IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Terminalia Arjuna

A REVIEW ON THE PHARMACEUTICAL PLANT DRUG (TERMINALIA ARJUNA), THEIR USES AND PHARMACOLOGICAL STUDIES.

Pooja D. Mane, Akshada R. Hole, Tejashri K. Sapre

Pursing in B Pharmacy in Sarsam College of pharmacy, Pune, Maharashtra, India.

Principal. Sushil Waghmare Sir

ABSTRACT

Terminalia Arjuna, also generally appertained to as T. arjuna, is an evanescent tree that belongs to the family Combretaceae. It can be set up in numerous regions of India. T. arjuna is a 60-80 bottom altitudinous tree set up alongside rivers, gutters and courses each over the Indo-sub-Himalayan areas of Delhi, Uttar Pradesh, Chota Nagpur, the southern part of Bihar, Madhya Pradesh and Deccan regions.

Medicinal plants have been a main source of remedial agents from ancient time to cure conditions. Terminalia arjuna (Roxb.) Wight and Arn. (T. arjuna) is one of the most accepted and salutary medicinal shops in indigenous system of drug for the treatment of colourful critical conditions. This comprehensive review provides colourful aspects of its ethnomedical, phytochemical, Medicinals, pharmacological and clinical significance to different conditions particularly in cardiovascular conditions. This factory has a good safety figure when used in combination with other conventional medicines. This review highlights colourful medicinal properties of T. arjuna through different studies similar as antioxidant, hypotensive, anti-atherogenic, anti-inflammatory, anti-carcinogenic, anti-mutagenic and gastro-protective effect.

Keywords: Terminalia arjuna, cardiotonic, saponin, arjuna bark, Arjunolic acid, Anti-carcinogenic, Anti-inflammatory.

INTRODUCTION

Terminalia arjuna (Family: Combretaceae) is a large tree, it's distributed throughout the South Asian region. It's one of the most resourceful medicinal shops with a wide range of natural conduct [1]. In Ayurveda, it's well honoured for Jaiswal etal., its colourful remedial value [2,3]. The factory is also known as a potent cardiotonic since ancient times [4]. In Ayurvedic textbooks (Indian medical system), it's useful in ecchymosis, spermatorrhoea, and sexually transmitted conditions similar as gonorrhoea. Terminalia arjuna has tangy, cooling, aphrodisiac, cardiotonic parcels and is used for the treatment of cough, leucorrhoea, inordinate perspiration, ulcer, diabetes, excrescence, asthma, inflammation, and numerous skin diseases [5]. Lately it has been proved that powdered dinghy excerpt of the factory has veritably good implicit for coronary heart complaint [6,7].

The factory has also the implicit to cure hepatic, natural, venereal and viral conditions, dinghy greasepaint is reported to parade hypocholesteroleic and antioxidant goods [8]. Several chemical ingredients have also been exported from the stem dinghy portion of Terminalia arjuna similar as hydrolysable tannins [9] triterpenoids acid and their glycosides [10,11], flavonoids [12], phenolics [13], phytosterol [14]. In addition, arjunic acid, arjunolic acid, arjuna glucoside I-III, arjunetin, and terminotics acid belong to the group of important ingredients of the dinghy [15].

Terpenoids saponins like arjunic acid, arjunolic acid, arjunetin, arjuna glycosides, flavonoids (luteolin arjunone, arjunolone), gallic acid, ellagic acid, and phytosterol are also set up in a rich quantum n the dinghy part of the factory [16,17,18,19]. Although, multitudinous studies have shown numerous phytocompounds that are produced within the factory, still factory has ample compass for farther exploration to probe new lead composites. Present review reports the colourful pharmaceutical significance of the factory.

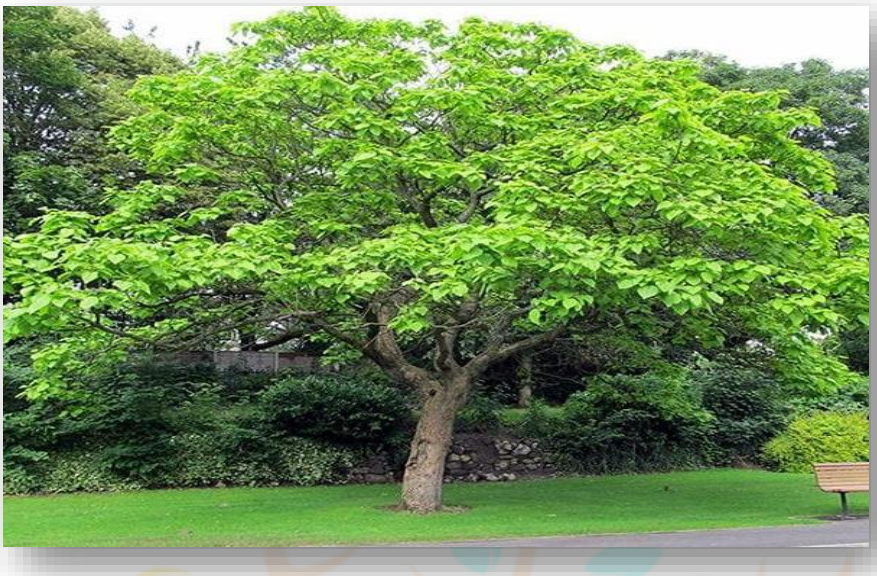

Figure (1): ARJUNA TREE (TERMINALIA ARJUNA)

HISTORY

The name terminalia is deduced from Latin, 'Terminalia' due to terminal crowding of the leaves in numerous species of the rubric Terminalia. It belongs to the family combretaceae. It's a large evanescent tree with buttressed roots, and reaches up to 60-70 bases. Stem is covered with white Argentine dinghy which changes its colour to pink according to season and age of the dinghy, and flakes off in large flat pieces from the box.

