The Efficacy of Powdered Ginger in Osteoarthritis of The Knee

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Ginger is an effective treatment against nausea and vomiting but there are only a few clinical studies of the effect as an anti-inflammatory or analgesic agent. A double-blind randomized controlled trial of one gram of powdered ginger per day in a capsule compared with a placebo in patients with osteoarthritic knees was carried out. The number of participants in each group was thirty. The length of treatment was eight weeks. The efficacy of the drug was monitored by using the Knee Injury and Osteoarthritis Outcome Score (KOOS). The authors used repeated ANOVA to compare scores between each group. One gram of powdered ginger per day did not improve knee joint pain, symptoms, daily activities, sports activities and quality of life compared with a placebo. Prominent side effects did not occur. The systolic and diastolic blood pressure, body mass index and blood chemistry were not changed after receiving treatment. The present study showed that one gram per day of powdered ginger could not relieve joint pain and improve symptoms and the quality of life during eight weeks of treatment of osteoarthritis of the knee compared with the placebo.

Keywords: *Ginger, Zingiber officinale, Osteoarthritis, Knee*

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Osteoarthritis (OA) is the most common musculoskeletal disorder affecting the synovial joint and is a major cause of pain and physical disability in older adults[1]. The conservative treatments for OA before surgery include the use of patient education, activity modification, weight control, exercise and physiotherapy[1]. In addition, drug therapy includes non opioid analgesics such as paracetamol, non-steroid anti-inflammatory drugs (NSAIDS), opioid analgesics, chondroprotective agents such as glucosamine sulfate, and intra articular injection with steroids or hyaluronic acid[1]. In general, the common drugs used are NSAIDS and analgesics. Because the OA is a chronic disease, most of the patients need to continue to take these drugs for long time. Many patients are concerned about the long term side effect of these drugs and seek alternative therapy. The use of alternative medicine such as botanicals and nutritional supplements has become popular with osteoarthritis patients[2]. Ginger, the rhizome of *Zingiber officinale*, was one of these alternative medications. It has a long history of medicinal use in China and India for conditions such as headache, nausea, cold and rheumatism[3]. Ginger has been accepted for use against dyspepsia, nausea and motion sickness[4]. *In vitro* study, ginger also blocked the formation of inflammatory mediators such as thromboxane, leukotrienes and prostaglandin[5-8]. As the authors know, there are only four studies[9-12] using gingers in the treatment of arthritis. Three of them[9-11] used ginger extract and only one reported the anti-inflammatory effect of powdered ginger and fresh ginger on arthritis patients[12]. In the present study, the effectiveness and adverse events of ginger on the treatment of osteoarthritis was studied using one gram per day of ginger power in capsule.

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Material and Method

Sixty patients with the diagnosis of osteoarthritis were randomly assigned to receive treatment. The diagnoses of osteoarthritis were based on clinical criteria of osteoarthritis[13].

On physical examination, the patients have had no deformities of the knee and no surgical procedure of the lower extremities in the past six months. At the study entry, treatment with analgesics and NSAIDS was discontinued for two weeks. During the treatment, paracetamol 500 mg, 2 tabs per day, was allowed if severe pain occurred before the next visit.

The present study was approved by Ethical Committee of the Faculty of Medicine, Thammasat University. All patients completed an informed consent form and were advised of the risks of the present study, including increased symptoms, and adverse effects of ginger.

The patients were randomly selected to the treatment group and placebo group. The treatment group received dry powdered ginger, 500 mg in one capsule, (by Khaolaor Laboratories Ltd) twice daily for two months. The placebo group also received the same looking capsule twice daily.

