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CONCEPT AND EVALUATION OF ANTHELMINTIC ACTIVITY IN TERMINALIA CORIACEA LEAF EXTRACT

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Abstract:

The purpose of this study was to investigate Anthelmintic activity of aqueous and Methanolic leaf extract of Terminalia Coriacea {Roxb} Wight & Arn based on traditional consumption approx 4 grams of Terminalia Coriacea (Leathery Murdah) leaves paste taken orally for the treatment of Diarrhea, Anti-nociceptive effect, Wound healing, Antipyretic activity. Traditionally used medicine in many parts of India especially in rural areas due to availability and low cost from natural form. Anthelmintic activity was assessed with two different solvents extracts at five different concentrations with recording the time of paralysis and time of death were Albendazole as a reference standard drug to see the potential of the extract. The lowest time for paralysis and death of worms for the test sample at highest concentration (100mg/ml) of the Aqueous Leaf Extract of Terminalia Coriacea paralysis time was 6min 3 seconds and death time 15min 1 sec and Methanolic Leaf Extract of Terminalia Coriacea paralysis time was 5min 2 seconds and death time 12min 3seconds which gradually decreased with the increase in the concentration which significantly result as Doses Dependent increase.Therefore, further studies are suggested to evaluate the possible mechanism of action and the active compounds responsible for the biological activities of the plant extract.

Keywords: *Terminalia Coriacea, Aqueous Leaf extract, Methanolic Leaf Extract, Anthelmintic Activity, Albendazole.*

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INTRODUCTION:

HELMINTHIASIS

Helminths infections are among the most common infections in human beings in which human intestinal parasitic worms are vectored through air, food, and water, which causes disease state, secretes toxins, and steals the vital nutrients from host bodies [1].Earthworms are also called megadriles or big worms, as opposed to the microdriles or small worms in the families Tubificidae, Lumbriculidae, and Enchytraeidae, among others. The earthworms are eco-friendly for decomposing organic materials, feeding upon undecayed leaves and other plant materials, more geophagous [2, 3].It would, therefore, be imperative to explore possibilities of developing new anthelmintic compounds. This has drawn attention of researchers to the validation of traditionally used botanical anthelmintics [4] .The conventional method for the treatment of helminth infections is by using anthelmintic drugs such as Albendazole, Omeprazole, Piperazine (Wahab, 2003). However, the disadvantages of these drugs include non-availability in some developing countries, high cost, drug resistance, environmental pollution and food residues [4] Treatment with an antihelminthic drug kills worms whose genotype renders them susceptible to the drug. Worms that are resistant survive and pass on their "resistance" genes. Resistant worms accumulate and finally treatment failure occurs. Intestinal worm infections in general are more easily treated than those in other locations in the body[5] Hence there is an increasing demand towards natural anthelmintics and to prevent resistance. The genus Terminalia Linn. (Family Combretaceae) includes about 200 species of trees and shrubs with a wide distribution throughout the tropical and subtropical regions of the world[6]. Besides yielding high value timber, many Terminalia species are the source of various non-wood forest products (NWFP). Throughout the Indian subcontinent, Terminalia species are valued as sources of an array of non- wood forest products[7].Different species of Terminalia, viz T. alata, T. arjuna, T. bellerica, T. bialata, T. catappa, T. chebula, T. citrina, T. coriacea, T. crenulata, T. manii, T. myriocarpa, T. paniculata, T. procera, T. pallida and T. travancorensis yield indigenous drug preparations, tannins, gums, oils, wood (for matchboxes, splints, pulp), fodder and certain organic compounds from their leaves, trunk, bark or fruits. Industries such as pharmaceutical, animal husbandry, leather, dyeing, soap, chemical, resin, and gum, paper, railways, match, oil, and cosmetic utilize Terminalia species for their raw materials[8].The species of Terminalia are very well known for their therapeutic values since long and have been proved by many researches to be useful as antiulcer[8] , antigenotoxic[9], anti-inflammatory[9] etc. Terminalia is a genus of large trees of the flowering plant family, Combretaceae, comprising around 200 species distributed in tropical regions of the world. This genus gets its name from Latin “Terminus”, referring to the fact that the leaves appear at the very tips of the shoots. Trees of this genus are known especially as a source of secondary metabolites, e.g. cyclic triterpenes and their derivatives, flavonoids, tannins, and other aromatic compounds. Some of these substances have analgesic, anti-bacterial, anti-cancer, anti-diabetic, anti-diarrhoeal, anti-fungal, anti-inflammatory, anti-ulcer, cardioprotective, hepatoprotective, neuropharmacological and wound healing activities. *Terminalia coriacea* Wight & Arn Literature surveys reveal that this species has chemical constituents rich in tannins and phenolic content and exhibits high antioxidant activity that can be the basis for many medicinal properties. Hence, the present investigation is being undertaken[17]. Scientifically Documented Pharmacological Properties Preliminary phytochemical screening, acute toxicity studies and antipyretic activity of Terminalia coriacea (Roxb.) Wight & Arn Stem Bark Aqueous Extract[11].Anti-nociceptive effect of *Terminalia coriacea* (Roxb.) Wight & Arn Leaf Methanolic Extract[12]. Wound healing potential of Leathery Murdah, *Terminalia coriacea* (Roxb.) Wight & Arn. Stem Bark Methanolic and Aqueous Extract[13]. Alkaloids, flavonoids, glycosides, saponins, sterols, tannins, triterpenoids and phenolic compounds[14].EthnoMedicinal values of stem bark of the plant is used as cardiac stimulant and in treatment of atonic diarrhea & callous ulcer, treating ulcers, fractures, hemorrhages diuretic, cardiotonic properties and bronchitis. A decoction of the bark is taken internally in atonic diarrhea, and locally as an application to weak indolent ulcers and Sushruta recommends the ashes of the plant in the treatment of snake bite.

