throughout the phloem parenchyma and cortical cells.

Figure 2: Stem, fruit, flower, leaf and bark of C. congesta

5. Stem: Round shape, even exterior with an internode, little perceptible fracture, absence of ridges, dark green color. The existence of single-layered epidermal cells surrounded by the cortex and hypodermis is studied at the microscopic level. Four to five layers of parenchyma cells make up the cortex. The cortical region is scattered with lignified fibers. The bicollateral vascular bundles' pericyclic fibers are not lignified. The pith located at the section's middle.

6. Leaves:

Fig 3: leaf shape, leaf margin, leaf apex

i) Ovate, leathery, 4.5 cm long, 2.5 cm wide, with a reticulate pinnate venation, an entire edge, a petiole that is 3 mm long, and leaves that, when removed from the stem, exude a white latex [5]. Its leaves are oval, opposite, and typically measure 2-3 cm by 1-1.5 cm. They have a dull green color underneath and a shiny green top. All year long, old leaves continue to shed.[9]

ii) Microscopic analysis: Anisocytic stomata are present in wavy-walled epidermal cells with thin cuticles. There are glandular trichomes and coverings. Single-layered parenchymatous cells make up the upper epidermis, which is followed by bilayered, radially elongated palisade cells. Three to four layers of lower epidermal cells and spongy parenchyma envelop these cells. The upper epidermis and a single layer of parenchymatous hypodermis make up the midrib. Collenchyma beneath the hypodermis is present. Collenchyma cells are girdled bychlorenchymato us cells. Bicollateral vascular packets are followed by calcium

oxalate chargers and bounce grains

7. Flowers:

Fig 4: Flowers size, colors, types

These have fragrant, white flowers that are grouped in clusters of two to five. Corymbose cymes and short-stalked, sweet-smelling, bisexual, full, white blooms with a diameter of 3–5 cm form at the tips of branches.[9]

8. Fruit:

Fig 5: Fruit type,shape, size, color.

This ovoid fruit, which is 5–12 mm long and 6 mm in diameter, is green when unripe and lustrous black when ripe.[5] It is a berry that grows in clusters of three to ten fruits. It is glabrous, woody, fibrous, and has five to one hard angle that curves upward. It also has five to seven wings. The fruit is globose to broadly oval in shape and contains several seeds. Young fruits are pinkish white, but ripe fruit turns scarlet to dark purple. Depending on the genotype, ripe fruit might be white, green, or pinkish red in appearance.[4]

9. Seed:

Fig 6: Seed color, texture, shape, coat

Each fruit contains three to five flat, eleptic, blackish brown, and light-weight seeds. [5]

10. Root [13]

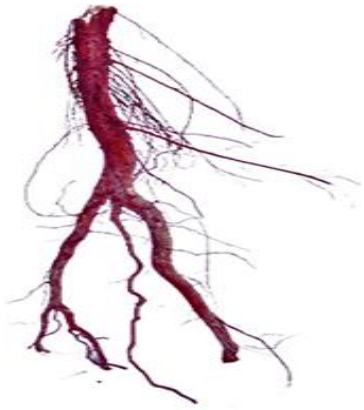

Fig 7: Root type, depth, color

i) Macroscopic: woody, cylindrical, rusty or yellowish-brown, moderately long, frequently irregularly bent, smooth surface, hard fracture, indistinct taste and odor.

The secondary cortex, which is composed of one or two layers of very narrow, thin-walled cells; the secondary phloem, which is composed of multiple cavities and is situated directly beneath the secondary cortex in a ray pattern; the presence of stratified cork, which is composed of lignified, tangentially elongated cells; the presence of scattered stone cells in the phloem regions; the phloem rays are uni- or biserriate and contain calcium oxalate prisms; the cambium is not visible; and tracheid, fibers, xylem channels, and

even xylem parenchyma comprise secondary xylem.

Chemical Composition

Fruit: It is made up of acids, sugars, pectin, tannins, reducing and non-reducing sugars, and **vitamin C.** lupeol, oxalic, tartaric, citric, malic, malonic, and glycolic acids; carissol (an epimer of A-amyrin); glycine, alanine, phenyl alkaline, cerine, glucose, and galactose.[5] The highest concentrations of pyridoxine, pantothenic acid, thiamine, riboflavin, biotin, and folic acid can be found in fruits.[13] The highest concentrations of anthocyanin, total phenolic content, and vitamin C are found in fresh karonda berries.[4]

Root: The chemical components in root are carissone, carindone, carinol, odoroside H, digitoxigenin, glucose, and D- digitalose.[5] Small amounts of alkaloids, flavonoids, and saponins were found in the root extract, whereas high amounts of cardiac glycosides, triterpenoids, phenolic compounds, and tannins were found in the crude extract, according to phytochemical screening. Additionally, it has been observed that roots contain volatile principles such as lignan, carinol, β-sitosterol, 16β-hydroxybetulinic acid, α-amyrin and β-sitosterol glycoside, lupeol, β-sitosterol, and des-Nmethylnoracronycine, an acridone alkaloid.[4]

Extract use- Root extract is used in chest pain.