The factory has a long history of medicinal uses in India. First time described by Vagbhata (a notorious ayurvedic expert in ancient times) as per ayurvedic croaker had the print that the dinghy of this tree had some special virtue in promoting the union of fracture and dissipation of ecchymosis when given internally [20].

SCIENTIFIC CLASSIFICATION OF ARJUNA

Kingdom	Plantae
Class	Dicotyledons
Subclass	Polypeptalae
Series	Calyciflorae
Order	Myrtales
Family	Combretaceae
Genus	Terminalia
Species	Arjuna

NAMES

- **ENGLISH NAME:** Arjun Tree.
- **HINDI NAME:** Arjun.
- **SANSKRIT NAME:** Dhavala, Nadisarja, Indradru, Phalguna, kakubha, Veerantaka, Pandava, Partha, Virarksha, Dhoorta, Veeravruksha, Bhuruha .

- **BENGALI NAME:** Arjun Gach.
- **GUJARATI NAME:** Sadado.
- **MALYALAM NAME:** Adamboe, Chola, Poomaruthu, Manimaruthu, Venmaruthu.
- **MARATHI NAME:** Sadaru.
- **TAMIL NAME:** Poomarudhu, Neelamarudhu.
- **TELUGU NAME:** Tella Maddi.
- **KANNADA NAME:** Neer Matti, Holemaththi, Holedaasaala.

MORPHOLOGY OF ARJUNA

HABITAT: Plant of Arjuna is set up in everywhere in Indian aeroplanes similar as from bottom hills of Himalaya, Bihar, Bengal and Madhya Pradesh. Arjuna factory grows huge (21,22).

BARK: Dinghy of Terminalia Arjuna is simple, slate and smooth on external face. The dinghy is thick, soft and of red colour from outside.

Figure (2): BARK OF TERMINALIA ARJUNA

THE LEAVES

Dinghy was set up an important element of the factory, possesses a wide range of natural conditioning. The waterless excerpt contains 23 calcium mariners and 16 tannins whereas a veritably little quantum of tannins and colouring matter was set up in the alcoholic excerpt of dinghy [23]. Farther, the presence of sugar, tannins [12], colouring matter, glucosides, and carbonates of calcium, sodium, and traces of chloride of alkali essence were also verified by chemical analysis of the dinghy part [24]. Latterly studies of dinghy showed the presence of alkaloids and glycoside.

Glycoside was attained as an organic acid with a high melting point, phytosterol, as an organic ester fluently hydrolysed by mineral acids, pyrocatechol constituted 12 of tannins, calcium mariners were set up in large volume while aluminium and magnesium mariners were set up in large volume while aluminium and magnesium mariners were in lower quantum some colouring matter and sugar were also present in the dinghy [25]. It was observed that glycoside can increase the force of compression of the frog heart [26].

Figure (3): TERMINALIA ARJUNA LEAVES

FRUIT OF TERMINALIA ARJUNA: The fruits are 1-1.5 inch in fringe and with 5-7 longitudinal lobes. These are rough with five to seven bodies, woody and stingy. Fruits is drupe and is constantly indented near the top, marked with oblique upward curving stria

Figure (4): Fruit of Terminalia Arjuna

Figure (5): Fruit of Terminalia Arjuna (Image No. 2)

FLOWERS OF TERMINALIS ARJUNA: White or yellowish flowers ae set up in groups. Flow earing occurs in summer and fruits appear in downtime or spring season.

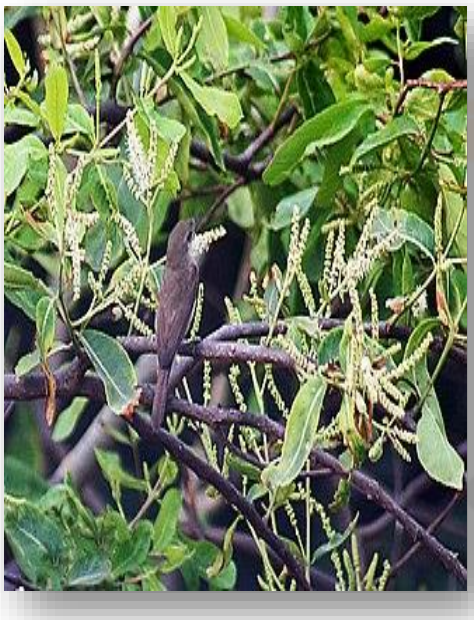

Figure (6)

Figure (7)

Flower of terminalis Arjuna

ROOTS: Multitudinous studies revealed insulation of phytocompounds from its root part, Triterpene carboxylic acid, terminic acid, and arjunoside III and IV were insulated from the root excerpt of ethyl acetate Anjaneyulu and Prasad, (1982 a, b). Latterly n hexane excerpt of root was studied for the insulation of terminic acid along with b-sitosterol, this was significant since lup-20 [27]- en secondary first time insulated from nature [28].

Figure (8): ROOTS OF TERMINALIA

CHEMICAL INGREDIENTS

It was originally reported that dinghy had 34 ash content conforming entirely of pure calcium carbonate. The waterless excerpt revealed 23 % calcium salts and 16 % tannins, whereas the alcoholic excerpt contained veritably little colouring matter and tannins. Latterly chemical analysis of the dinghy showed substantiation of sugar, tannins (12 %), colouring matter, a glycoside, and carbonates of calcium, sodium and traces of chloride of alkali essence. Latterly presence of an alkaloids as well as a glycoside was verified. The glycoside of able of adding the force of compression of the frog heart. Attempt to insulate the glycoside redounded into finding of an organic acid with a high melting point, a phytosterol, an organic ester fluently hydrolysed by mineral acids, nearby 12 % tannins conforming largely of phyrocatechol tannins, large amounts of calcium and lower quantities of aluminium and magnesium mariners, colouring matter and sugar.

