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ANTIDIABETIC USE OF INSULIN PLANT BY TRIBAL COMMUNITIES OF AHMEDNAGAR DISTRICT OF MAHARASHTRA, INDIA.

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ABSTRACT:

Tribal communities in Maharashtra have relied for a long time on the antidiabetic, antioxidant, anti-inflammatory, antiproliferative, neuroprotective, and anti-microbial benefits of *Costus pictus* D. Don, also known as the insulin plant. This research aims to learn more about the potential therapeutic uses of the *Costus pictus* (insulin plant) and to determine how its major phytoconstituents work to combat diabetes for future studies and formulations.

Keywords: insulin plant, Phytochemical. *Costus pictus* D. Don, anti-inflammatory, diabetes mellitus,

INTRODUCTION

The Scheduled Size comprises 5809 villages and 16 cities spread across 12 districts and 46,531 square kilometers, or 15.1% of the state's total land area like Gadchiroli, Thane, Nanded, Pune, Nandurbar, Nashik, Ahmednagar, Dhule, Jalgaon, Amravati, Yeotmal, and Chandrapur. The State. Akola, Maharashtra, has 1,813,906 inhabitants, according to the 2011 census. 932,334 males and 881,572 women. In 2011, there were 395,690 families in Akola. Akola's sex ratio is 946. Akole's population is 2,91,950 people. Census 2011: 189 settlements. Akole tehsil is 47.86 percent tribal (1,39,730). Western tehsil is sparsely populated owing to dense woods, hills, and poor agriculture. Akole tehsil villages were classified based on their population per the 2001 census. Under 1046 are 102 settlements. There are 1047-2240 inhabitants in 62 localities. There are 2243 to 4421 inhabitants in each of the 23 communities. Only four communities have more than 15500 residents. The dry deciduous woodlands of Akola, Sangamner, and Ahmednagar are home to 3.53 percent of the tribe's total population. They are in Rajur, Kotul, Bramhanwada, Ratanwadi, and Bhandardara in Akola taluka and Sangamner taluka. Due to a lack of modern healthcare, tribals depend on the traditional *warkari* or *bhagat* and their medicines. The *warkari* provides plant-based therapies and encourages people to be good. The ethnomedicinal study sought plants Maharashtra's Adivasi tribals used to treat cuts and wounds (Shinde et al., 2017).

The Plant *Costus pictus* D. Don is a medicinal herb that belongs to the *Costaceae* family, also known as Step ladder or Insulin plant, are a South and Central American natural plant (Jose and Reddy,

2019). It is often grown in South Indian greenery as a flowering plant, but it also grows wild in many places. It is also called the Insulin Plant because its leaves help the body make insulin. One such ayurveda plant that has lately acquired prominence and is commonly used as an ayurvedic medicinal herb is the insulin plant. The leaves of this plant are reported to reduce blood sugar levels, and diabetics whose blood sugar levels decreased after consuming the leaves. (Elavarasi and Saravanan 2012). In herbal treatment, diabetes is often treated by chewing a plant's leaves for at least a month in order to manage blood sugar levels (Devi and Urooj 2008). The tribal inhabitants of Akole Tehsil near Kalsubai, a mountain in the Western Ghats of Ahmednagar district, Maharashtra, stated that *Costus pictus* leaves effectively heal diabetes.

Costus pictus is a perennial, straight, tropical plant from *Costaceae*. Leaves are simple, entire, alternate, and oblong, having 2-8 inches in length with a parallel venation system. Large, dark green, and velvety leaves with light purple undersides spiral around the tree's stems, producing elegant, arching bunches from subterranean rootstocks. Maximum it has 60 cm in height, with the tallest stems falling over and lying on the ground. Beautiful orange blooms with a 2.5-12.5 cm diameter occur on cone-shaped heads at the end of branches on hot days. Insulin plants are propagated using stem cuttings. (Eevera et al., 2010; Jose and Reddy, 2019; Urooj and Devi, 2015; Harini et al., 2016; David and Saranya, 2016).

