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Remedial effect of *Alpinia officinarum*

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ABSTRACT

Alpinia officinarum belong to the ginger family, cultivated in Southeast Asia. It originated in China, where its name ultimately derives. The purpose of this study was to review remedial effect of *Alpinia officinarum*. This review article was carried out by searching studies in PubMed, Medline, Web of Science, and IranMedex databases. The initial search strategy identified about 93 references. In this study, 59 studies was accepted for further screening and met all our inclusion criteria [in English, full text, remedial effects of *Alpinia officinarum*, and dated mainly from the year 1997 to 2016]. The search terms were “*Alpinia officinarum*,” “remedial properties”, “pharmacological effects”. It is commonly used for its anti-inflammatory, antihyperlipidemic bioactivity, anticancer, dysmenorrhea, osteoblast, anti-influenza virus activity, antibiotic resistance, antimicrobial effect. The results from this study was shown that *Alpinia officinarum* is a multi-purpose medicinal candidate. While *Alpinia officinarum* has been used in traditional medicine for many centuries, further clinical trials are needed to confirm its remedial use.

Keywords: *Alpinia officinarum*, Phytochemicals, remedial effects, Alternative and complementary medicine.

INTRODUCTION

The history of herbal remedies in the treatment of many diseases dated back to ancient times [1-24]. *Alpinia officinarum* belong to the ginger family, cultivated in Southeast Asia. It originated in China, where its name ultimately derives [25]. It can grow several feet high, with long leaves and reddish-white flowers. The rhizomes, known as galangal, are valued for their sweet spicy

flavor and aromatic scent. This herbaceous plant can grow up to ten feet in height, though three to five feet is more common [26]. The leaves are lanceolate (long and thin), and the flowers are white with streaks of red, growing from a spike at the top. *Alpinia officinarum* contains high concentrations of the flavonol galangin, which has been shown to slow the increase and growth of breast tumor cells [27]. Historically, the rhizomes were reputed to have stimulant and digestive effects. It has antioxidant [28] and antimicrobial effect [29], immunostimulating activity [30], anti-inflammatory, anti-nociceptive, and anti-psychiatric effects [31], anti-ulcer [32], hypoglycaemic activity [33], anti-fungal activity [34], antiviral activities [35], anti-inflammatory [36] effects.

Chemical compound

Major chemical constituents of *Alpinia officinarum* include volatile oil, diaryheptanoid [37], sterol and flavonoids [38]. The chemical components of this plant are galangoflavonoid [39], 1'S-1'-acetoxychavicol acetate [40], phenylpropanoids [41] and hydroxybenzaldehyde [42], acetoxycineoles (trans and cis)-2- and 3-acetoxy-1, 1, 8-cineoles, 1'-acetoxychavicol acetate (galangal acetate) [43], β -Sitosterol diglucoside (AG-7) and β -sitosteryl Arabinoside (AG-8) [44], The phenylpropanoids (4,4'[2E,)-bis (prop-2-ene)-1, 1'-diphenyl-7, 7'-diacetate [41], hydroxy-1,8-cineole glucopyranosides, (1R, 2R, 4S)- and (1S, 2S, 4R)-trans-2-hydroxy-1,8-cineole β -D-glucopyranoside, and (1R, 3S, 4S)-trans-3-hydroxy-1, 8-cineole β -D-glucopyranoside [43].

RESULTS

Anti-inflammatory activity

The antioxidant, anti-inflammatory activity, and the total phenolic content of isolated compounds from *Alpinia officinarum* rhizomes was evaluated. The results confirm the usefulness of *A. officinarum* in the treatment of inflammatory disorders like rheumatoid arthritis and inflammatory bowel diseases [45].

The *A. officinarum* extract exhibited strong repellent and contact toxicities against *L. serricorne* adults. The naturally occurring *A. officinarum* extract could be useful for integrated management of *L. serricorne* [46].

A recent labdane diterpene, and a novel innate cadinane sesquiterpene showed no considerable cytotoxic effect against HeLa and HepG2 cancer cell lines with $IC_{50} > 50 \mu\text{g mL}^{-1}$ [47]. The anti-inflammatory effects of *Alpinia officinarum* rhizomes on acute and chronic arthritis in SD rats was examined. *Alpinia officinarum* rhizomes may be lasting remedial or preventive alternatives in acute and chronic arthritis remedy [48].