The evaluation of the result of the treatment was made by physical examination and Knee injury and Osteoarthritis Outcome score (KOOS) questionnaire which was translated into Thai[14], at the beginning, after four weeks and after eight weeks. The KOOS is knee specific instrument, developed to assess the patient's opinion about their knees and associated problems. It is an extension of the Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) and validated for several cohorts of younger and/or more active patients with knee injury and/or knee osteoarthritis in both long term and short term study. The KOOS is a 42-item self-administered self-explanatory questionnaire in five separately scored subscales: Pain (nine items), Other Symptoms (seven items), Function in Daily Living (ADL) (17 items), Function in Sport and Recreation (Sport/Rec) (five items) and Knee-related Quality of Life (QOL) (four items). Scores are transformed to a 0-100 scale, with zero representing extreme knee problem and 100 representing no knee problem. The KOOS has been proven to be more sensitive than the WOMAC in more active patients[15,16].

Adverse events were recorded during follow-up. The routine Complete Blood Count (CBC), Urine Analysis (U/A) and blood chemistry test (FBS, BUN, Cr, SGOT, SGPT, ALP, Cholesterol, TG, HDL and LDL) values were also recorded.

Results

The effectiveness of powdered ginger

Of the 60 patients initially enrolled in the present study, 30 in the treatment group and 30 in the placebo group, four patients in the treatment group and seven in placebo group dropped out of the present study. In the treatment group the four patients withdrew because of urinary tract infections. In placebo group, four patients felt edema, two had skin rash and one was afraid to perform a blood test. 49 patients completed the study and reported for testing at baseline, four weeks and eight weeks. The baseline characteristic of patients who completed the present study is given in Table 1. There are no differences between two groups (p-value > 0.05). After eight weeks of treatment the pain scores improved in both ginger group and placebo group. The mean of stiffness symptom score in ginger group slightly improved, but did not improve in placebo group. The daily living function score in both groups also improved. The sport and recreation score and quality of life score improved in placebo group but did not improve in ginger group. The mean of KOOS scores in the five categories of KOOS at baseline, four weeks and eight weeks after treatment are given in Fig. 1. All results demonstrated no improvement of KOOS in the five items comparing ginger and placebo by repeated ANOVA test (p-value > 0.05).

Adverse events

Adverse events were recorded and shown in Table 2 which shows that only one patient had heartburn.

During the present study (initial, four weeks and eight weeks) all of the patients show no abnormal change of their laboratory value (CBC, Urine analysis, BUN, Cr, SGOT, SGPT, Chol, TG and ESR).

Discussion

The present study is the first double blind randomized placebo controlled study about the effect of powdered ginger on osteoarthritic knee. Our results showed that one gram of powdered ginger had no effect in decreasing pain or other symptoms, nor improving ADL, Sports activity and Quality of life compared with the placebo. These results were different from the previous study in which ginger had been shown to have a mild to moderate effect on the treatment of osteoarthritis[9-12]. The different outcome might be caused by the type of ginger which was used. In our study, dry ginger was used because it was available in Thammasat University and has been shown effective against nausea[17] but powdered ginger from the same source did not demonstrate positive effect in anti-

Table 1. Baseline characteristic of patients

Variable	Treatment group Mean (SD) (n = 26)	Placebo group Mean (SD) (n = 23)
Male:Female	5:21	2:21
Age (year)	48.88 (7.35)	49.09 (8.03)
Body mass index (kg/m^2)	24.14 (3.53)	24.87 (4.96)
Kellgren-Lawrence (KL) score	2.03 (0.75)	2.16 (0.83)
Baseline KOSS score [Mean (SD)]		
Pain	72.86 (16.41)	75.24 (12.97)
Symptom	73.63 (17.98)	80.90 (12.21)
Daily activity	78.39 (15.84)	81.71 (13.40)
Sport and Recreation activity	60.82 (24.40)	57.88 (25.08)
Quality of life	54.09 (26.09)	50.81 (27.39)

Table 2. Adverse events occurring during eight weeks of treatment

Adverse event	Treatment group (n = 26)	Placebo group (n = 23)
Skin rash, Urticaria	0	0
Anorexia, Nausea, Vomiting, Abdominal distension	0	0
Headache	0	0
Numbness	0	3
Flush, Cramp pain	0	0
Palpitation	0	0
Heart burn, Mouth burn	1	3
Constipation, Diarrhea	0	0
Loss of libido	0	0
Body smell, Breath smell	0	0
Drowsiness, Insomnia	0	0
Abnormal bleeding (gum, menstruation, skin, hematuria, hematochezia)	0	3

inflammation.

