 Evaluation of Clinical Efficacy of *Cissus quadrangularis* in Pain Management and Bone Healing after Implant Placement: A Pilot Study

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ABSTRACT

**Background:** The ancient ayurveda science of medicine describes various herbal preparations that achieve the hastening of bone healing and relieve from pain and swelling.

**Aim:** To evaluate the clinical efficacy of *Cissus quadrangularis* in pain management and bone healing after implant placement.

**Objective:** To evaluate the clinical and biochemical parameters using *C. quadrangularis* after implant placement in terms measurements of pain, swelling and serum alkaline phosphatase level.

**Type of study:** Prospective randomized control study.

**Materials and methods:** The patients were divided in two groups—study group and control group. Three patients in each group received implants either single implants or multiple implants. Study group was given *C. quadrangularis* without any additional medicine and control group was given routine antibiotics (amoxicillin 500 mg and diclofenac sodium). Pain was assessed using visual analog scale (VAS) at 3rd, 5th days and, after 1 week, swelling was checked in form of mild, moderate and severe. And, serum alkaline phosphatase was recorded preoperatively and 4th and 8th weeks of postoperative measurement.

**Results:** Pain and swelling are minimal, and bone healing is maximum in study and in control groups. There was an increase in serum alkaline phosphatase level at different follow-up in study groups compare to control group.

**Conclusion:** Use of *C. quadrangularis* after implant placement showed significant effect on pain and swelling management. Also rising level of serum alkaline phosphatase indicates new bone formation thus helps in osteointegration.

**Keywords:** *Cissus quadrangularis*, Implants, Osteointegration, Pain, Serum alkaline phosphatase, Swelling.


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Conflict of interest: None

INTRODUCTION

*Cissus quadrangularis* is an indigenous medicinal plant seen in India. The plant is known as ‘Harshankar’ in Hindi and ‘Asthisanghara’ in Sanskrit. In old practice, the use of this plant was to promote fracture healing process. The plant contains a high amount of vitamin C, carotene A, anabolic steroidal substance and calcium.1

*Cissus quadrangularis*, a perennial climber widely used in traditional medicinal systems of India, has been reported to possess bone fracture healing, antibacterial, antifungal, antioxidant, anthelmintic, antihemorrhoidal and analgesic activities. This plant has been recognized as a rich source of carotenoids and ascorbic acid and is proved to have potential for medical effects, including ‘gastroprotective activity’ in conjugation with non-steroidal anti-inflammatory drugs (NSAIDs) therapy and in ‘lipid metabolism and oxidative stress’.6

Dental implants are inert, alloplastic materials embedded in the maxilla and/or mandible for the management of tooth loss and to aid replacement of lost orofacial structures. Dental implants have become an important therapeutic modality in the last decade, mainly after the works developed by Brånemark (1960s), in which the direct contact between the bone functional tissues and the biomaterial titanium was termed osseointegration.2

Implant stability and success mainly depends on osteointegration. The great majority of clinician and patients are interested in shortening the treatment time between tooth extraction and implant placement. So, the present study aimed to evaluate the clinical efficacy of *C. quadrangularis* in pain management and bone healing after implant placement and to state reduction in osteointegration period.
As *C. quadrangularis* is rich in vitamin C, carotene A, anabolic steroidal substance, calcium and increase the osteoblastic activity to help in repair the fracture bones. It can be used in post implant insertion to accelerate the osteointegration.

**MATERIALS AND METHODS**

In this study, six patients were selected in whom implant placement was planned to replace the missing teeth. The study was done at Department of Oral and Maxillofacial Surgery, Narsinhbhai Patel Dental College and Hospital, Visnagar, Gujarat. All patient underwent an adequate presurgical preparation consisting of detailed case history, consenting of patient, blood investigations and radiographic examination. All patients met an inclusion and exclusion criteria. Inclusion criteria was patient with missing teeth and want replacement with fixed prosthesis. Patient willing to participate in the study and come for follow-up and age group 18 to 55 years and exclusion criteria was medically compromised patient. Patient not willing for the procedure and patients taking drugs that affect bone metabolism.