RASA PANCHAKA OF ARJUNA:

RASA (TASTE)	Kashaya (Astringent)
GUNA (VIRTUE)	Laghu (Light). Ruksha (Dry)
VIRYA (POTENCY)	Sheet (Cold potency), Ushana (Dry potency) by Dhanwantri Nighantu
VIPAKA (POST-DIGESTION)	Katu (Pungent)

USES OF TERMINALIA ARJUNA:

Following conditions in which Arjuna is extremely salutary:

- **Cardio Modulator**
- **Blood pressure**
- **Hypo Lipidaemia**
- **Hyperactive Lipidaemia**
- **Hypercholesterolemia**
- **Reduce stress**
- **Liver alcohol**
- **Urinary tract colour**

Arjuna is truly helpful in treating various health related problems. Below are conduct of Arjuna as per the body's organ system.

- **Cardiovascular System:** Terminalia arjuna is one of the swish cardio protection agents. Since time old, Arjuna has been a seasoning of choice in dealing with various forms of heart related problems. It's largely effective in nurturing the heart

and its muscles. It's truly helpful in proper contraction and relaxation of the heart muscles. It's also helpful in conservation of proper heartbeat. It is also truly effective constricting the blood capillaries that is truly essential for proper working of heart; further over it's helpful in adding the blood density. It's also helpful in dilation of the blood vessels and is truly effective in coagulation of the blood in case of any injuries and additional essential for maintaining proper viscosity of the blood.

This is truly helpful in stimulation of the heart for its working in the most optimized situations. This property of coagulation is attained by due to the presence of Kashaya rasa i.e., pungent taste in it. In a disquisition conducted indicated that the 70 alcoholic extract of terminalia arjuna produced hypotension of supplemental origin and support the claims of its traditional operation as cardiovascular medicine. The observed effect could be due to adrenergic b 2 -receptor agonist quip and /or direct action on the heart. Detailed studies on the active constituent are demanded which might give new perceptivity in cardiovascular drugs.

A report published in journal of disquisition in Education in Indian Medicine (1988) has started Arjuna to be enjoying anti-hypertensive, cardiotonic, diuretic parcels. Hypolipidemic property has been published in International Journal of crude drug Research. It has been shown to increase the HDL- C situations Indian Medical Gazette (1992) has started that. Arjuna bark extract in cure of 500 mgm with other drugs given for three months improves Treadmill test and Exercise forbearance extensively without any side goods in Angina cases. Arjuna also possesses coenzyme Q10. This Coenzyme Q10 is being specified to cardiac cases for preventing heart attacks. Its protective cardiovascular effect was due to its combined goods like hypolipidemic effect, drug capsule dependent reduction in heart rate and blood pressure.

- **Mechanisms:** Improvement of cardiac muscle function and posterior advanced pumping exertion of here seems to be the primary benefit of terminalia. Recently, two new the main action of these cardenolides is to increase the force of cardiac compression by means of a rise in both intracellular sodium and calcium.
- **Original action:** Arjuna, is one of the swish blood coagulants. It's wide used in stopping external haemorrhages as it has the power to congeal blood and constrict the blood vessel locally to stop the blood let. It's applied on the crack to get the instant results. Arjuna is also one of the most important herbal supplements that is known for its healing powers. Good vaticinations have been seen in cases of injuries and injuries especially in cases like bone, ligaments and cartilaginous injuries. It's also applied on the injuries to attain early healing and recovery from it.
- **Digestive System:** It's also salutary in maintaining proper condition in our digestive tract. Due to its pungent parcels it's truly helpful in treating up of the diarrhoea and dysenteric condition in the body. It regulates the peristaltic movements in the body and does not allow dehydration leading to loose feces. Arjuna is Kashaya in nature that is extremely helpful in condition like bleeding piles and dysentery. It's a general health alcohol and a good reedy in perfecting liver condition like bleeding especially cirrhosis of liver.
- **Respiratory system:** Arjuna is also considered salutary in expelling out the spare amount of mucus that somehow gets accumulated in the respiratory tract. It's also helpful in preventing the accumulation of the mucus thereby helpful in toning up of the respiratory tract. It's also helpful in keeping down with the infections in the lungs and also facilitates the increase in the lung capacity.
- **Nervous system:** It's also considered a good nervine alcohol. Though it's a matter of disquisition but good results have been seen. It provides strength to the nervous system and also strengthens the distastes.
- **Reproductive system:** Arjuna being pungent in nature helps in thickening of the serum and the sperm that is truly essential for the proper fertilization of the ovum. It's also helpful in adding the sperm count and also is helpful in adding the overall stamina of the body.
- **Endocrinal system:** It's also truly helpful in regulating the hormonal system of the body. It's extremely helpful in maintaining the proper stimulation to the endocrine gland.
- **Excretory system:** It's helpful in polyurea condition and is also helpful in homogenizing the increase urine frequency. It's also helpful in fading down the infection in the body.
- **Skin:** It's truly useful in treating all kinds of skin related problems. Due to its cold energy, it's largely recommended in skin affections. Affections like eczema, itching, rashes scars and serious skin conditions like psoriasis can also be treated with the regular use of Arjuna.