MATERIAL AND METHODS:

Collection of plant materials:

The leaves of Terminalia coriacea were collected from Chittoor district, Tirumala hills. The plant was identified and authenticated by Dr .Madhava Chetty (Assistant professor, Sri Venkateswara University). A specimen has been deposited in Herbarium bearing voucher number: 985.

Preparation of Extract:

The Terminalia Coriacea {Roxb} Wight & Arn leaves were used. The plants leaves were collected washed and free dust particles. Then they were shaded place and blended to form a fine powder passed through

sieves and this pulverized form is stored in a airtight container. The powdered leaves of Terminalia Coriacea were extracted by two different solvents i.e. Methanol and Distilled water in the ratio of 1:5 (powder : solvent).The sufficient quantity was added , then it was kept Maceration for 72 hours .The alcoholic extract obtained was filtered and Concentrated on a hot plate. Similarly the aqueous extract of Leaf's was prepared by Macerating coarse powder for 24hrs and was filtered and Concentrated.

Selection of Doses:

The leaves extract was prepared by dissolving in Normal saline to give 20, 40, 60, 80, 100 mg/ml concentrations and the same concentration for the Albendazole is taken as standard drug and the concentration of the standard drug was prepared in 1% gum acacia in normal saline.

Experimental Model:

Earthworms, each of average length of 6 cm, were placed in Petri dishes containing 2 mL of various drug concentrations, 20 mg/mL, 40mg/mL, 50 mg/mL, 60 mg/mL, 80 mg/mL and 100 mg/mL, of solutions. Albendazole solution was used as a reference standard drug and distilled water as control. The worms were observed for the motility after incubating at 37°C. This was done after pouring the Petri dishes content in the wash basin and allowing the worms to move freely. By tapping the end of each worm with the index finger and applying a bit of pressure, the worms that were alive showed motility and those dead were non-motile. The motile worms were returned to the respective Petri dishes containing drug solutions, and the incubation process was carried out again. Anthelmintic Activity of Albendazole mediates through hyper polarization that leads to muscle relaxation and flaccid paralysis. Observation were made for the time taken to paralysis, motility activity of any sort, and death time of individual Worms paralysis was noted when no movement of any sort could be observed except when the worms was noted when the earthworms neither moved when shaken vigorously or when dipped in warm water [5°C] was concluded to death when the worms lost their mortality followed with fading away of their body color[15].

