

## **Use of Arrowroot in Dentistry- A Review**

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## **ABSTRACT:**

Arrowroot is a source of unconventional starch that is known to have various therapeutic benefits. *Maranta arundinacea* or arrowroot possess various chemical components such as alkaloids, glycosides, phenotypic compounds, saponins, phenols, phosphorus, sodium, potassium, magnesium, iron, calcium and vitamin B that helps in improving circulation and metabolism. It is famously used as a traditional remedy for athlete's foot skin infection, UTIs and diarrhoea as well. The potential of arrow root has not been fully utilized mainly due to lack of knowledge on its technological and functional properties. Several studies have shown that these properties make it ideally suited to treating oral pain including Gingivitis. It also has anti inflammatory properties that could be used to cure a range of inflammatory diseases of the oral cavity. It is well known and said to be administered by boiling in water or seasoned with milk. It is said to cure patients with irritable bowel syndrome. Some studies also reveal that it decreases cholera – induced net water secretion, by reviewing various articles, this study may be helpful in determining the efficiency of properties of a natural substance when introduced with the help of nanotechnology. The relevant articles used for this study were collected from the year 2000-2019. In future, nano-technology can develop dose-dependent formulation consisting of arrow root as the major component and associate it with other compounds to target gingival inflammation and other periodontal problems.

Keywords: Arrowroot, therapeutic, natural remedy, anti inflammatory, gingivitis, periodontal diseases.

## **INTRODUCTION:**

This review study is aimed at determining the efficacy of arrow root and its potential and therapeutic use in dentistry[1].

The use of plant-derived medications in the treatment and prevention of disease is called phytotherapy and it consists of more traditional approaches, such as medical herbalism[2],[3]. There are a number of phytotherapeutic preparations in use. Few examples include preparations derived from *Caralluma fimbriata* which has antihyperglycemic activity[4]. It is also known to have cytotoxic activity against human colon cancer cells[5].

The most recent advancement of the use of nanotechnology has aided in creating dose-dependant formulations of medicinal compounds in the right amounts for treatment[6],[7]. Few studies conducted such as biosynthesis of zinc oxide nanoparticles using *Mangifera indica* leaves showed antioxidant and cytotoxic properties in lung cancer cells[8] and another study used *Brassica oleracea* mediated zinc oxide nanoparticles and showed antibacterial activity against pathogenic bacteria[9]. Currently, selenium nanoparticles are an emerging field of interest in nanotechnology[10].

Arrow root belongs to the Marantaceae family and is also called *Maranta Arundinacea*. It is a perennial herb that is grown primarily for its starch extraction since it is a source of unconventional starch [11]. Anti Inflammatory property of a substance is that property that has the potential to reduce swelling or inflammation.

Arrow root is known to have various therapeutic benefits and due to its high Amylose content, it has been used majorly in the food industries as a flour alternative and thickening agent. It has a good fibre resource which also proves its usage in the textile industry. Arrow root extract has also been used as a remedy for UTIs, diarrhoea and athlete's foot skin infection which shows its anti fungal and anti bacterial and anti inflammatory activities [12]. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade [13][8,14–35].

Based on previous literature, Caroline Cooke has portrayed that Arrowroot is an old fashioned remedy for diarrhoea [36]. It is well known and administered boiled in water or milk and seasoned . It is said to cure patients with irritable bowel syndrome. Some studies also reveal that it decreased Cholera – induced net water secretion.

Eni. Harmayani, et al, gave away in their study about the effect of arrow root on the selected bacterial population and their in vitro study indicated that diet containing arrow root powder increased lactobacilli population significantly and decreased the viable counts of *Escherichia Coli*, *Bifidobacteria* and *Clostridium perfringens*[37]. The potential of arrow root has not been fully utilized mainly due to lack of knowledge on its technological and functional properties[38]. Hence there is a need for further studies to introduce arrowroot into the human diet since it exhibits characteristics such as easy gelation capacity , absence of gluten, anti cancer , antibacterial properties, high digestibility and its medicinal properties[39]

However, the conservation of the species aimed at encouraging less produce and studies aimed at recommending growth and increased produce of the source *Maranta Arundinacea*[40].

Due to all of its known features and proven benefits in various other studies, the objective of this study is to determine its potential uses in dentistry.

## **MATERIALS AND METHODS:**

This study reviews various previous literature and studies based on arrow root and its properties and deduces a potential for its uses in the field of dentistry. The relevant articles used for this study were collected from the year 2000-2019.

## **DISCUSSION**

### **Medicinal health benefits of arrowroot**

Arrow root is extremely low in calories and was an effective natural remedy for Diarrhoea and irritable bowel syndrome[41].

One study published in 2000, found that arrowroot powder was effective for significant reduction of abdominal pain in subjects and improved their digestive problems[42].

By mixing arrowroot powder in milk or water and consuming several times a day helps to treat UTIs and prevent its recurrence[43].

Arrow root also contains cytotoxic properties which help boost the immune system and keeps illness at bay and hence bolster the immune system of individuals. One study published in 2012 found the arrow root extract helped stimulate the immune function in cells of animals both in-vitro and in -vivo[44].

Arrowroot tuber has a glycemic index of 32 which makes it a very useful natural substitute to treat diabetes and is also recommended in the blood sugar diet of several patients as part of home remedy [45].

Most importantly it is known to be an effective remedy for oral related issues due to its anti-inflammatory and antibacterial properties. Several studies have shown that these properties make it ideally suited to treating oral pain including gingivitis. It is also known to suppress inflammation and as a useful treatment for various periodontal diseases influenced by bacteria. The powder is also seen to possess teeth whitening properties [46].