PHARMACOLOGICAL STUDIES

According to multitudinous ancient Indian medicinal literature including charaka Samhita and Astana Hridayam, the bark of Terminalia arjuna (family Combreatacease) is an Ayurvedic remedy that has been to retain cardioprotective parcels and is used to treat several affections [(29)]. Cardioprotective exertion Terminalia arjuna has reacted in significant stimulant action on frog and rabbit hears. It acts as a cardiotonic due to the presence of glycoside in tis bark [(30).] Glycoside also reacted in enhancing blood pressure. (Ghosh, 1926). Alcoholic extract of bark increases the force of contraction of frog heart [(31)]. Subsequently studies vindicated that intravenous administration alcoholic extract fitted into rabbit cure (1024 mg/ml) reacted in to rise in coronary flux [(32)]. Goods of Terminalia species of plant of the cardiovascular system were studied in the insulated frog, rat's gallerias, and isolated perfused frog and rabbit hearts. It was reported that the alcoholic extracts of three Terminalia species videlicet, Terminalia arjuna wight & Arn; Terminalia Billerica Roxb. And Terminalia, Displayed negative inotropic and chronotropic goods on the heart in a cure dependent manner [(33)]. Interestingly the arid extract of the bark in insulated rat gallerias demonstrated positive inotropic exertion [(34)]. This was again vindicated in posterior work where an arid extract of the bark in insulated rat gallerias produced inotropic action

which was abolished by propranolol and cocaine [35]. Hypotensive goods – effect of Terminalia arjuna on blood pressure was studied fairly late whereas before it was used as an antihypertensive [36]. Also, infection of the both arid and alcoholic extract could block hypotension and bradycardia singly [37]. In another study intravenous administration of arid extract in hound reacted in reductio in blood pressure. When different pulses of the arid extract were conducted to anesthetized hounds, also 40mg/ kg cure reacted in a fall in blood pressure for about 90 beats.

Myocardial ischemia was defended by Terminalia arjuna in rabbits [38]. Isoproterenol- induced myocardial necrosis in rats was studied by using a conflation containing Terminalia arjuna 20 mg per tablet (Abana). The drug showed a reduction in serum CPK, SGOT, SGPT, and glycogen situation in ischemic rats were also dropped. Further reduction in mitochondrial enzymes analogous as g – GT and superoxide dismutase SDH) by 44 and 48 singly from the drug. [39]. The high flavonoid content of Terminalia arjuna was reported for salutary effect in CAD. Myocardial ischemia was induced in rabbits and treated with Terminalia arjuna bark cream 500 mg twice daily, after 90 days incubation it was observed that aortic prostaglandin E2 like exertion was increased. This may increase coronary flux [40]. Myocardial necrosis is defended by arjunolic acid [41]. Ischemic perfuse rats were treated with crude extract of Terminalia arjuna reacted in the addition off endogenous antioxidant mixes of rat heart thus heart defended from oxidative stress induced by catecholamine were also defended by the stem bark of Terminalia arjuna [42].

The hypolipidemic effect of the dinghy of terminalia arjuna was studies in the high cholesterol-fed rabbit. Latterly, it was set up that the ethanolic excerpt of dinghy greasepaint, at a cure of 100mg/kg significantly reduced the total LDL position and cholesterol in hypercholesterolaemia rabbits [43] and there was low- fat deposit in the heart, liver, and, order. The excerpt hadn't any adverse effect on biochemical parameters of liver and renal function and haematological parameters [44]. Still, the excerpt didn't show any significant in HDL position this observation was relatively different from earlier workshop. Atherosclerosis was also averted by ethanolic excerpt of Terminalia arjuna, Terminalia Billerica, Terminalia chebula, Terminalia arjuna was set up the most potent hyperlipidaemic agent [45]. The stem of Terminalia arjuna is used as a cardioprotective agent in hypertension, heart conditions, hypocholesterolaemia, and antioxidants effect in Hymans [8]. Ethanol excerpt of dinghy of Terminalia arjuna possesses antihyperlipidemic rats were treated with a cure of 250mg/ kg body weight ethanol excerpt performing in lowering effect of elevated tube position of total cholesterol (T C), triglyceride (TG), and phospholipid. Also, ether and ethanol excerpt also possess antidyslipidemic exertion. It may possible that arjunic acid and its derivation of ether and ethanol excerpt converted to its active constituents through hepatic medicine metabolism waterfall, and is responsible for lipid lowering exertion [1]. The cardioprotective effect of Terminalia arjuna dinghy is intermediated through a reduction thyroid function by using21.42 and mg/ kg of factory excerpt [46].

Antioxidant Conditioning shops have multiple types of antioxidants. For the last three decades, mortal health is maintained by natural factory grounded antioxidants [46]. The oxidants conditioning of Terminalia arjuna have been studied veritably lately. The crude excerpt has significant effect to compound endogenous antioxidant composites [48]. Latterly it was Jaiswal etal. 8 verified, when myocardial ischemic rats were treated with alcoholic excerpt of Terminalia arjuna results in a raised position of glutathione, superoxide dismutase, and catalyse exertion [49]. Free revolutionaries scavenging conditioning are also increased in polymorphonuclear cells by arjungenin and its glucoside, Arjun glucoside II [50]. Waterless excerpt of Terminalia arjuna protects mortal tube LDL from bobby intermediated oxidation [51]. Essence ion-convinced oxidative declination of lipids in mortal LDL and rat liver microsomes was also supressed by using ethanolic excerpt of Terminalia arjuna [1]. The high quantum of DPPH (2,2-diphenyl-1-peicrylhydrazyl) free revolutionary, ascorbic acid, ferric reducing power present in methanolic excerpt of Terminalia arjuna stem dinghy were set up largely reactive for antioxidant and free revolutionary scavenging conditioning [52]. Wound Healing activity Would heal bioactivity is also contributed by the dinghy of Terminalia arjuna is mentioned id Sushruta Samhita [53]. Hydroalcoholic excerpt of dinghy terminalia arjuna was applied on dermal injuries of rats. It was observed that tannins were set up more effective than saponin for complete epithelialization [54]. Triterpenoids composites present in the dinghy of Terminalia arjuna, also have a salutary effect on the rejuvenescence of bone and muscle towel of frogs [55]. Ethnical healers of Orissa and Eastern Ghat (India) also used dinghy paste of Terminalia arjuna for shattered bones of creatures as well as mortal beings [55].