The patients were divided into two groups (three patients in each group). Group 1 (study group) was given capsules of *C. quadrangularis* (500 mg/day), two capsules BD, for 50 days postsurgery and group 2 (control group) was given regular antibiotics and analgesics regimen. Antibiotics was amoxicillin and clavulanic acid 625 mg and analgesic diclofenac sodium.

Following the standard surgical protocol, under local anesthesia (lignox 2%) the implant placement was carried out serum alkaline phosphatase was assessed preoperatively to set up baseline values. Results was assessed on the basis of the following parameters: pain, swelling, and serum alkaline phosphatase levels.

Pain was assessed using visual analog scale (VAS) at the 3rd day, 5th day and after 1 week. Swelling was checked in form of mild, moderate and severe.

**TYPE OF STUDY**

Prospective randomized control study

**STATISTICAL ANALYSIS**

All the collected data were subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS)-17 software. Statistical analysis was done by using pair Z test.

**RESULTS**

Total six patients included in the study. Three patients in each groups: (1) Control group and (2) study group. They all met inclusion criteria and attended follow-up. All patients were males and mean age was 37.16. Total 18 implants were placed in six patients which was single implants to multiple implants. Equinox Myriad implant system was used and all implants were placed under standard surgical protocol under local anesthesia. Control group was given routine antibiotics and analgesics postoperative for 1 week and study group was given *C. quadrangularis* 250 mg/BD for 50 days. Serum alkaline phosphates value were recorded preoperative to set baseline value and postoperative it was recorded at 4th and 8th weeks. Follow-up for pain and swelling was done at 3rd day, 5th day and at end of 1st week. Pain was assessed in VAS (Fig. 1) and it is shown in Table 1. Swelling was assessed in the form of mild, moderate and severe form following Table 2 shows the observed swelling at 3rd, 5th and 7th days. All patients in both
groups have got mild swelling at 7th postoperative day (Table 2).

Graph 1 shows mean serum alkaline phosphatase values in both groups preoperatively and postoperatively at 4th and 8th weeks.

Mean serum alkaline phosphatase values shown significant value (Table 3). Group 2 study group proved to be best group who received C. quadrangularis and these patients received prosthesis early than usual integration period. This resulted in patients and clinicians satisfaction.

**DISCUSSION**

Dental implant is an alloplastic material that is surgically inserted into hard and soft tissues which bear a superstructure for esthetics and function purposes. After loss of teeth, loss of bone occurs both in width and height resulting into various esthetic and functional complications.\(^5\)

The ancient ayurveda medicinal science describes various herbal preparations that achieve the hastening of bone healing. The names of the plants in ayurveda have been given based on their medicinal properties. The plant is known as Harshankar in Hindi and Asthisanthgra in Sanskrit. Harjor means that which joins the bones.\(^3\)

Bone is a dynamic organ that undergoes lifelong changes by bone remodeling using specialized cells and is the predominant process after attaining peak bone mass around the third decade. Remodeling is an essential process for maintaining the skeleton by repairing any damaged portions and removal of old bone as well as for discharging calcium and phosphorus from bone stores to maintain ionic homeostasis in the body.\(^7\)

Different cultures around the world have used herbs for thousands of years to treat several health conditions. One of the herbs that have shown beneficial effects on bone belongs to the *Cissus* family of plants. *Cissus quadrangularis* is a medicinal herb used in Siddha and ayurvedic medicine since ancient times in Asia, as a general tonic and analgesic, especially for bone fracture healing.

