

## Buchanania lanzan (Spreng.): Pharmacological review

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### ABSTRACT

*Buchanania lanzan* belonging to the family *Anacardiaceae* is believed to be a multipurpose tree possesses numerous uses. Every part of the plant is used. It is a good species for afforesting bare hill slopes. It is an important source of both rural and tribal economy. The use of plant extracts and phytochemicals, both with known antimicrobial properties, are of great significance to therapeutic treatments.

### 1. Introduction

Forests play key role in the life of people inhabiting mountains or plains as they fulfil their basic requirements such as oxygen, water and energy (Kala, 2004). Variety of trees, shrubs and herbs provide wood for construction of big and small dwellings, fire wood, fiber, vegetable oil and food additives. Noteworthy tropical trees are bestowed with impeccable products like timber *Tectona grandis*, *Pterocarpus marsupium*, *Adina cordifolia*, *Gmelina arborea*; food additives *Buchanania lanzan*, *Tamarindus indica*; fiber *Bombax malabaricum*; medicines *Buchanania lanzan* color or marking ink *Butea monosperma*, *Semecarpus anacardium*; oil *Shorea robusta*, *Madhuca longifolia*, etc. However, the most impressive is their potential to keep us fit to live a healthy life. Forests provide a wide range of economic and social benefits, such as employment, forest products, and protection of sites of cultural value (FAO, 2006).

*Buchanania lanzan* Spreng (common name - Char, Chironji) belonging to family *Anacardiaceae* was first described by Francis Hamilton in 1798. It is a vulnerable medicinal plant and a non wood tree species found in deciduous forests throughout the greater part of India and generally attaining a height up to 18m and girth 1.5m. The tree is almost evergreen and grown in the tropical deciduous forests of Northern, Western and Central India, mostly in the states of Chhattisgarh, Jharkhand, Madhya Pradesh, Varanasi and Mirzapur districts of Uttar Pradesh (Pandey G.P)... In Madhya Pradesh, it is a common associate of teak, sal and mixed forests. It is used for environmental conservation and in 'agroforestry system'. The tree is leafless or nearly so, for a very short time during the summer season. Flowering start from January to March and fruits ripen in the month of April-June (Troup, 1986) and their colour is greenish-white. Fruits ripen in the months of May-June. The fruits become red after ripening. The fruit collection starts from mid April and ends by mid June, but its harvesting is generally finished in 15-20 days only. The harvesting period may vary with the purpose of fruit collection in different agro-climatic zones.

### 2. Uses of *Buchanania lanzan*

*Buchanania lanzan* is believed to be a multipurpose tree. The wood derived from it is used in making boxes and furniture and is cheap as compared to other woods (timber). It

has been reported to be suitable for match industry. It is an important source of both rural and tribal economy. The use of plant extracts and phytochemicals, both with known antimicrobial properties, are of great significance to therapeutic treatments (Nagesh and Shanthamma, 2009). Extracts of plants were used for the treatment of various diseases and this forms the basis for all Indian systems of Medicine. However, this area is not much developed when compared to modern system of medicine, mainly because of the lack of scientific documentation in this field (Kalimuthu et al., 2010).

### 3. Phytochemical & Pharmacological Investigations

All over the world, plants have served as the richest source of raw material for traditional as well as modern medicine, particularly in Africa and Asia (Tsakala et al., 2006). The problem however remains that some drugs are scarce, costly and unavailable to the common man, hence a study of the medicinal importance of plants, scientifically and a confirmation of the use of these plants towards curing diseases is a possible solution to development of less costly and effective drugs from our local raw materials (Zamble, 2006).

Chitra (2009) studied the wound healing effect of alcoholic extract of *Buchanania lanzan*. Further its positive reaction in dexamethasone suppressed wound healing was studied in Albino rats. Three different kinds of wound models were used for the study namely incision, excision and dead space respectively. Parameters used were breaking strength in case of incision wounds, epithelialization and wound contraction in case of excision wound and granulation tissue dry weight, breaking strength and hydroxyproline content in case of dead space wound. The conclusion of the study was that the dexamethasone group showed significant reduction in wound breaking strength as compared to control group in incision type. Further more it was observed that in coadministration of *Buchanania lanzan* with dexamethasone increased the level of breaking strength of dexamethasone treated group. Moreover in excision wound model, the percentage of the wound contraction was significantly increased by *B. lanzan* and also it reversed the dexamethasone suppressed wound contraction and significantly reduced the time required for epithelialization and reversed the epithelialization delaying effect of dexamethasone.

