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Anti-cancer and osteoarthritic pain activity of *Symphytum officinale* L.

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ABSTRACT

Introduction: *Symphytum officinale* L. belongs to the plant family of plantain family Plantaginaceae, The plant is native to most of Europe and northern and central Asia, but has widely naturalized elsewhere in the world. The aim of this study was to overview pharmacological properties of *Symphytum officinale* L.

Methods: This review article was carried out by searching studies in PubMed, Medline, Web of Science, and IranMedex databases. The initial search strategy identified about 102 references. In this study, 44 studies was accepted for further screening and met all our inclusion criteria [in English, full text, therapeutic effects of *Symphytum officinale* L. and dated mainly from the year 1992 to 2016. The search terms were “*Symphytum officinale* L.”, “therapeutic properties”, “pharmacological effects”.

Result: the result of this study indicated that *Symphytum officinale* L. possess anti-cancer and osteoarthritic pain activity.

Conclusion: based on the result, *Symphytum officinale* L. was shown to be effective in carcinoma treatment as well as being effective in relieving pain and stiffness and in improving physical functioning and were superior to placebo in those with primary osteoarthritis of the knee without serious adverse effects.

Keywords: *Symphytum officinale* L, Phytochemicals, Therapeutic effects, Pharmacognosy, Alternative and complementary medicine.

INTRODUCTION

Herbal medicine is shown to contribute effectively in remedy and well-being of many diseases [1-24]. *Symphytum officinale* L. is a perennial herb belongs to the family Boraginaceae and to the genus *Symphytum* [25]. It is native to Europe, growing in damp, grassy places, and is locally frequent throughout Ireland and Britain on river banks and ditches [26].

Symphytum officinale L. was historically used to treat a wide variety of ailments ranging from severe burns, acne and other skin conditions [27, 28], bronchial problems, broken bones [29], sprains [30], arthritis [31], gastric and varicose ulcers, It was reputed to have bone and teeth building properties in children, and have value in treating "many female disorders" [32,33]. *Symphytum officinale* L. root extract has been used for the topical treatment of painful muscle and joint complaints and possess wound healing activity [34]. It is clinically proven to relieve pain, inflammation and swelling of muscles and joints in the case of degenerative arthritis, acute myalgia in the back, sprains, contusions and strains after sports injuries and accidents, also in children aged 3 years and older [28, 35].

The plant contains the small organic molecule allantoin, which is thought to stimulate cell growth [36] and repair while also depressing inflammation [37, 38]. Constituents of *Symphytum officinale* L. also include mucilage, steroidal saponins, tannins, pyrrolizidine alkaloids, inulin, and proteins[39-41].

RESULTS

Anti-cancer

The efficacy of a novel phytochemical (p-DGA) from *Symphytum officinale* L. was investigated. It was found that both p-DGA and m-DGA suppressed the growth and induced death in PCA cells. So, p-DGA with no toxicity confirmed to have anti-cancer activity [42].

In a study, it was shown that all *Symphytum officinale* L products contain remarkable amounts of Pyrrolizidine alkaloids (Pas) [43]. In a study, it was demonstrated that *Symphytum officinale* L is mutagenic in liver, and PA from *Symphytum officinale* L cause toxicity and tumor induction [44].

Symphytum officinale L induces liver tumors through a genotoxic mechanism. Mutation induction and tumor initiation was due to the presence of pyrrolizidine alkaloids in the plant [45]. Results of a study showed that *Symphytum officinale* L containing PA products contribute to its toxicological assessment [46].

Knee, ankle, and acute low back pain treatment

Symphytum officinale L. root extract plus methyl nicotinate topical cream was compared with placebo cream for relief of acute upper or low back pain. The result showed that the combination demonstrated superiority to the two other treatment creams, while methyl nicotinate displayed a considerable effect as well [47].

The effect of 2 concentrations of topical, *Symphytum officinale* L creams containing tannic acid was assessed. Result showed that both active topical cream was useful in soothing pain and stiffness and in boosting physical condition and were superior to placebo in those with primary osteoarthritis of the knee without severe side effects [29]. The efficacy of thrice daily topical 4Jointz was assessed on osteoarthritic knee pain, markers of inflammation and cartilage breakdown over 3 month. Topical treatment using 4Jointz minimize pain but had no effect on inflammation or cartilage breakdown [48].

The superiority of *Symphytum officinale* L root extract cream to placebo in patients with acute upper or lower back pain was examined. *Symphytum officinale* L root extract showed a remarkably potent and pertinent effect in attenuating acute back pain. For the first time a fast-acting effect of the topical cream was also observed [49].

The effect of an everyday ointment application of *Symphytum officinale* L on painful osteoarthritis of the knee was investigated. The results suggest that the plant ointment is well suited for the treatment of osteoarthritis of the knee. Pain is reduced, mobility of the knee improved and quality of life increased [50]. The efficacy of an ointment of *Symphytum officinale* L extract and Diclofenac gel was compared in the treatment of acute unilateral ankle sprain. The results indicate that *Symphytum officinale* L extract is likely to be superior to Diclofenac gel [51].

The percutaneous efficacy of an ointment of *Symphytum officinale* L. extract was confirmed decisively in patient with unilateral acute ankle sprains. Compared to placebo, the active treatment was clearly superior regarding the reduction of pain and ankle edema [31].

CONCLUSION

Based on the result, *Symphytum officinale* L. was shown to be effective in carcinoma treatment as well as being effective in relieving pain and stiffness and in improving physical functioning and were superior to placebo in those with primary osteoarthritis of the knee without serious adverse effects.

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