Treatment Schedule with Antihelminthic Investigation Parameters:

Randomly divide three earthworms in five different concentration 20, 40, 60, 80, 100 mg/ml concentrations of two Terminalia Coriacea leaf Aqueous (TCLAE) and Terminalia Coriacea Methanolic extract (TLCME) and other one Standard Drug Albendazole

1. Time Of Paralysis (Min.Sec).
2. Time Of Death (Min.Sec).

FIGURE-1 STANDARD DRUG (ALBENDAZOLE) DIFFERENT CONCENTRATIONS

FIGURE-2 TERMINALIA CORIACEA LEAF AQUEOUS EXTRACT (TCLAE)

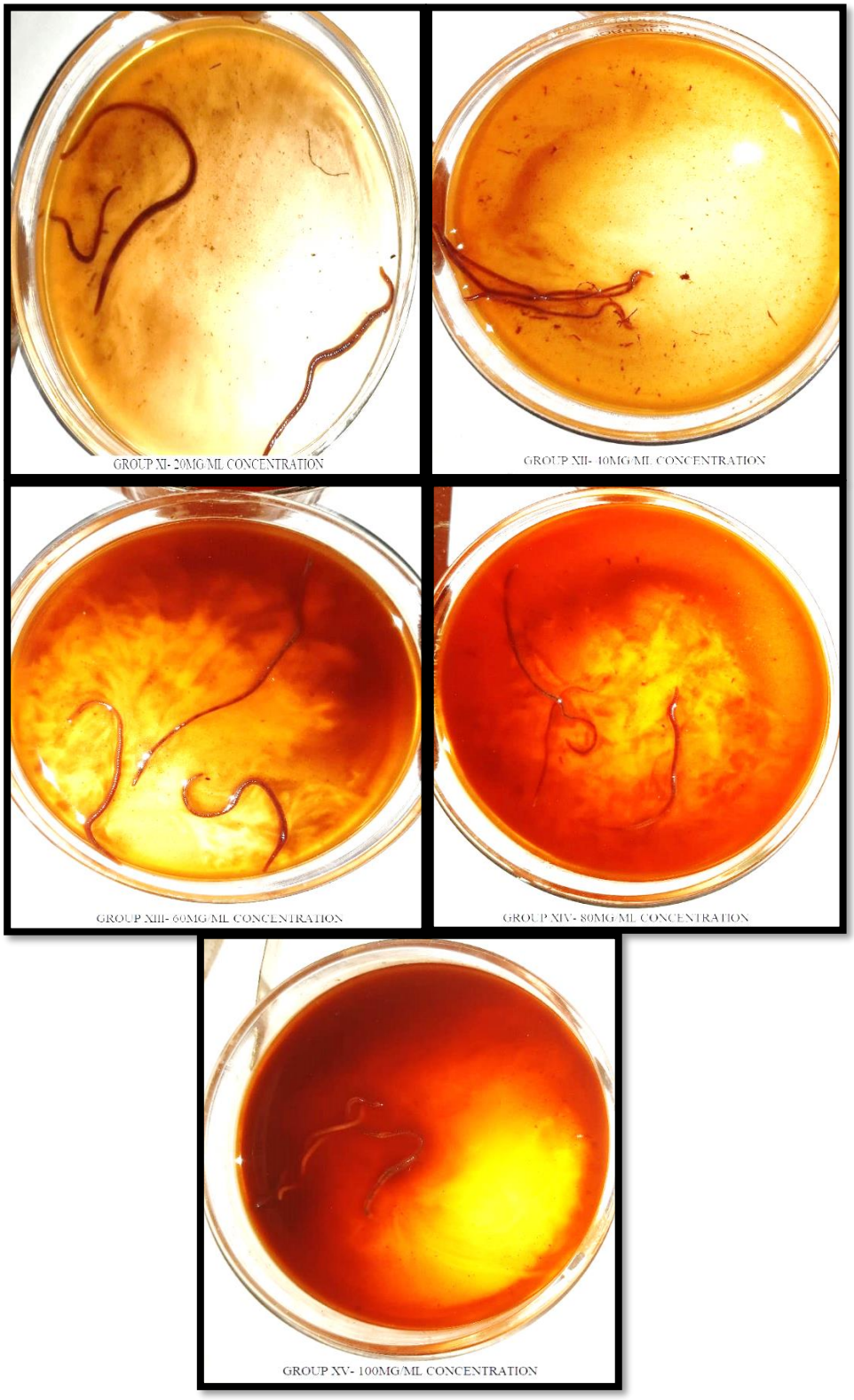


FIGURE-3 TERMINALIA CORIACEA LEAF METHANOLIC EXTRACT (TCLME)