Stem: Chemical analysis of stem showed the presence of sesquiterpene glucoside.[4]

Seed: Palmitic acid, stearic acid, oleic acid, arachidic acid, and linoleic acid are its constituents. Hexadecanoic, Octadecanoic, and Eicosanoic Acids [5]

Leaves: The various chemical groups found in Carissa carandas leaves, such as alkaloids, flavonoids, gums, reducing sugars, saponins, steroids, and tannins, were examined in the crude methanolic extract of the leaves.[3] Ursolic acid and triterpene alcohol make up this mixture. Carandinol, Betulinic acid, Carissic acid monoacetate, Carissic acid methyl ester.[5] According to reports, fresh leaves of C.congesta contain four pentacyclic triterpenoids, including two previously unknown compounds and a novel ingredient called carissin. It has been determined that the new triterpenoid is 3-β-hydroxy-27-E-feruloyloxyurs-12-en-28-oic acid. Based on 2D NMR research, the protons in the compounds have also been fully assigned.[16]

Flower: A-terpeneol, citronellal, β-ionone, nerylacetate, linalool, Menthol, Piperitone,p-Cymene, Neryl acetate, and geranyl acetate are among its constituents, along with myrcene, limonene, camphene, canine, farnesol, nerolidol, and dihydrojasmone[13].

Nutritional Value:

Karonda is a nutritious food. It has a lot of iron.The fruit is antiscorbutic, contains vitamin C, and is effective in treating anemia.(Table 1).

Table 1: Nutritional value of Karonda fruits.[09]

Nutrients	Nutritional value (100 gram)	
	Fresh	Dried
Energy (Calorie)	42	364
Moisture (%)	91	18.2
Protein (%)	1.1	2.3
Carbohydrate (%)	2.9	67.1
Fat (%)	2.9	9.6
Mineral (%)	-	2.8
Calcium (mg)	2.1	160
Phosphorus (mg)	28	60
Iron (mg)	-	39
Vitamin –C (mg)	200-500	1
Sugar (%)	7.35-11.58	
Total acids (mg)	9 to 11	

Cultivation & Collection: This evergreen shrub can be found growing between 300 and 1800 meters above sea level in hilly regions of India, including the Western Ghats and the Himalayas. Aside from higher altitudes in India, states like Bihar, West Bengal, Maharashtra, Karnataka, Rajasthan, Gujarat, and Uttar Pradesh have excellent growth rates for it. [13] The majority of Maharashtra's cropland is dispersed among submountain regions including the districts of

Pune, Ratnagiri, and Kolhapur. In addition to C. carandas L., some other significant cultivated species of Carissa are Carissa grandiflora DC, Carissa ovata, Carissa edulis Vahl., Carissa inermis Vahl. Syn., Carissa macrophylla, C. carandas, and C. spinarum.

In north India, the fruits are in season from July to September. After fruit set, karanda fruits take 100–110 days to develop. Fruits start to take on their natural color at this point. After this point, the fruit ripens, taking around 120 days (after fruit set) to turn soft and achieve a dark purple, maroon, or red hue. Fruits are stored in shade once they have been packed. Mature fruits can be picked and kept at room temperature for a short while. Fruits kept in SO2 solution (2,000 ppm) for six months can be stored.[3]

Climate: It can be grown well in tropical and subtropical climates, although significant rainfall and wet conditions can hinder plant growth. Arid climates with high temperatures are ideal for karonda cultivation. This fruit is not suited for climates with a lot of frost or snowfall. Since the plants are vulnerable to both front harm and cold temperatures. Its cultivation is not appropriate in tropical and subtropical climates' wet places.[9]

Soil: This resilient and drought-tolerant plant thrives in a variety of soil conditions, including calcareous soil, sandy loams, laterite, alluvial sand, and stony, rocky, and less fertile soils. However, alluvial sandy loam soils with adequate drainage offer the best growth and production. Orchards do not do well in clay soil with inadequate drainage. These can be grown in a variety of pH ranges of soil, from 5.0 to 8.0[9].