In a mixed animal and human study, the anti-inflammatory properties of this compound on macrophage cell line (RAW 264.7) and human lateral blood mononuclear cells (PBMCs) *in vitro* was demonstrated. The results suggested that HMP from *Alpinia* inhibited the LPS-induced production of NO, IL-1 β , and TNF- α and expression of iNOS and COX-2 gene expression by suppressing NF- κ B activation and phosphorylation of p44/42 MAPK [49].

The methanol extract of the rhizomes of *Alpinia officinarum* L. illustrated significant antitumor-boosting action in an experimental condition. Seven diarylheptanoids (1-7) displayed noticeable anti-inflammatory effects, with a 50% repressory dose [50].

Antihyperlipidemic bioactivity

Antihyperlipidemic bioactivity of rhizoma galangae was assessed. The result showed for the first time that the occurrence of curcumin in rhizoma *A. officinarum*. Curcumin synergically evokes anti-dyslipidemic bioactivity with coexisting total polyphenolics, dietary fibers and phytosterols [51].

The antiobesity effect of *A. officinarum* ethanol extract (AOE) on lipid accumulation in 3T3-L1 cells and obesity in mice fed a high-fat diet (HFD) was investigated. The results suggest that AOE prevents obesity by suppressing adipogenic and lipogenic genes. AOE has potential for use as an antiobesity remedial candidate that can function by regulating lipid metabolism [52].

Anticancer activity

The proliferation activity of methanolic extract of *A. officinarum* on the of the breast cancer cell line MCF-7 was investigated. The findings indicate that the *A. officinarum* extract evokes an antiproliferative effect in MCF-7 breast cancer cells by induction of S-phase cell cycle arrest and apoptosis [53].

The in vitro effects of *Alpinia officinarum* Hance extract (AOHE) on MIF expression in obese and non-obese persons was compared. Results indicate that AOHE is a major modulator of MIF-dependent pathologic state in obesity and are consistent with increasing evidence describing a regulating role for MIF in cytokine genesis in an inflammatory conditions in in vitro studies [54].

Dysmenorrhea activity

The effect of *Alpinia officinarum* Hance (*A. officinarum*) 80% alcohol extract on the primary dysmenorrhea was tested. These findings suggest that *A. Officinarum* 80% alcohol extract can remarkably mitigate primary dysmenorrhea [55].

Osteoblast activity

Osteoblast mineralization of a water extract of *A. officinarum* rhizome (WEAO) was evaluated in vitro. The results demonstrate that WEAO agitate osteoblast mineralization and prohibit osteoclast separation. Thus, WEAO may be an encouraging herbal agent to treat or prevent pathological bone diseases by adjusting the balance between osteoclast and osteoblast activity [56].

Anti-influenza virus activity

Diarylheptanoids and AO-0011 from *Alpinia officinarum* exhibit anti-influenza virus effect in vitro. Efficacies against influenza virus infection and the mechanism of antiviral action were evaluated in vivo and in vitro, in respect. AO-0002 was suggested to have a distinct anti-influenza virus action to that of oseltamivir and was ascertained to show anti-influenza activity in vitro and in vivo [57].

Antibiotic resistance activity

The bioactive phytochemicals from *Alpinia officinarum* Hance was addressed. The findings make a new generation of phytopharmaceutical utilizing galangin, quercetin and baicalein in composition with ceftazidime to cure PRSA that at this time almost untreatable microorganism. The anti-PRSA activity and mechanism of action of this plant is reported for the first time [58].

Antimicrobial activity

Inhibitory effects on bacterial growth showed that 40% ethanol extract of *Alpinia* can inhibit *Staphylococcus aureus*, alpha-Hemolytic streptococcus, beta-Hemolytic streptococcus, and *Streptococcus pneumoniae*. The unalterable inhibition introduced in two steps. It is possible that the *Alpinia* extract suppress FabG, thus showing antibacterial ability [59].

CONCLUSION

The results from this study was shown that *Alpinia officinarum* is a multi-purpose medicinal candidate. While *Alpinia officinarum* has been used in traditional medicine for many centuries, further clinical trials are needed to confirm its remedial use.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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