RESULT:

The ultimate aim of present research work is to determine anthelmintic activity of aqueous and Methanolic extract of Terminalia Coriacea {Roxb}Wight & Arn.[Leathery Murdah] against Indian earthworm Pheretima Posthuma.In this study the paralysis time and death time of the earthworms in different doses of the extract (20mg/ml, 40mg/ml, 60mg/ml, 80mg/ml, 100mg/ml) were determined. Albendazole drug used as standard/reference drug to compare Anthelmintic activity of the Aqueous and Methanolic extract of Terminalia Coriacea(Leathery Murdah).The result suggests that the Methanolic extract of Terminalia Coriacea possess concentration dependent Anthelmintic activity. Anthelmintic activity studies were performed by comparing with the Standard Drug Albendazole at different concentrations. The paralysis time and death time of worms in different concentration of extracts were noted in table no:5,6 and the standard doses of Albendazole Drug at different concentration such as 20mg/ml of Albendazole shows the paralysis time of 38min 08sec and the death time of the worms were 33min 04 sec which compared with the Aqueous Terminalia Coriacea extract at 20mg/ml of concentration it shows paralysis time 38min 02sec and death time 48min 05sec and Methanolic extract of Terminalia Coriacea paralysis time 36min 11sec and death time 40 min 02sec which indicates that it significantly determines the Anthelmintic activity. Then at 40mg/ml of concentration the standard drug Albendazole show paralysis time 16min 05sec and the death time 23min 02sec.Terminalia Coriacea leaf Aqueous extract shows the paralysis time at 28min 02 sec relate almost same with Terminalia Coriacea Methanolic extract shows paralysis time 25min 02 sec and death time 32min 02sec both of the extract timing are correlated the values the standard drug. As increasing the concentrations of the Standard Drug and Terminalia Coriacea Aqueous and Methanolic leaf extract they shows more notable results at the last concentration at 100mg/ml of aqueous extract of Terminalia Coriacea shows the of Terminalia Coriacea shows the paralysis time 6 min 03sec and death time 15min 01 sec and Methanolic extract of Terminalia Coriacea shows time of paralysis 5min 02 sec and time of death 12min 03sec when compared with Standard Drug Albendazole paralysis time 4 min 01 sec and death time 6min 02sec.From the results concluded that Aqueous and Methanolic extract of Terminalia Coriacea (leaves) showed concentration dependent Anthelmintic activity significantly improved the paralysis and lethal effects when compared with Standard Drug Albendazole.

TABLE NO:1 STANDARD DRUG (ALBENDAZOLE)