Anti-inflammatory Conditioning Arjun Olic acid also showed anti–inflammatory exertion, it inhibits the arachidonic acid-convinced observance edema by 55.5 It affects the cyclooxygenase and adding its Anti-inflammatory conditioning [56]. Antidiabetic conditioning streptozotocin- convinced diabetes in Swiss albino rats have been treated with arjun Olic acid at a cure 20 mg/kg body weight reduces the increased position of ROS and RNS (Reactive Oxygen Species, Reactive Nitrogen Species) and also regulates the mitochondrial- dependent signal transduction pathway leading to apoptotic cell death, therefore arjun Olic acid has salutary part against diabetes [57]. STS-convinced diabetic renal injury in rats was treated with a cure of 20 mg/kg body weight. It reduces oxidative, nitrosative stress, and multiple foci of haemorrhagic necrosis and cloudy swelling in tubules of the order. Antiasthamatic exertion mast cell dislocation releases histamines, acetylcholine, etc. Alcoholic excerpt of Terminalia arjuna which contains arjun Olic acid was set up significant for mast cell stabilization [58], histamine causes bronchoconstriction leads to asthma. Terminalia arjuna act against histamine and acetylcholine [59]. Acetylcholine convinced bronchoconstriction, secondary to stimulation of histamine. Therefore, Terminalia arjuna has antiasthmatic and antianaphylactic exertion [58,60]. Antitumor activity cancerous cells are generally treated with antitumor medicines that beget DNA damage thereby leads to apoptosis [61]. Terminalia arjuna deplete GSH situations and promote oxidation induction that results in apoptosis of HepG2 cells, due to the accumulation of p53 protein and proteolytic fractionalization of caspases- 3 protein [62]. Luteolin has antimutagenic exertion, it inhibits the growth of the cancerous cell. Ethyl gallate and gallic acid have antimutagenic action.

It was reported that gallic acid includes cell death in colourful converted cell lines similar as PLC/PRF/5 (mortal hepatoma) HL-60, RG (mortal promyelocytic leukaemia), and P388D1 (mouse lymphoid lump) [63]. The dinghy of the factory has been reported

as a potent Jaiswal etal 9 chemo preventive agent against N nitrosodiethylamine convinced liver cancer [64]. The waterless excerpt significantly averted excrescence conformation. DMBA (7,12 dimethyl Benz(a) anthracene) convinced hamster buccal poke. Carcinogenesis was reduced by inhibition of lipid peroxidation and elevated antioxidant eventuality in creatures. The Chemo preventive effect of Terminalia Arjuna is due to the presence of several bioactive composites and their synergistic effect [65]. Tannic acid, flavonoid (luteolin) insulated from Terminalia Arjuna also inhibit the excrescences and leukaemia [66]. Terminalia arjuna excerpt have been also reported for inhibition of growth osteosarcoma (U 205) and glioblastoma (U251) [67].

Antimicrobial exertion Dinghy excerpt of Terminalia arjuna possesses antibacterial exertion. Arjunic acid and its glycosylated secondary arjunetin showed antimicrobial exertion against Staphylococcus epidermidis. Dinghy excerpt has shown significant antibacterial exertion against Staphylococcus aureus (MTCC 96), Staphylococcus epidermidis (MTCC 435), Streptococcus mutans (MTCC 890), Bacillus subtilis (MTCC 121), and Mycobacterium smegmatis (MTCC 155). The crude excerpt has shown exertion against Klebsiella pneumonia (MTCC 109) and Enterococcus faecalis (MTCC 439) [68]. Antibacterial exertion against both Gram-positive and Gram-negative bacterial species Bacillus megatherium, Bacillus subtilis, Staphylococcus aureus, Sarcina lutea, and eight strains of Gram-negative bacteria- Salmonella Para typhi, Salmonella typhi, Vibrio parahaemolyticus, Vibrio mimicus, Escherichia coli, Shigella dysenteria, Pseudomonas aureus, and Shigella boydii was reported in a crude excerpt of dinghy of Terminalia arjuna. Also, 100 ethanol excerpts also possess antibacterial exertion against Vibrio cholera [69]. The antimicrobial eventuality was observed in 50 ethanol excerpt of dinghy of Terminalia arjuna against Bacillus megatherium, Bacillus subtilis, Staphylococcus aureus, Sarcina lutea, and eight strains of Gram negative bacteria- Salmonella para typhi, Salmonella typhi, Vibrio para haemolyticus, Vibrio mimicus, Escherichia coli, Shigella dysenteries, Pseudomonas aureus, and Shigella boydii and maximum inhibition was set up ins Dysenteries followed by S. Para typhi, S. typhi, V. mimicus, E.coli, P. aureus, S. boydii, B. megaterium, S. aureus, S. lutea, B. subtilis, and V. parahaemolyticus.

Result indicates that ethanol excerpt of dinghy of Terminalia arjuna possess broad-diapason antimicrobial eventuality. Stem dinghy samples, apical dinghy, middle dinghy, mature dinghy of Terminalia arjuna were studied for antimicrobial exertion against different pathogenic bacteria similar as Bacillus subtilis, Staphylococcus aureus, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa, Salmonella typhi, Micrococcus, and Proteus mirabilissp. Methanol excerpt of apical dinghy was set up more effective than middle and mature dinghy against all organisms but Staphylococcus aureus was most sensitive.