Kodati et al., (2010) investigated the antidiarrhoeal activity of the leaf aqueous extract of *Buchanania lanzan* Spreng in mice. Castor oil induced diarrhoeal test was used in the study to assess the antidiarrhoeal activity and gastrointestinal tract transit of charcoal meal test was used to assess the antipropulsive activity of the alcoholic extract of *Buchanania lanzan* Spreng roots along with phytochemical analysis were carried out using well. The study revealed that alcoholic extract of *Buchanania lanzan* Spreng roots reduced faecal output in castor-oil induced diarrhoea and also significantly lessens the number of diarrhoeal episodes. In addition it delayed the onset of diarrhoea induced by castor oil and reduced the number of animals exhibiting diarrhoea. Moreover, reduced the intestinal propulsion of charcoal meal in mice. The phytochemical screening of the roots showed the presence of tannins, saponins particularly steroidal saponin, and flavonoids. The final result obtained indicate that the alcoholic extract of *Buchanania lanzan* Spreng. roots possess antidiarrhoeal activity.

Mishra et al., (2010) studied the antioxidant activity of different dry fruits (almonds, walnut, cashew nut, raisins, chironji) through several chemical and biochemical assays: reducing power, lipid peroxidation damage in biomembranes, determination of antioxidant enzymes activity (SOD and CAT) through estimating total phenolic content. Folin-Ciocalteu reagent was used. The EC<sub>50</sub> values were also calculated for all the methods in order to evaluate the antioxidant efficiency of each dry fruit. The results obtained revealed that there was significant differences among the dry fruits. The methanolic extract of walnut showed the higher value of antioxidant activity based on lipid peroxidation assay. Almonds, cashew nut, and chironji showed the presence of higher phenolic content and least phenolic content was found in raisins. Hence proved to contain antioxidant property in either high and low value respectively.

Mehta (2010) studied the medicinal value of by its phytochemical screening of leaf extract. The study was carried out by using TLC and HPTLC techniques for Identification, separation and quantification of chemical constituents. Two major class of secondary metabolites were namely Glycosides, Phenolic compounds were detected. These findings were helpful in establishing a relationship between chemical composition of the leaf extract and previously reported activities of *B. lanzan* and also might assign a new potential role of *B. lanzan* extract in human health care.

Another study on methanolic extract of *B. lanzan* was carried out by Pattnaik (2011) to assess the analgesic and anti-inflammatory activities of varied concentrations of the methanolic extract using three different models, acetic acid-induced writhing model in mice and hot plate reaction time model in rats for analgesic property and carrageenan-induced rat paw oedema model for anti-inflammatory respectively. He found significant reduction in writhes in experimental rats in experiment rats compared to control, and hot plate test showed significant licking effect in rats. Paw volumes was significantly reduced in treated animals.

Jain (2012) reported the ethanolic extracts of five medicinal plants including *Artocarpus heterophyllus*, *Alangium salvifolium*, *Buchanania lanzan*, *Sesbania grandiflora* and *Wrightia tinctoria* for their total phenolic content and in-vitro antioxidant activity by 1, 1'-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging method, reducing power assay and total antioxidant capacity (Phosphomolybdenum reduction Assay). The study was carried out on the basis that antioxidants are identified as anticarcinogens. The study finally conclude that all five plants show antioxidant activity but *Buchanania lanzan* found to be most effective antioxidant.

Pattnaik et al., (2013) performed the Pharmacological studies on *Buchanania lanzan* Spreng to evaluate the wound healing activity of the methanolic root extract with a focus on antimicrobial and anti-biofilm properties. The extract was evaluated in two models, excision and incision models respectively. Moreover, the extract was also screened for antibacterial properties against both Gram positive and Gram negative bacterial strains. In addition to that biofilm formation and disruption of preformed biofilms was also studied keenly which concluded that the root extract of *B. lanzan* possess a significant wound healing potential, which was supported and well correlated with pronounced antibacterial activity of the tested plant parts. In addition to that *B. lanzan* was able to reduce biofilm formation and also caused disruption of preformed biofilms in a manner similar to ciprofloxacin

Methanolic extract of *B. lanzan* was assessed for its antioxidant, anti-inflammatory, and DNA protective properties by Shailasree et al., (2013), the experiments conducted showed anti-inflammatory property were elucidated by its capacity to inhibit 15-lipoxygenase and human cyclooxygenase-2. Moreover, anti-hyaluronidase and anti-elastase activity were measured which revealed anti-ageing effect. In addition, the methanolic extract could prevent damage to DNA from the hydroxyl radicals produced during Fenton reaction.