Manure and fertilizer: It is believed that the most crucial factor influencing productivity and quality is a balanced diet. Karonda reacts differently to fertilizers and manure applied externally based on the soil type, climate, and cultivar. The reaction of fertilizer application varies greatly among locations due to the great diversity of soil and environment. A one-year-old plant should receive 100 grams of a mixture of potash, phosphate, and nitrogen and 5 kg of FYM. For the next three years, this growth should increase at the same ratio. 400 g of an NPK mixture and 15-20 kg of FYM should be given to plants that are four years old or older. June and July, following fruit harvesting, are the ideal months to apply fertilizer (Table 4). **[9]**

Table4: Recommended doses of fertilizer

Year	Quantity/annum/tree			
	FYM(Kg)	Nitrogen (g)	Phosphorus(g)	Potash (g)
1	5	50	25	25
2	10	100	50	50
3	15	150	75	75
4onwards	20	200	75	125

Water Management: The Karonda plant is resilient. Watering the recently planted plants is necessary. In the winter, young plants should be watered every 10–15 days, and in the summer, every 6–7 days. The most common irrigation technique is the flood or basin technique. Drip irrigation, on the other hand, has been proven to be useful for improving growth and using water more wisely. Most mature orchards do not receive irrigation. Moisture conservation is aided by mulching the basin with dried leaves or leftovers.

Harvesting and yield: After the third year, the Karonda plant begins to yield. around the Western Ghats, fruit ripens around April to June, while flowers appear in December to March. Fruits are evaluated for maturity based on color changes. Since not all fruits ripen at the same time, harvesting is typically done three to four times.

Harvesting is carried out by hand. Fruit quality and storage are improved and the amount of latex that leaks from fruits is reduced when fruits are harvested with stock. A plant could produce 4–5 kilogram of fruit. Promising lines put in orchards could produce 10–15 kg of fruit per tree. The fruits keep well at room temperature for three to four days. the fruits used to make pickles, jam, and candies.[9]

Traditional Uses: Karonda is mostly utilized in industrial settings to make pickles, jelly, jam, squash, syrup, and chutney. This is a pleasant summertime drink made from ripe fruit that releases gummy latex when cooked yet produces a rich red liquid that turns clear when cooled. Astringent, ant scorbutic, cooling, acidic, stomachic, anthelmintic, and leaf decoctions are provided in the event of recurrent fever. Unripe fruit also makes a wonderful starter. To control worms in minors, mix a half cup of honey with two drops of plant oil.[10] Since ancient times, carandas (Carissa) have been traditionally utilized to treat a variety of human diseases. As a result, C. carandas has well-established traditional uses. Bitter, stomachic, antidiarrheal, and anti-anthelmintic qualities are attributed to the root. Tarts, puddings, chutneys, and curries all use the ripe fruits. They are used to make jelly when they are just barely underripe. 1 In India, pickles are produced from green, sour fruits. They have been used as a common apple alternative in tarts after the peel and seeds are removed and they are seasoned with honey and cloves. The unripe fruit has astringent properties and is used in medicine. Ripe fruit is used as an antiscorbutic and nauseous treatment. The smooth, hard wood, either white or yellow, can be used to form spoons, combs, kitchen tools, and other turnery items. On sometimes, it is used as fuel.[3]

Pharmacological use of Carissa carandas Linn.

It is well known that Carissa carandas contains a wide variety of phytochemical elements, which provide the plant significant medicinal potential. The pharmacological usage of the plant has been researched by various investigators utilizing in-vitro and in-vivo methodologies and revealed different restorative action for human diseases.[12] The Carissa genus is abundant in several classes of primary and secondary metabolites, such as proteins, lipids, carbohydrates, and flavonoids and tannins, terpenoids, coumarone, lignin, glycoside, tannins, and steroids. Researchers have worked very hard to isolate several chemicals from the wood, roots, stem, and leaves of the Carissa species. From C. spinarum, 93 chemicals have been extracted, including 27 polyphones, 27 lignin, 23 terpenoids, 8 steroids, 2 polyphones, 4 lignin, 20 terpenoids, and 2 terpenoids. From the roots of the caranda plum, a total of 35 polyphenols, including flavonoids and phenolic acids, were extracted belonging to the genus Carissa.[11]

Cardiovascular activity: These days, a wide range of conditions affecting the heart and blood arteries are included in the category of cardiovascular disease, including coronary artery disease, heart attacks, heart failure, excessive blood pressure, and stroke. The World Health Organization estimates that the disease claims the lives of almost 30,000 individuals per day. The effect of C. carandas extract was studied on cardiovascular function of normal rats. When this extract was injected intravenously at a dose of 45 mg/kg, the result was a significant ($p<0.001$) dose-dependent drop in arterial blood pressure. The mean arterial blood pressure significantly decreased (50.75%) after the 45 mg/kg dose.