*Cissus quadrangularis* contains vitamins and steroid which are found to have a specific effect on bone healing. The anabolic steroidal principle from *C. quadrangularis* shows a marked influence on the rate of fracture healing by influencing early regeneration of all connective tissues involved in the healing and quicker mineralization of callus.\(^9\)

There was shortening of about 2 weeks in the duration of bone healing. The hastening in the bone healing was attributed to the stimulation of all cells of mesenchymal origin, namely, the fibroblasts, chondroblasts and osteoblasts, by *C. quadrangularis*.\(^12,13\) Thus *C. quadrangularis* builds-up the chemical composition of the fractured bone namely mucopolysaccharides, collagen calcium phosphorus and others as well as its functional efficiency.\(^6,8,16\)

In human medicine, bone markers are commonly used for control of various therapeutic protocols and monitoring...
of cell activity in bone metabolic diseases and other disorders related to bone changes. For assessing bone healing and bone formation, serum alkaline phosphatase is one of the most important serum biomarkers for checking alkaline phosphatase (ALP) levels at regular intervals, which helps in clinically evaluating the bone healing progress. In this study, we used chemical biomarker serum alkaline phosphatase (Alk PO₄) to monitor bone healing after implant insertion.⁴,¹⁰,¹¹ We measured levels of several serum biochemical markers to determine the influence of *C. quadrangularis* on the state of bone turnover.

We used *C. quadrangularis* in tablet form (Hadjod of Himalaya). In the study group, we gave *C. quadrangularis* and it proved to be very beneficial. There was an elevation in serum alkaline phosphatase in the study group. Thus, it has shortened the osteointegration period after implant placement.¹⁴,¹⁵ We delivered prosthesis earlier.

Deka et al (1994)¹ conducted a study on eight healthy dogs to evaluate the efficacy of *C. quadrangularis* in accelerated bone healing in experimentally fractured radius and ulna. The results showed that, at the end of 11th day radiographically, bony dissolution and periosteal reaction were more in *Cissus* group than in control group. At the end of 11th day, serum calcium levels were also significantly decreased in *Cissus* group showing increased uptake of calcium at the healing site. At the end of 21st day, *Cissus* group showed significantly more bony deposition and periosteal reaction compared to control group radiographically.

In our study, we took radiographs at regular intervals of 1st, 4th, and 6th weeks and it showed better osteointegration (Figs 2A to C). Singh et al (2011)³ conducted a study on 44 fracture patients to check the efficacy for osteogenic potential of *C. quadrangularis*, *Moringa oleifera* and Osteoseal. They checked serum calcium, total and ionic, phosphorous levels and took pre- and post-treatment radiographs at 1st, 4th and 6th weeks after trauma. The results showed that healing was the fastest in the osteoseal group followed by *Cissus* group. They concluded that *C. quadrangularis* has vitamins and anabolic steroids which have marked influence on bone healing. The bone healing period was shortened by 2 weeks in *Cissus* group.

Sinha et al (2011)⁴ conducted a study on 36 fracture patients to evaluate role of common biomechanical markers for the assessment of bony union. They measured the levels of serum alkaline phosphatase, urinary hydroxyproline, and took X-rays 3rd, 5th, 8th and 12th weeks postoperatively. The results showed that there is a statistically significant difference of serum ALP levels and urinary hydroxyproline levels between normal union and malunion groups. Serum ALP levels were significantly increased in patients in whom normal bone healing occurred and it also increased slightly in patients in whom malunion of the bony fragments occurred. Thus, they concluded that serial monitoring of biochemical markers like serum ALP levels reflects the actual status of bone resorption and bone formation over a short time frame. A statistically significant positive correlation between serum ALP levels indicates progress toward satisfactory bone healing.

**CONCLUSION**

We conclude that *C. quadrangularis* (CQ) can reduce bone loss. *C. quadrangularis* probably reduces bone resorption primarily by downregulating proinflammatory cytokines. The beneficial effects of CQ are probably due to the flavonoids present. *Cissus quadrangularis* being an edible plant and with a history of medicinal effects, especially in healing bone fractures, may be a good supplement to existing medication for the reversal of postmenopausal bone loss. And, we recommend it after dental implant placement to minimize the osteointegration period.
REFERENCES