Chanda et al., (2013) studied the total polyphenols and flavonoid content of methanolic extract of twelve Indian medicinal plants (*Averrhoa carambola* L., *Buchanania lanzan* Spr., *Calophyllum inophyllum* L., *Celastrus paniculatus* Willd., *Clerodendron multiflorum* L., *Luffa acutangula* (L.) Roxb., *Morinda citrifolia* L., *Ocimum gratissimum* L., *Peltophorum ferrugineum* (Decne.), *Phyllanthus fraternus* Webster Syn., *Triumfetta rotundifolia* Lam. and *Ziziphus nummularia* (Burm. F.) The plant material was extracted individually in different solvents by cold percolation method. Total phenol and flavonoid content was measured by using Folin-Ciocalteu's reagent method and aluminium chloride colorimeter method respectively. Results obtained in there study of work explained the plants can be considered as a medicinal source for the treatment and prevention of many free radical related diseases.

Singh (2013) strictly focussed on the protective and preventive effect of antioxidant activity on certain degenerative illnesses such as cardiovascular, cancer, neurological diseases, cataracts and oxidative stress dysfunction. This study was conducted to evaluate the antioxidant activity of processed dry fruits. Total antioxidant

activity was assessed by the reducing power and superoxide anion scavenging activity assays. The results of reducing power and scavenging ability revealed that the reducing power increases with concentration in two processing methods (roasting and boiling with milk) but decreases in other two processing methods (deep and shallow frying). The superoxide anion scavenging ability indicated that frying (deep and shallow) affects higher to the antioxidant activity while the other two processing (roasting and boiling with milk) had less effect on their antioxidant potential.

A study on alcoholic extract of *B.lanzan* and *B.angustifolia* was attempted by Hullatti (2014) to evaluate the diuretic potency of total alcoholic extracts and its polar and non polar fractions of priyala fruits in healthy adult Wistar albino rats. Acute toxicity study was performed to determine therapeutic dose of the extracts and fractions. Lipschitz method was employed for the assessment of diuretic activity in which the control group received normal saline (25ml/kg P.O), and standard group received Frusemide (20mg/ kg, P.O). The remaining groups were treated with two doses (250 and 500mg/kg) of *B..angustifolia* and *B.lanzan* total alcoholic extracts, n-hexane insoluble and n-hexane soluble fractions. Total alcoholic extracts, n-hexane insoluble and n-hexane soluble fractions of the both fruits have shown significant diuresis when compared with control at 5 hrs.

A recent study was carried out by Khatoon et al., 2015 regarding the phytochemical, antioxidant and neuraceutical of *B.lanzan*. An underutilized exotic was selected for the investigation which revealed that it is a good source of protein content, moderate carbohydrate and of high amount of fiber and fat with high calorie value. A thorough physiochemical characterization of the seeds demonstrates that it as an active source of phenolics, natural antioxidants and minerals. . Antioxidant activities were carried out using FRAP assay and the results reveal that Ethanolic water extract and Methanolic extract showed the highest antioxidant activity.

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An important study on the anticancerous activity of alcoholic extract of *B.lanzan* was performed by Monika et al., (2015). Various types of extracts from different parts of plants were screened for their anticancerous activity in two test models, in-vitro and in-vivo respectively. The results of the work conclude that the alcoholic extract of the aerial parts of *B.lanzan* showed anticancer activity.

The phytochemical work on *B.lanzan* was reported by Banerjee et al., (2015). Three major constituents namely celidoniol, vomicine, epinitol have been characterized from an organic extract of leaves. Such extracts were reported to exhibit antidiabetic, antihyperlipidemic, antioxidant, anti-inflammatory, wound healing, antidiarrheal, antivenom activity including a host of other curative properties.

An important phytochemical study on *Buchanialanzan* was performed by Warokar et al., (2015) by isolating the Flavonoid (BL1) from the ethanol extract of the plant kernels by preparative HPTLC. Moreover purity of isolated flavonoid was ascertained by HPLC technique. The structure of BL1 was elucidated mainly by spectrometric methods viz: UV, FTIR, MS, 1H-NMR. Two models were selected for outcome of anti-inflammatory effect. Ethanol extracts of *Buchanialanzan* kernels proved significant in vivo anti-inflammatory activity in both acute and chronic model. In addition, the silico molecular docking studies, isolated flavonoid BL1 showed significant binding interaction with musculus-prostaglandin H 2 synthase-1 (1CQE), COX 2 enzyme that modulate anti-inflammatory effect.

With reference to the literature surveyed, information and facts in context to the micropropagation and pharmacological properties of plant based drugs, it is clear from above all the references that there have lot of research work done on phytochemicals in search of various pharmacological properties of *Buchanialanzan*.

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