BENEFITS OF ARJUNA

1. Arjuna has a pungent effect which acts to detoxify the blood. Its homeostatic parcels help to relieve bleeding conditions and control aggravated pitta countries.
2. The general sanctification effect of this seasoning helps to clean urinary infection (UTI).
3. In ladies it can be used to support the uterus and regulate the hormonal cycle. It's given in all kinds of hormonal imbalance, fibroids, excrescencies and endometriosis etc. This seasoning can help to relives spare bleeding in menorrhagia. In this way, it helps to heal injuries and ulcerations.
4. This seasoning is mainly known as a cholesterol lowering. It helps to control the blood cholesterol situations and can be good for people having atherosclerosis in which cholesterol pillars block roadways at one or multiple spots.
5. It has remedial goods over respiratory system also. As it helps to keep the airways to clear and supports to fight serious long illness.
6. Being cardiac alcohol Arjuna helps to meliorate energy situations in the body and stimulates stamina so that people can work in a better way without feeling too stressed-out-eschewal and fatigued.
7. Because of its pitta pacifying parcels, arjuna can be given in all kinds of external and internal bleeding problems and conditions associated with it.
8. Be it bleeding bonds, menorrhagia, devilish bleeding from open injuries etc.
9. The tannins present in Arjuna extracts act as truly useful antioxidants for the body. Co-Q10 which is truly important for the heart muscles, is abundantly set up in Arjuna tree bark. It stabilizes the heart when one is suffering from angina or is susceptible to develop it.
10. It can also be truly useful for cases having fractured bone. This alcohol helps to heal the bones at a faster rate.
11. It pacifies kapha and pitta dosha.

SIDE EFFECT, CAUTION

It's side goods or adverse goods are not well reported but rather it's used in limited dosage, high cure may have liver problems and reduced thyroid gland exertion. Terminalia arjuna has been used in the cure of 1-2 g/day in various clinical studies, numerous side goods are mild gastritis, headache, and constipation. No toxic goods in haematological metabolic, renal, and hepatic exertion have been reported after its administration indeed after further than 24 months.

CONCLUSION

The effectiveness of Terminalia arjuna has been proved by its scientific evaluation of multitudinous bioactive ingredients like glycosides, flavonoids, tannins, and minerals and their cardioprotective- seditious, lipid- lowering, antimicrobial, antitumour exertion, protection against poison, etc. Further studies are also demanded to isolate and characterize, functional group of

pharmacologically active mixes by which they parade various remedial conduct. Studies on molecular mechanism in different cells, immunological markers, and emulsion of phytocompound and evaluation of its poison have to be finished.

REFERENCES

1. Chandar R, Singh K, Khanna AK, Kaul SM, Puri A, Saxena R, Bhatia G, Rizvi F, Jaswal et al. 11 Rastogi AK. Antidislipidemic and antioxidant conditioning of different fragment of T. arjuna stem dinghy. Indian Journal of Clinical Biochemistry. 2004;19(2):141-148
2. Kalola J, Rajani M. Extraction and TLC densitometric determination of triterpenoid acids (Arjungenin, Arjunolic Acid) from Terminalia arjuna Stem Bark Without Interference of Tannins. Chromatographia. 2001; 63: 475-481.3
3. Nadkarni KM.Terminalia arjuna. Indian Materia Medica Popular Prakashan. India. 2000; 1:1198 – 1202.
4. Yesodharan K, Sujana KA. Ethnomedicinal knowledge among malamalasar tribe of parambikulam wildlife sanctuary, Kerala. Indian J. of Traditional Knowledge. 2007;6(3):481-485.
5. Paarakh PM. Terminalia arjuna (Roxb.) wt. and arn:A review. Int. J. Pharmacol 2010; 6:515- 534.
6. Maulik SK. Focused conference group:Natural product:past & future? Role of Terminalia arjuna An Indian medicinal plant in cardiovascular disease. Basic and Clinical Pharmacology& Toxicology. 2010; 107:445-446.
7. Shukla SK, Dwivedi S, Sing SB, Sharma UR. Terminalia arjuna as a therapeutic and preventive modulator in experimentally induced myocardial infarction. Diabetes and vascular disease research 2011; 8:1:80- 81.
8. Gupta R, Singhal S, Goyle A, Sharma VN. Antioxidant and hypocholesterolemic effects of Terminalia arjuna tree-bark powder:a randomized placebo-controlled trial. J. Asso. Physician, India. 2001; 49:231- 235.
9. Kandil FE, Nassar MY. A tannin anticancer promoter from Terminalia arjuna. Phytochem. 1998; 47:1567- 1568.
10. Tripathi VK, Pandey VB, Udupa KN, Rucker G. Arjunolitin, a triterpene glycoside from Terminalia arjuna. Phytochem. 1992; 31:349 – 351.
11. Ahmad MU, Mullah KB, Norin T, and Ulla JK. Terminoic acid, a new trihydroxy triterpene carboxylic acid from the bark of Terminalia arjuna. Indian J. Chem. 1983; 22:738- 740.
12. Sharma PN, Shoeb PN, Kapil RS, Popli SP. Arjunolone—a new flavone from the stem bark of Terminalia arjuna. Indian Journal of Chemistry. 1982;21B:263–264.
13. Anjaneyulu, ASR, Prasad AVR. Chemical examination of the roots of Terminalia arjuna (Roxb) Wight and Arnt. Phytochem. 1982; 21:2057–2060.
14. Row LR, Murty PS, Subba Rao GSR, Sastry CSP, Rao KJV. Chemical examination of Terminalia species XIII. Isolation and structure determination of arjunic acid, a new trihydroxytriterpene carboxylic acid from the Terminalia arjuna bark. Indian J. Chem. 1970; 8:716–721.
15. Honda T, Murae T, Tsuyuki T, Takahashi T, Sawai M.Arjungenin, Arjunglucoside I, and Arjun glucoside II. A New Triterpene and New Triterpene Glucosides from Terminalia arjuna. Bull. Chem. Soc. Jpn. 1976; 49:3213.
16. Miller AL. Botanical influence on cardiovascular disease Alt. Med. Rev 1998; 3:422.
17. Kusumoto I, Nakabayashi T, Kida H, et al. Screening of various plant extracts used in ayurvedic medicine for inhibitory effects on human immunodeficiency virus type 1 (HIV-1) protease. Phytotherapy Res. 1995; 9:180-184.
18. Jain V, Poonia, A, Agarwal RP, Panwar RB, Kochar DK, Mishra SN. Effect of Terminalia arjuna in patients of angina pectoris (A clinical trial). Indian Medical Gazette (New Series). 1992; 36:56–59.
19. Chopra NR, Nayar SL, Chopra IC. Glossary of Indian Medicinal plants, New Delhi: C.S.I.R Publication. 1956;241.
20. Bhava mishra, Bhavaprakasha, Choukhamba publications, Varanasi; 1998
21. http://www. herbs2000.com
22. http://www.neeroga.com
23. Dymock WM, Warden GH, Hooper D, Pharmacographica India. Thodkar Spink Company, London; 1891.
24. Ghoshal LM, Terminalia arjuna. Ph.D. thesis, Calcutta University, Calcutta, India; 1909.
25. Chopra RN, Ghosh S. Terminalia arjuna:its chemistry, pharmacology and therapeutic action. Indian Medical Gazette. 1929; 64:70–73.
26. Ghosh S. Annual report of the Calcutta School of Tropical Medicine. Institute of Hygiene and the Carmichel Hospital for Tropical Diseases, Calcutta, India; 1926.
27. . Amalraj A, Gopi S. Medicinal properties of Terminalia arjuna (Roxb.) Wight & Arn : A review. Journal of Traditional and Complementary Medicine. 2016;7(1):65- 78.
28. Anjaneyulu, ASR, Prasad AVR, Structure of terminic acid, a dihydroxy triterpene carboxylic acid from Terminalia arjuna. Phytochemistry. 1983; 22:993–998.
29. Nadkarni AK. Indian Materia Medica. 1st ed. Mumbai, India:Popular Prakashan; 1976.
30. Ghoshal LM, Terminalia arjuna. Ph.D. thesis, Calcutta University, Calcutta, India; 1909.