### **General applications of arrowroot**

Arrow root is majorly used in the food and textile industries for a very long time due to its high amylose content and 83% starch content and makes it a flour alternative . It produces strength and elasticity in fibres material[47]. Arrowroot has also been used in homeopathy as a natural remedy for treating infections as it is said to smoothen the blood flow and maintain the blood pressure in various health conditions. In the agricultural industries it is used as cattle feed to improve their digestion and produce. The raw material of arrow root is also used in the cottage industry[48]. Apart from these uses, the pre gelatinized form is used to thicken drilling fluids in oil field services. It also has anecdotal use and absorbs oil well which stimulates skin healing and hence is used in cosmetics as well.

Maranta arundinaceae possesses various chemical components such as alkaloids, glycosides, phenotypic compounds, saponins and phenols that promote good health. It also contains phosphorus, sodium, potassium, magnesium, iron, calcium and vitamin B that helps in improving circulation and metabolism. It is known to produce IgM serum levels to cause immunostimulatory effects. The substance is known to have anti-inflammatory activity by producing pro-inflammatory cytokines and adopting mechanisms to inhibit cox pathways, MMP and inflammatory pathogens[49].

Our institution is passionate about high quality evidence based research and has excelled in various fields ( [30,31,50–58]. An article published in 2010, showed that arrow root is used as herbal or natural therapy in 80% of the rural areas and arrowroot starch consist of derma pharmaceutical composition[59]. The presence of glycosides indicates the potency in curing cardiac insufficiency and circulatory problems. They also have good antispasmodic, anti-carcinogenic and immune stimulating properties due to the presence of flavonoids [60] which makes it a good moisture absorber. Hence is safe to use on skin as it soothes and allows deep penetration.

One article published in 2013 showed that it possesses antifungal activity due to its ability to cure Tinea Pedis and also has a glycemic index that is low, 32, and can be effective when used in a blood sugar diet [61]. Arrow root comprises terpenoids which is what is known to prevent diseases like cancer and elicit properties such as immune modulation and anti-inflammation. This explains its usage in density as it adopts anti-inflammation mechanisms when penetrated into the mucous membrane of oral cavity and thereby suppressing swelling. When used as mouthwash, it is anti-bacterial and suppresses growth of several bacterial strains.

### **Applications of arrowroot in dentistry**

Arrowroot, as per another study by M.N.Maderini, 2012 , can stimulate immune cells , prevent normal tube defects, aid in growth, boost immune system and also improve the heart rate of subjects[62].

An article by TK Lim, 2016, said that arrowroot powder starch is good for babies because it is allergen free and can soothe digestion. Arrowroot biscuits can be given to babies for teething as it is hard to bite and won't be a choking hazard and isn't synthetic or plastic. It also showed that arrowroot supports healthy digestion because it is rich in starch that acts as a mild laxative in regulating bowel movement and digestion. It improves circulation hence preventing heart conditions such as congestive heart failure. It is vitamin B9 rich and iron rich which is technically good for pregnant women to consume to promote good health of the baby in the womb and reduce chances of foetal malformations and abnormalities[63].

Arrow root extract has proven both scientifically and naturally to be of good use and benefit in the treatment of health problems and oral – cavity related issues that can be used as a safe natural substitute.

Due to its properties of anti-inflammation, antibacterial and antifungal, researchers have suggested that usage of arrow root promotes healing of oral – related disease manifestation as it can soothe mucous membranes of the mouth and gingiva. It can reduce the oral pain and heal sore gums. It also shows significant reduction of gingival swelling and can be used as home remedy to cure gingivitis. However, it also exhibits teeth whitening properties with no known side effects. Few, studies have shown that it could be used as an anti – septic as it suppresses the growth of few bacterial strains.

### **Mode of usage**

After obtaining arrowroot powder it can be applied directly as well. But a suitable method is to mix it with essential oils such as coconut oil and apply it to the teeth, gingiva and tongue for oral problems such as swellings or soreness of the mouth. It promotes teeth whitening properties[64]. For Digestive problems, the powder of arrow root can be mixed with water or milk and consumed several times in a day to improve digestion.

### **Advantages and disadvantages**

Arrow root is known to have several advantages such as being a natural substitute to cure several diseases related to health and oral cavity. So far there are no known disadvantages to people consuming arrowroot even on a daily basis [65].

### **Side effects**

When taken by mouth arrowroot is likely safe when the starch is used in food there isn't reliable information to know if it is safe when used in large amounts found in medicine. It only has a minute possibility to cause stomach discomfort to those who may be allergic to arrowroot. When applied to the skin it is potentially known to be anecdotal and enables active ingredients to penetrate the upper layers of skin. Hence may only be of good effect when used[66].

### **Precautions**

Arrowroot is possibly safe for pregnant and breastfeeding women when taken by mouth in food amounts. There isn't reliable information to know if arrow root is safe to use in the larger amounts found in medicine. However it is advised to comply with the food amounts[67].

### **FUTURE SCOPE:**

In future, nano technology can develop dose – dependent formulation consisting of arrow root as the major component to target gingival inflammation and other periodontal problems. By introducing nano sized formulations, newer substances can be associated with it to form compounds that are having a superior effect than that of the individual constituents.

## **CONCLUSION:**

It can be concluded that the arrow root can be used as an effective natural substitute to various teeth whitening chemicals-based tooth products and is also capable of anti-inflammatory action. The substance is known to adopt cellular mechanisms to counteract and inhibit inflammation.

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## **AUTHOR'S CONTRIBUTION**

Twinkle Francis has contributed for the execution of the work, data collection and drafting of manuscript. Jayalakshmi Somasundaram has contributed for concept and design of the study, validation of the data collection, revision and proof-reading of the review. Anjali.A.K has contributed for, validation of the data collection, revision and proof-reading of the review.

## **CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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