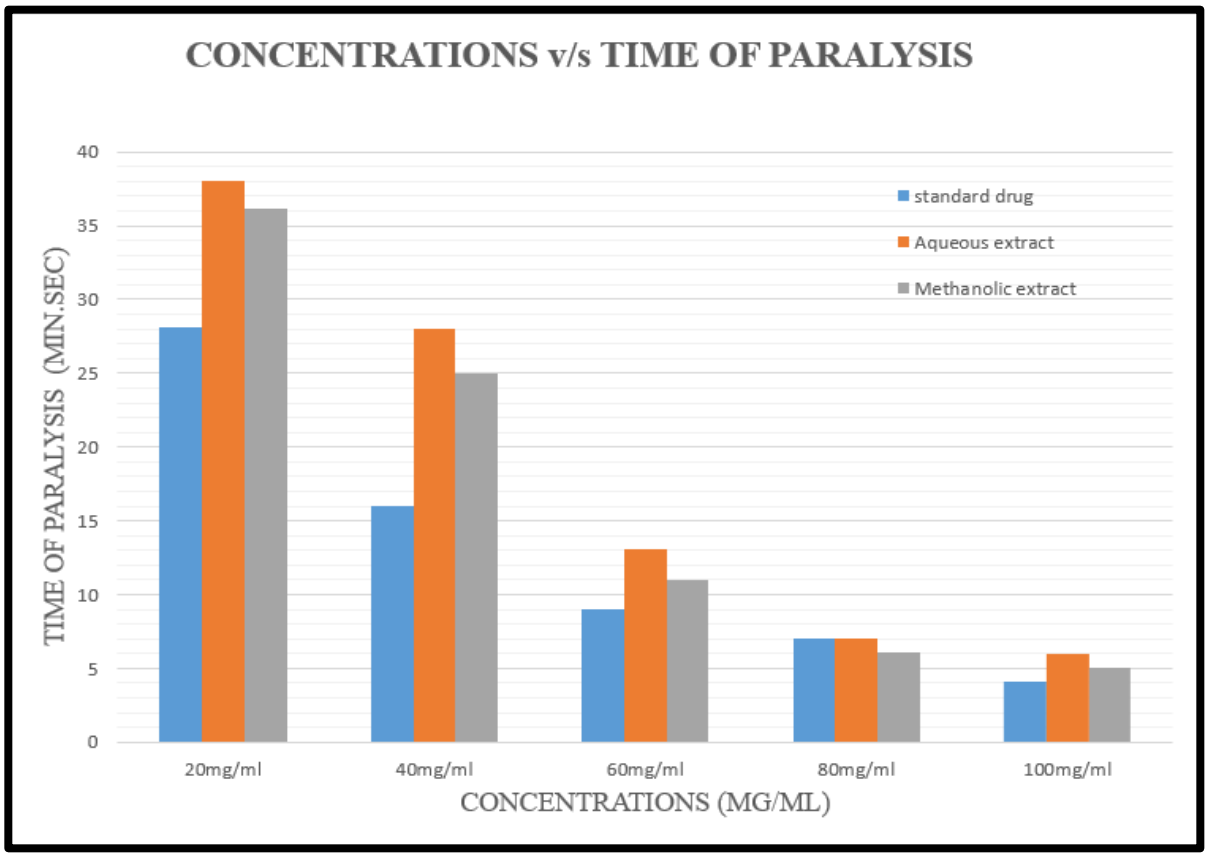
Group No.	Concentration (mg/ml)	Time Of Paralysis (min.sec)	Time of Death (min.sec)
Group I	20mg/ml	28.08	33.04
Group II	40mg/ml	16.05	23.02
Group III	60mg/ml	9.01	17.08
Group IV	80mg/ml	7.02	10.09
Group V	100mg/ml	4.10	15.01

TABLE NO:2 TERMINALIA CORIACEA LEAF AQUEOUS EXTRACT (TCLAE)

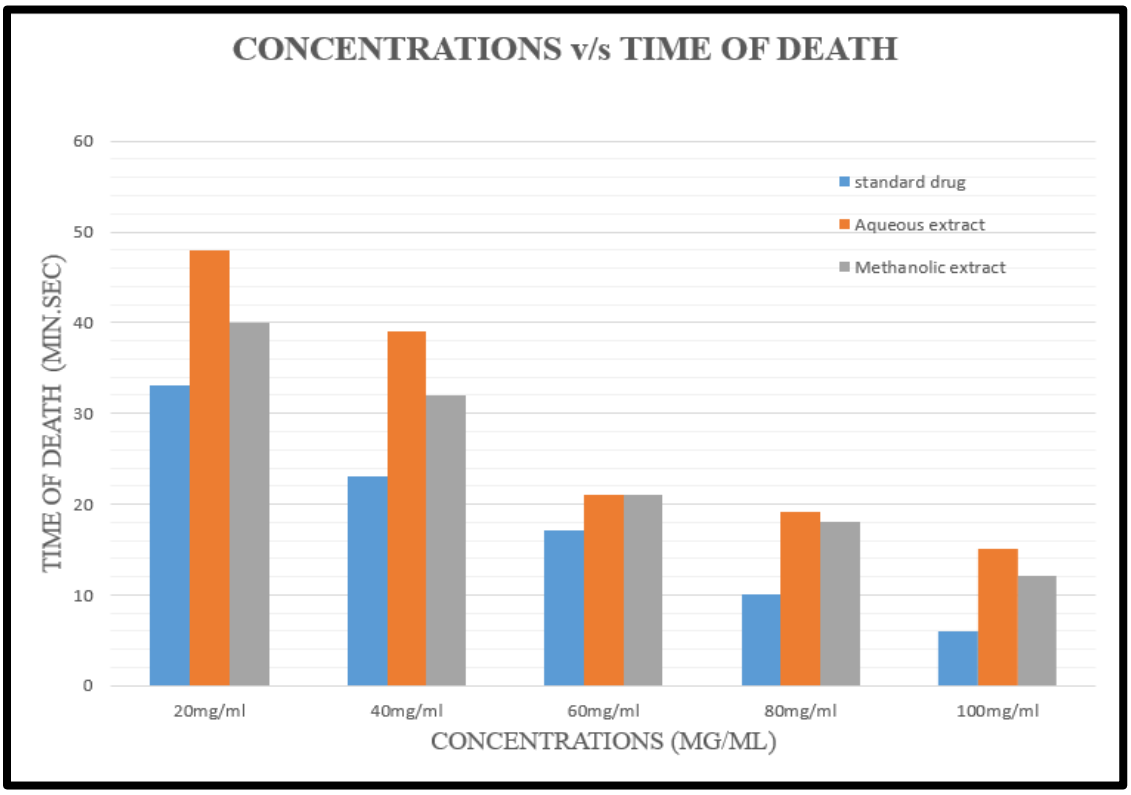
Group No.	Concentration (mg/ml)	Time Of Paralysis (min.sec)	Time of Death (min.sec)
Group VI	20mg/ml	38.02	48.05
Group VII	40mg/ml	28.02	39.03
Group VIII	60mg/ml	13.04	21.09
Group IX	80mg/ml	7.02	19.08
Group X	100mg/ml	6.03	15.01