31. Gupta LP, Studies on cardiac muscle regeneration under the influence of certain indigenous drugs. Ph.D. thesis, Banaras Hindu University, Varanasi, India; 1974.
32. Srivastava RD, Dwivedi S, Sreenivasan KK, Chandrashekhar CN. Cardiovascular effects of Terminalia species of plants. Indian Drugs 1992; 29:144–149.
33. Radhakrishnan R, Wadsworth RM, Gray AI. Terminalia arjuna, an Ayurvedic cardiotonic, increases the contractile force of rat isolated atria. Phytother Res. 1993; 7: 266– 268.
34. Karamsetty M, Ferrie TJ, Kane KA, Gray AI. Effects of an aqueous extract of Terminalia arjuna on isolated rat atria and thoracic aorta. Phytother Res. 1995; 9:575– 578.
35. Colabawalla HM. An evaluation of the cardiotonic and other properties of Terminalia arjuna. Ind Heart J. 1951; 3:205–230.
36. Singh N, Kapur KK, Singh SP, Shankar K, Sinha JN, Kohli RD. Mechanism of cardiovascular action of Terminalia arjuna. Planta Med. 1982; 45:102–104.
37. Bhatia J, Bhattacharya SK, Mahajan P, Dwivedi S. Effect of Terminalia arjuna on blood pressure of anesthetized dogs (Abstract). Indian J Pharmacol. 2000; 32:159–160.
38. Dwivedi S, Somani PN, Chansouria JPN, Udupa KN, Cardioprotective effects of certain indigenous drugs in myocardial ischemia in rabbits. Indian Journal of Experimental Biology. 1988; 26:969–975.
39. Tandon S, Rastogi R, Kapoor NK. Protection by abana, a herbomineral preparation, against myocardial necrosis in rats induced by isoproterenol. Phytotherapy Research. 1995; 9:263–266.
40. Bhatia J, Bhattacharya SK, Mahajan P, Dwivedi S. Effect of Terminalia arjuna on coronary flow—an experimental study (Abstract). Indian Journal of Pharmacology 1998; 30:118- 120.
41. Sumitra M, Manikandan P, Kumar DA, Arutselvan N, Balakrishna K, Manohar BM, Puvana krishnan R. Experimental myocardial necrosis in rats: role of arjunolic acid on platelet aggregation, coagulation, and antioxidant status. Molecular and Cellular Biochemistry. 2001; 224:135–142.
42. Kumar S, Enjamoori R, Jaiswal A, Ray R, Seth S, Maulik SK. Catecholamine-induced myocardial fibrosis and oxidative stress are attenuated by Terminalia arjuna (Roxb.). J Pharm Pharmocol. 2009; 61:1529–1536.
43. Pathak SR, Upadhya L, Singh RN, Effect of Terminalia arjuna on lipid profile of rabbit fed hypercholesterolemic diet. International Journal of Crude Drug Research. 1990; 28:48–51.
44. Ram A, Lauria P, Gupta R, Kumar R, Sharma VS. Hypocholesterolaemia effects of Terminalia arjuna tree bark. Journal of Ethnopharmacology. 1997; 55:165–169.
45. Shaila HP, Udupa SL, Udupa AL. Hypolipidemic activity of three indigenous drugs in experimentally induced atherosclerosis. International Journal of Cardiology. 1998; 67:119–124.
46. Parmar HS, Panda S, Jawa R, Kar A. Cardioprotective role of Terminalia arjuna bark extract is possibly mediated through alterations in thyroid hormones. Pharmazie. 2006; 61:793-795.
47. Devasagayan TPA, Tarachand U, Decrease lipid peroxidation in rat kidney during gestation. Biochem. Biophys. Res. Comm. 1987; 145:134-138.
48. Gauthaman K, Maulik M, Kumari R, Manchanda SC, Dinda AK, Maulik SK. Effect of chronic treatment with the bark of Terminalia arjuna:a study on the isolated ischemic-reperfused rat heart. Journal of Ethnopharmacology. 2001; 75:197–201.
49. Karthikeyan K, Bai BR, Gauthaman K, Sathish KS, Devaraj SN. Cardioprotective effect of the alcoholic extract of Terminalia arjuna bark in an in vivo model of myocardial ischemic reperfusion injury. Life Sciences. 2003; 73:2727– 2739.
50. Pawar RS, Bhutani KK. Effect of oleanane triterpenoids from Terminalia arjuna- a cardioprotective drug on the process of respiratoryoxyburst. International Journal of Phytomedicine and Phytopharmacology. 2005; 12:391–393.