In ginger, the main active constituents are gingerols and shogaols[18]. Both of them have been shown to have a number of pharmacological uses, including antiemetic, antipyretic, analgesic, antitussive, cardiac ionotropic, antibiotic, antifungal[19] and anti-inflammatory[8]. In fresh ginger, there is a large amount of gingerol but with heat and processing to make it powder, gingerol could convert to shogaol[20]. The ratio of gingerol: shogaol in powdered ginger might decrease from fresh ginger. Since gingerol has been reported to be a more potent anti-inflammatory by inhibition of both COX-1 and COX-2 than shogaol[7,8], a reduction in gingerol content in dry powder might reduce the anti-inflammatory effect of ginger. In commercial powdered ginger, there is a lot of variation of content of 6-gingerol, 6-shogaol, 8-gingerol and 10-gingerol composition in powdered ginger in various brands from 0.00-9.43 mg/g, 0.16-2.18 mg/g, 0.00-1.1 mg/g and 0.00-0.83 mg/g respectively[21]. The real cause of the variation is not known, but the variation might be due to the source and/or the age of ginger, the homogeneity of the rhizome used, or the method of processing[21]. Because of this, the exact dosage of gingerol in powdered ginger could not be controlled and might not reach a therapeutic level. This reason could explain why our treatment group did not improve compared with the previous studies that used ginger extract which contain standardized content of gingerol[9-12]. The authors also believe that the negative result of some powdered ginger studies[22,23] might be caused by the variation of content of gingerol and shogaol. With the