TABLE NO:3 TERMINALIA CORIACEA LEAF METHANOLIC EXTRACT (TCLME)

Group No.	Concentration (mg/ml)	Time of Paralysis (min.sec)	Time of Death (min.sec)
Group XI	20mg/ml	36.11	40.02
Group XII	40mg/ml	25.02	32.02
Group XIII	60mg/ml	11.03	21.03
Group XIV	80mg/ml	6.04	18.01
Group XV	100mg/ml	5.02	15.01



GRAPH:1 CONCENTRATIONS V/S TIME OF PARALYSIS



GRAPH:2 CONCENTRATIONS V/S TIME OF DEATH

DISCUSSION:

Control of helminth parasites is a key challenge for human and veterinary medicine .In the absence of effective vaccines & adequate sanitation, prophylaxis and treatment commonly surely upon Anthelmintics .There are concerns about the development of drug resistance, side effects, lack of efficacy and Cost effectiveness that drive the need for new classes of Anthelmintics. In 2019 8th Consortium for Anthelmintic Resistance and Susceptibility (CARS) in Wisconsin ,USA reported on the Novel Anthelmintics Drug development moving into the 21st Century. Some of these Phyto-Constituents like Alkaloids, Tannins, Phenols etc. May be accountable to have a significant Anthelmintic Activity. It was reported that Tannins may interfere with energy generation of worms by uncoupling oxidative phosphorylation or they bind to the free protein of the gastrointestinal tract of the worms and lead to death. In another study, Alkaloids were reported to cause paralysis of the worms by acting on its central nervous system. The prime effect of Albendazole is to cause a flaccid paralysis of the worm which results in expulsion of the worm by peristalsis. Albendazole acts to increase chloride ion conductance of worm muscle membrane which produces hyperpolarization and excitability reduction that leads to muscle relaxation and flaccid paralysis of worms.It is expected that the phytochemicals present in the extract of T.Coriacea may have produced similar effects, causing death of the worms. Therefore, the usual claim of leaves of T.Coriacea as an anthelmintic has been confirmed as the extracts showed significant activity against Pheretima Posthuma. Preliminary phytochemical screening reveals the presence of Alkaloids, Amino Acids, Carbohydrates, Condensed Tannins, Diterpenoids, Flavonoids, Glycosides, Resins, Saponins, Steroids, Triterpenoids And Phenolic Compounds.

CONCLUSION:

Terminalia Coriacea {roxb.} Wight & arn. was lack of confirmed data from this research work it has found that it significant Anthelmintic Activity depending on the concentration of the plant extract. Detail further studies need to isolation purification character extraction & reveal the active compound in the crude extract establish the mechanism of action are required which can be good source of novel anthelmintic & cytotoxic agent so the results suggests that the extract of

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