Following injection of 45 mg/kg of C. carandas extract, a substantial reduction in heart rate frequency was seen ($p<0.001$). The outcomes were similar when using 10-4 M acetylcholine. The ethanol extract of C. carandas was found to have a strong acute hypotensive impact in normal rats. It activates the muscarinic receptors on the

vasculature's endothelial cells. Nitric oxide or endothelial-derived relaxing factors are released in response to this stimulation, and these molecules diffuse to the smooth muscles of the vasculature to induce relaxation. The roots of C. carandas were extracted ethanolically, which demonstrated cardiotonic action and reduced blood pressure.[12]

Antidiabetic activity: By screening methanol extracts and its fractions in alloxan diabetic rats, Prakash R. Itankar et al. assessed the plant's potential anti-diabetic properties. He claimed that there is a significant reduction in methanol extract and its ethyl acetate soluble component. After 24 hours, blood glucose levels following an oral 400 mg/kg dosage were compared to diabetes control. The ethyl acetate soluble fraction's polyphenol content was determined to be 15.8 ± 1.2 mg and 18.55 ± 0.34 mg (gallate equivalent / g extract), respectively, in the methanol extract. The two extracts' flavonoid concentrations were found to be 2.92 ± 0.03 mg and 1.534 ± 0.30 mg (rutin equivalent / g extract). concluded that fractional distillation partially purifies the ethyl acetate fraction for methanol extract, increasing the degree of polymerization and secondary metabolites and contributing to its anti-diabetic potential.[3]

Anticonvulsant activity: There have been reports of C. congesta's ethanolic extract having strong anticonvulsant effects on seizures generated chemically and electrically.through an unidentified method of action.[16] The ethanolic extract of C. carandas root, at doses between 100 and 400 mg/kg, demonstrated a significant reduction in electrically and chemically generated seizures in the study of anticonvulsant activity. However, the mice were only protected to a 25 percent and 50 percent degree, respectively, by 200 and 400 mg/kg of the extract. The animals under examination were spared from tonic seizures caused by pentylenetetrazole and the beginning of tonic seizures caused by picrotoxin and N-methyl-dl-aspartic acid were markedly postponed by the same doses.[12]

Antimicrobial activity: According to reports, C. congesta's ethanolic extract possesses strong antibacterial properties against a variety of test bacteria, including B. subtilis, S. aureus, S. faecalis, E. coli, P. aeruginosa, and S. typhimurium. Furthermore, ethanol extract has demonstrated strong anticandidal activity.[16] Antimicrobial assays of leaves, roots, and stems isolated from various cassia species agents are shown in the overview. The same human pathogen is detected together with gram positive and gram-negative bacterial stains. According to a previous study, all parts of the Carissa species—leaves, roots, stems, and fruits— have good antibacterial action against human pathogens such Salmonella typhi, Bacillus subtilis, Pseudomonas aeruginosa, Enterococcus faecalis, and Klebsiella pneumoniae. The most effective remedy against was determined to be C. spinarum root extract.[11]

Antioxidants and anti-cancer activity: According to a study, human ovarian carcinoma cells and lung cancer were both significantly inhibited by the methanolic extract of C. crandas leaves. Carandinol (3β, 21α-dihydroxyisohopane), a pentacyclic triterpenoid that was extracted from the leaf extract, shown considerable cytotoxicity to all examined cell lines (PC-3, 3T3, and HeLa) in vitro. It was comparatively more hazardous to the human cervical cancer (HeLa) cell line. Chloroform, n-hexane, and methanol extracts of C. carandas fruits had strong anti-cancer effects on human ovarian carcinoma and lung cancer cells in a different study. On MCF-7 cancer lines, the anticancer and antioxidant properties of the methanolic extract were examined using uncommon antioxidant enzymes as glutathione transferase, catalase, dismutase, superoxide, and glutathione. It exhibited significant antioxidant activity and fortification of cell death in MCF-7 cell line. The antioxidant activity is mainly due to