Active Compounds of *Costus pictus*: These plant sections include phytochemicals such as flavonoids, alkaloids, and terpenoids. For a long time, people in India have used this plant to treat diabetes and in diabetic rat tests. Bio-components may be found in many plant parts, including the leaves, stems, rhizomes, and roots. (Saraswathi et al., 2017, Kalaikingam et al., 2013). The leaves, for example, include carbohydrates, triterpenoids, protein, alkaloids, tannins, saponins, and flavonoids. Furthermore, the leaves of this plant include sugars like rose oxide, fatty acids like hexadecanoic acid, 9, 12-octadecanoic acid, tetradecanoic acid, ethyl oleate, oleic acid, and squalene, and sugars like rose oxide. (Radha et al., 2015). Terpenoids such as lupeol and steroids such as stigmasterol may be detected in stems. Rhizome contains quercetin, diosgenin, a steroidal sapogenin, and other compounds. (Reddy et al., 2014). There are Terpenoids, Alkaloids, Tannins, etc. in the root section. (Eevera et al., 2010).

Antidiabetic Effects: This insulin plant was traditionally employed as a decorative plant. The insulin plant's leaves are the main component that generates solid antidiabetic action. It also decreases fasting and post-meal glucose levels. The exact mechanism of action underlying the anti-diabetic actions of these phytoconstituents is unclear. Other therapeutic activities of this plant include reducing diabetic-related complications, bringing renal and hepatic parameters to a level of control, decreasing the number of glycosylated hemoglobin, increasing weight and insulin level, and showing significant improvement in diabetic patients' histopathological examination (Shinde et al., 2022).

Neuroprotective Role: According to Gupta et al. (2018) looked at the protective effects of exogenous melatonin and insulin plant (*Costus pictus* D. Don) extract on the brains of diabetic female rats sick with streptozotocin. The extract significantly reduced lipid peroxidation in brain tissue compared to

the control group of rats. Antioxidant enzymes like SOD, catalase (CAT), and reduced glutathione (GSH) were also lowered in the brain by plant extract and melatonin. As a plant extract, melatonin helps the brain problem caused by diabetes's hyperglycemic effect get better. It also saved brain tissue by increasing the number of astrocytes and glial cells (Deepa et al., 2021).

Phytochemical analysis of *Costus pictus*

Fresh insulin plant leaves were collected from Akole Tehsil near Kalsubai, a mountain in Ahmednagar in the Western Ghats. The plant leaves were cleansed with tap water before being air-dried for around ten days at room temperature. Following air drying, the components were extracted with ethanol using modified conventional methods. (Memita et al., 2018). A 100-gram dried *Costus pictus* sample was placed in a clean, sterile container, mixed with 500 ml of 95 percent laboratory-grade ethanol, and stored at room temperature for 48 hours. The mixture was then filtered using No. 1 Whatman filter paper. For four (4) hours, the filtrates were refluxed to form a sticky residue. Jacob and David employed the traditional procedures of Sofowara (1993), as indicated and adapted by Jacob and David, to screen and identify the bioactive constituents of the *Costus pictus* plant (2016). The results were labelled + (traceable amount), ++ (appreciable amount), and - depending on the degree of colour change and the concentration of the response (absent).

Phytochemical constituents of Costus pictus

Phytochemicals are plant-derived bioactive substances that have health advantages for humans. The presence of phytochemical elements in the *Costus pictus* was investigated in this research. The phytochemical examination revealed that biochemical elements such as terpenoids, flavonoids, alkaloids, tannins, cardiac glycosides and steroids are found in small amounts on the ethanolic extract of *Costus pictus*, whereas saponins are present in significant amounts, as shown in Table 1.

Table 1. Phytochemical analysis of the ethanolic extracts of *Costus pictus*

Types of Phytochemical	<i>Costus pictus</i>
Terpenoids	+
Cardiac Glycosides	+
Flavonoids	+
Alkaloids	+
Tannins	+
Steroids	+
Saponins	++

Legend: (+) traceable amount; (++) appreciable amount; (-) absent

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