51. Singh S, Latheef SAA, Subramanyam G, Muralikrishna P, Selective protection of LDL against oxidation (Abstract). In:Proceedings of the 15th Annual Conference of the Indian Society of Hypertension Abstract Book, UCMS-GTB Hospital, Delhi, India, 2005; 12–13 November, p. 68.
52. Mety SS, Mathad P. Antioxidative and free radical scavenging activities of Terminalia species. International Research Journal of Biotechnology (ISSN:2141-5153). 2011; 2(5):119-127.
53. Ghanekar BG, Ayurveda Rahasyadipika, in Sushruta Samhita with Hindi commentary Sutra and Midansthan (Mehar chandLaccmandas, Lahore). 1936;213.
54. Chaudhari M, Mengi S. Evaluation of phytoconstituents of Terminalia arjuna for wound healing activity in rats. Phytotherapy Research. 2006; 20:799–805.
55. Patnaik T, Dey RK, Panchanan G. Isolation of triterpenoid glycoside from bark of Terminalia arjuna using chromatographic technique and investigation of pharmacological behavior upon muscle tissues. E-Journal of Chemistry. 2007; 4:474- 479.
56. Thiagarajan H, Sivasami P, Chidambaram B, Bhakthavatsalam MM, Rengarajulu P. Arjunolic acid:A novel phytomedicine with multifunctional therapeutic applications. Indian Journal of Experimental Biology. 2010; 48:238-247.
57. Manna P, Sinha M, Sil PC. Protective role of arjunolic acid in response to streptozotocin-induced type- I diabetes via the mitochondrial-dependent and independent pathways. Toxicology. 2009; 257:53.
58. Prasad MVV, Anbalagan N, Patra A, VeluchamyG, Balakrishna K. Antiallergic and anti-asthmatic activities of the alcoholic extract of Terminalia arjuna and arjunolic acid. Nat Prod Sci. 2004; 10:240.
59. Summer R, Sigler R, ShelhamerJH, Kaliner M. Effect of infused histamine on the asthmatic and normal subject; comparison of skin test responses. J Allergy Clin Immunol. 1981; 67:456.
60. Akah PA, Ezike AC, Nwafor SV, Ololiad CO, Enwerem NM. Evaluation of asthmatic property of astasia gangetic leaf extract. J Ethnopharmacol. 2003; 89:25.
61. Jamieson ER, Lippard SJ. Structure, Recognition, and Processing of CisplatinDNA Adducts. Chem Rev. 1999; 99:2467-2498.
62. Sivalokanathan S, Ilyaaraja M, Balasubramanian MP. Antioxidant activity of Terminalia arjuna bark extract on Nnitrosodiethylamine induced hepatocellular carcinoma in rats. Molecular and Cellular Biochemistry. 2006; 281:87–93.
63. Inoue M, Suzuki R, Koide T, Sakaguchi N, Ogihara Y, Yabu Y. Antioxidant, gallic acid, induces apoptosis in HL-60RG cells. BiochemBiophys Res Commun. 1994; 204:898-904.
64. Moore SR, Johnson NW, Pierce AM, Wilson DF. The epidemiology of mouth 15 cancer:a review of global incidence. Oral Dis. 2000;6(2):65-74.
65. Dhanarasu S, Mathi S, Suzan M, Abdel Tawab S, Manoharan S, Prema S.Terminalia Arjuna (Roxb.) Modulates Circulatory Antioxidants on 7, 12- dimethylbenz (a)anthracene-induced Hamster Buccal Pouch Carcinogenesis. Oman Medical Journal. 2010;25(4):276- 281.
66. Gali HU, Perchellet EM, Perchellet JP. Inhibition of tumor promoter-induced ornithine decarboxylase activity by tannic acid and other polyphenols in mouse epidermis invivo. Cancer Res. 1991; 51:2820-2825.
67. Nagpal A, Meena LS, Kaur S, Grover IS, Wadhwa R, Kaul SC. Growth suppression of human transformed cells by treatment with bark extracts from a medicinal plant, Terminalia arjuna. In Vitro Cell Dev Biol Anim. 2000; 36:544- 547.
68. Singh DV, Gupta MM, Santha TR, Kumar S, Khanuja SPS. Antibacterial principles from the bark of Terminalia arjuna,Current Science. 2008; 94:1- 10.
69. Fakruddin M, Alam KMA, Mazumdar RM, Islam S, Nipa MN, Iqbal A, Bhuiyan HR.Anti-bacterial activity of the extract of Terminalia arjuna against multi antibioticresistant Vibrio cholera. Journal of Scientific Research. 2011;3(1):129-137.