the presence of ascorbic acid and phenolic compounds. It was reported by another investigator that methanolic extract of the leaf exhibited significant ($P<0.05$) antioxidant and DNA damage inhibition potential with dose dependent at MIC_{50} 73.1 g/mL and 84.03l g/mL against 1, 1diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity and H_2O_2 scavenging activity respectively compared to ascorbic acid and gallic acid taken as standards. These samples' optical densities were measured at 517 nm in conjunction with a blank that contained 1 ml of methanol and 1 ml of DPPH solution. Using a DNA damage inhibition experiment, pBR 322 plasmid DNA was protected against oxidative stress caused by free radicals.[12] Carrissa carandas extracts were evaluated for their anticancer activities. The leaves, mature and unripe fruits of Carrisa carandas were extracted in three phases utilizing n-hexane, chloroform, and methanol as the solvent systems. In this work, human ovarian carcinoma Caov-3 and lung cancer NCI cells were used to assess the anticancer properties of plant extracts. Chloroform extracts from leaves showed good anticancer activity against the Caov-3 with the EC50 value of 7.702 ug/ml while the n-hexane extract of the unripe fruit reveal a remarkable activity towards the NCI with the EC50 value of 2.942ug/ml when assayed utilizing the methylene blue assay (MBA).[14]

Anti-inflammatory and Anti-pyretic activity: The leaf of C. carandas exhibited anti-inflammatory and antipyretic properties in its methanol extract. In comparison to the usual medication indomethacin, the extract at a dose of 200 mg/kg body weight demonstrated the highest level of inflammation inhibition, measuring 72.10%, 71.90%, and 71.80% at the end of three hours with histamine, dextran, and carrageenan-induced rat paw edema, respectively. Albino rats induced with pyrexia caused by Brewer's yeast were used to test the anti-pyretic efficacy. When compared to paracetamol at a dose of 150 mg/kg, he extracts at 100 and 200 mg/kg shown strong anti-pyretic efficacy [3]. The method used to compute the percentage of inhibition was % inhibition=Vc-Vt/Vc × 100 [11].

Antiviral activity: Effective antiviral action against the poliovirus HIV-1 at 6 mg/ml, the sindbis virus at 3 mg/ml, and the herpes simplex virus at 12 ug/ml is demonstrated by the ethanolic extract of C. carandas fruits. The antirhumatic properties of C. congesta's root were well-known. Atropine-like spasmolytic efficacy, antizymotic and antibacterial properties were demonstrated by isolated carissone derivatives. Studies have also been conducted on fruit's lipase activity. In an early pharmacological screening, an aqueous extract of the root showed anthelmintic, spasmolytic, cardiotonic, and hypertensive effect. According to reports, C.congesta possesses strong antipyretic properties as well.[12 and 16]

Antibacterial activity: MIC, minimum bacterial concentration, total activity, mean, and standard deviation were computed during the disc diffusion experiment used to examine the antibacterial activity of extracts from the leaves, roots, and stems of Carissa carandas. The organism that proved to be most vulnerable was Streptococcus aureus, which was followed by B. subtilis and E. coli. The most effective flavonoid against B. subtilis was found in roots (IZ = 15 mm, MIC = 0.312 mg/ml, MBC = 0.156 mg/ml, TA = 3.20 ml/g).[11]

Antidiarrhoeal activity: Comparing C. carandas at 200 and 400 mg/kg to the conventional medication loperamide (5 mg/kg), a significant reduction in the overall amount of moist feces was observed. When compared to atropine sulfate, the conventional medication, even the ethanol component of both plant parts reduced the propulsion of charcoal meal through the gastrointestinal tract (GIT). The results showed that the effects of the greatest doses of both plant

part extracts were identical, with the plants containing steroids having the potential to improve the intestinal absorption of water and sodium ion (Na+). Standard medication ethanolic fruit (EFC) and root (ERC) extracts. It is determined that the plant possessed antidiarrheal properties.[13]

CONCLUSION:

The purpose of the evaluation is to offer guidance for future clinical research aimed at promoting safe and efficient herbal remedies for treating various ailments.[05] Carissa, a plant species containing Kaempferol, exhibits potential therapeutic benefits, including antioxidant, anti-inflammatory, and neuroprotective effects. The traditional uses of Carissa in Ayurvedic and folk medicine also highlight its potential value in preventing and managing various diseases. However, further research is necessary to confirm the efficacy and safety of Carissa and Kaempferol for specific uses, particularly in human clinical trials.

Future Directions:

Future studies should focus on elucidating the molecular mechanisms underlying Kaempferol's pharmacological effects, investigating its potential interactions with conventional medications, and conducting clinical trials to confirm its therapeutic benefits.

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