

Original Article

Chondroprotective Potential of Fruit Extracts of *Phyllanthus Emblica* in Osteoarthritis

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There is a need for effective nutraceuticals for osteoarthritis care. The fruit of *Phyllanthus emblica* is used as a powerful rejuvenator in Ayurvedic medicine. This study measured the chondroprotective potential of *P. emblica* ('Amalaki') fruits *in vitro*. We used aqueous extracts of unprocessed *P. emblica* fruit powder (powder A), and the powder obtained after hot water extraction and drying of powder A (powder B). Chondroprotection was measured in three different assay systems. First, we tested the effects of both fruit powders on the activities of the enzymes hyaluronidase and collagenase type 2. Second, an *in vitro* model of cartilage degradation was set-up with explant cultures of articular knee cartilage from osteoarthritis patients. Cartilage damage was assayed by measuring glycosaminoglycan release from explants treated with/without *P. emblica* fruit powders. Aqueous extracts of both fruit powders significantly inhibited the activities of hyaluronidase and collagenase type 2 *in vitro*. Third, in the explant model of cartilage matrix damage, extracts of glucosamine sulphate and powder B (0.05 mg/ml) exhibited statistically significant, long-term chondroprotective activity in cartilage explants from 50% of the patients tested. This result is important since glucosamine sulphate is the leading nutraceutical for osteoarthritis. Powder A induced a statistically significant, short-term chondroprotective activity in cartilage explants from all of the patients tested. This is the first study to identify and quantitate new chondroprotective activities of *P. emblica* fruits. These data provide pilot pre-clinical evidence for the use of *P. emblica* fruits as a chondroprotective agent in osteoarthritis therapy.

Keywords: collagenase – glycosaminoglycans – hyaluronidase – *Phyllanthus emblica*

Introduction

Osteoarthritis (OA) is a serious, degenerative disease. A systematic research of randomized, placebo-controlled clinical trials performed between 1980 and 2002, confirmed the efficacy of oral glucosamine sulphate (GS) on arthritis (1). However, controversies on therapeutic

efficacy of glucosamine in OA prevail (2–4). Therefore, it is urgent and important to identify new chondroprotective nutraceuticals. Ayurvedic tradition has long recognized the medicinal properties of *Phyllanthus emblica* or *Emblica officianlis* fruits. *Phyllanthus emblica* fruits ('Amalaki'), are primarily used for their anti-inflammatory activity and rejuvenating properties. According to Svoboda, the ancient Indian text Charakha Samhita; cites 'Amalaki' as the single most potent rejuvenating medicine (5).

Three *in vitro* assays were used to evaluate the hypothesis that crude aqueous extracts of *P. emblica*

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