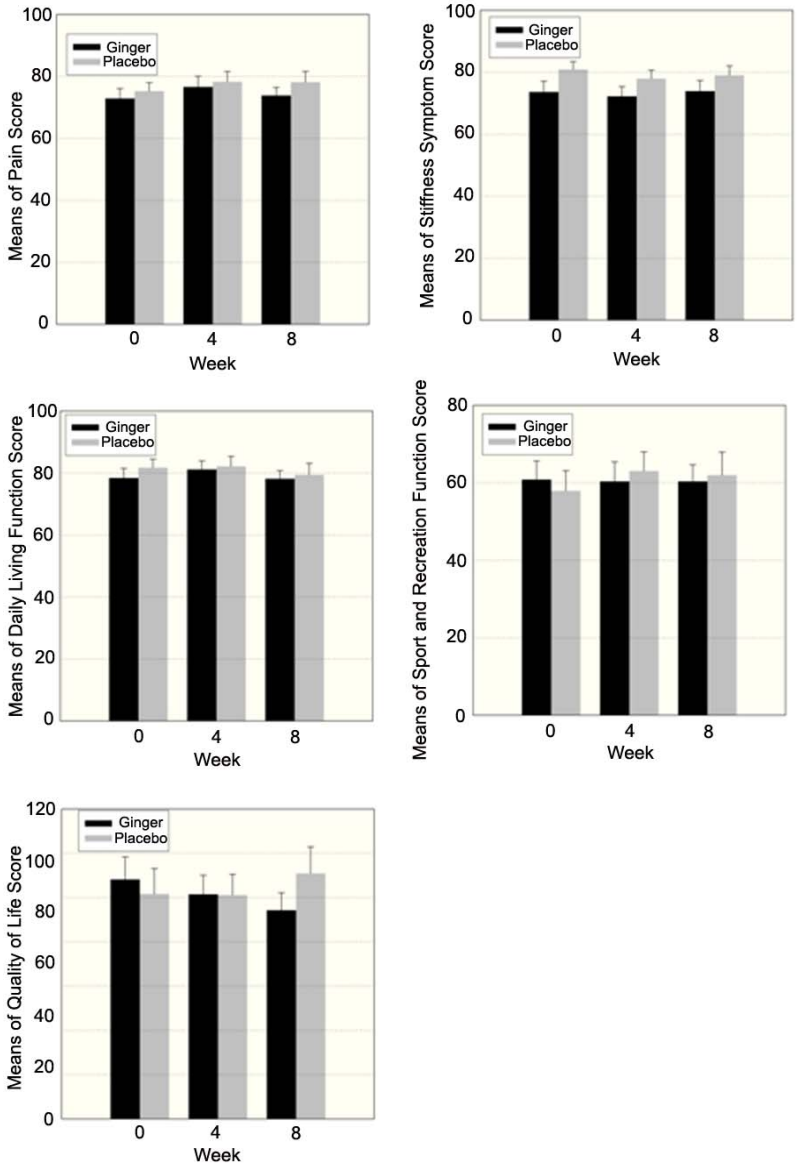

Fig. 1 Means of KOOS of pain, stiffness symptom, ADL, Sport and Rec score at baseline, 4 weeks and 8 weeks. There was no improvement in five categories compared with the placebo ($p > 0.05$)

same source of powdered ginger that the authors used, there was reported success using it as an antiemetic[17]. Our powdered ginger might contain a large amount of shogaol that had a potent anti-emetic effect via serotonin receptor[24]. Another cause of our negative result might be due to the short period of observation. The anti-inflammatory effect of ginger might need a long time of treatment[12].

Concerning adverse effects, the present study showed that one gram of ginger taken orally did not cause any major side effect in both clinical observation and laboratory tests. Only one patient of 26 had heartburn. These results are similar to other studies[12,16].

To evaluate the effect of ginger on arthritis in the next study, by our results, we suggest using fresh ginger or ginger extract with precise content of gingerol or a large dosage of powdered ginger (2-4 grams per day) should be tried with more than six months of treatment.

Summary

One gram of powdered ginger per day taken

orally for eight weeks did not have a positive effect in osteoarthritis of the knee compared with the placebo measured by the KOOS score.

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Potential conflicts of interest

None.

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ประสิทธิภาพของการใช้ขิงผงในการรักษาโรคข้อเข่าเสื่อม

สัญญาณ เนียมปุก, กัมมาล กุมาร ปาวา, ชุมพจต์ อมาตยกุล

ขิงผงมีประสิทธิภาพในการรักษาอาการคลื่นไส้อาเจียน แต่มีรายงานจำนวนน้อยที่รายงานการใช้ขิงผงรักษาอาการข้อเข่าเสื่อม การศึกษานี้เป็นการศึกษาเปรียบเทียบประสิทธิภาพของการใช้ขิงผงในการรักษาข้อเข่าเสื่อม โดยมีอาสาสมัครที่เป็นโรคข้อเข่าเสื่อมเข้ารับการทดสอบจำนวน 60 คน แบ่งออกเป็น 2 กลุ่ม กลุ่มละ 30 คน กลุ่มแรกได้รับขิงผงที่บรรจุในแคปซูลขนาด 1 กรัม วันละสองครั้ง กลุ่มที่สองได้รับยาหลอกที่บรรจุในแคปซูลที่เหมือนขิงผงในขนาดที่เท่ากัน ทำการประเมินผลการรักษาโดยใช้แบบสอบถาม KOOS (Knee Injury and Osteoarthritis Outcome Score) ที่ระยะเวลา 4 และ 8 สัปดาห์ หลังการรักษาและใช้ repeated ANOVA ในการเปรียบเทียบผล ผลการศึกษาพบว่าขิงผงและยาหลอกไม่มีความแตกต่างกันในตามหัวข้อทั้งหมดของแบบสอบถาม KOOS ในหัวข้อความเจ็บปวด อาการขัด การดำเนินชีวิตประจำวัน การเล่นกีฬา และคุณภาพชีวิตโดยที่ตลอดการวิจัยไม่พบผลแทรกซ้อนที่เป็นอันตรายร้ายแรง