and 200 (mg/kg/d), the M plus barberry (MB) groups with doses of 50, 100, and 200 (mg/kg/d) barberry, and the M plus sildenafil group (30mg/kg/d). Two weeks after a single injection of monocrotaline (60 mg/kg) to induce PAH on day one of the study, barberry water extract or sildenafil were gavaged daily for two weeks. At the end of the 4th week, hemodynamic, biochemical, and histopathological parameters were assessed.

After two weeks of intervention, both sildenafil and barberry at all doses significantly reduced the right ventricular systolic pressure (RSVP) compared with the M group. The effect on RSVP reduction was comparable between barberry MB100 and MB200 mg/kg and the sildenafil group. Right ventricular hypertrophy was significantly reduced in the sildenafil group and the MB100 and MB200 compared to the monocrotaline group. Histopathological parameters were only evaluated in the MB200 group, which had previously demonstrated the greatest effect in the hemodynamic parameters. Both sildenafil and MB200 intervention attenuated the monocrotaline-induced arteriole remodelling resulting in significant reduction in the medial wall thickness. The effect was significantly greater in the barberry intervention compared to sildenafil. Neither barberry nor sildenafil had any significant effect on the plasma levels of endothelin-1, glutathione peroxidase, and the malondialdehide of lung.

This interesting study demonstrated a beneficial effect of a barberry water extract on a monocrotaline-induced rat model of pulmonary hypertension. Furthermore, when compared to sildenafil, a currently used therapy for PAH, barberry demonstrated equivalent or greater effect at a dose of 200mg/kg/d. Authors suggest that the effect of barberry may be attributable to a combination of its phenolic and alkaloid compounds, potentially with some effect on redox balance. The study provides some good preliminary research and evidence for further exploring the potential of barberry or its derivatives in the treatment and management of pulmonary arterial hypertension.

Effectiveness of ginger for relieving symptoms of primary dysmenorrhea

Daily JW, Zhang X, Kim DS, Park S. 2015. Efficacy of ginger for alleviating the symptoms of primary dysmenorrhea: A systematic review and meta-analysis of randomised clinical trials. *Pain Med*. In press. DOI: 10.1111/pme.12853.

Primary dysmenorrhea is one of the most common gynecologic disorders, with a prevalence (of varying severity) of between 30-90% amongst different ethnicities with. Severe dysmenorrhea is estimated to contribute to a loss of 600 million work hours and $2 billion in lost productivity per year. Whist the cause of primary dysmenorrhea is not fully understood, it is known that increased production of prostaglandins derived from inflammatory mediators, including cyclooxygenase (COX)-2, cause excessive contractions of the uterus with associated pain and cramping. Non-steroidal anti-inflammatory drugs (NSAIDs), which inhibit COX-2, are the main treatment for primary dysmenorrhea, butthey are not completely effective and have considerable adverse effects, morbidity and mortality associated with their use. Accordingly, there is interest in interventions that provide efficacy and are well tolerated.

The root of *Zingiber officinale* (ginger) has previously demonstrated anti-inflammatory activity through inhibition of COX-2, NF-κB and 5-lipoxygenase (5-LOX). Additionally, ginger may act as an agonist of transient receptor potential cation channel subfamily V member 1 (TRPV-1), which is associated with transmission of physical and chemical stimuli, and is a target for novel pain relievers in development. With growing evidence that ginger has analgesic and anti-inflammatory efficacy in humans, the current study is the first systematic review and meta-analysis of randomised clinical trials (RCTs) assessing the effectiveness of ginger for primary dysmenorrhea.

In the undertaking of the systematic review, electronic databases including PubMed, EMBASE, Cochrane Library, Korean databases, Chinese medical databases and Indian medical journals were searched with key terms "ginger", "*Zingiber officinale*", "dysmenorrhea", and "pain". Randomised clinical trials that studied the effect of ginger on primary dysmenorrhea as a primary outcome in young women were included. Exclusion criteria included in vitro studies, studies where only an abstract was available, nonclinical trials, studies in which ginger formed part of a complex herbal mixture, and duplicate studies.

Of 29 publications initially identified, seven articles were included in the review. All of the RCTs investigated the effect of ginger powder, at varying doses between 750-2000mg/day during the first 3-4 days of menstrual cycle, with each study lasting for two cycles. The age of women enrolled ranged from 13-30 years. Of the RCTs, four compared ginger powder to placebo, one RCT compared ginger powder + exercise to exercise alone, and the remaining two RCTs compared ginger to active analgesic treatments. Outcome measures in the meta-analysis included severity of pain during menstruation, using a pain visual analogue scale (PVAS) and the duration of pain. Of the RCTs in the review, five used PVAS scores, whilst two reported scores as a percentage change from baseline. Of the five using real scores, one did not include standard deviations and one used exercise as its control, leaving only three RCTs, comparing ginger to placebo control, included in the meta-analysis.

When pooling the data of the three RCTs, the meta-analysis indicated that ginger is highly effective for the treatment of symptoms of primary dysmenorrhea, with significantly lower pain scores in the ginger group compared to the control across both one and two cycles. The relief from pain was also highly significant in studies

that used analgesic as a positive control, with ginger demonstrating similar improvements to the analgesic drug treatments.

Whilst the study reported ginger to be effective for treatment of primary dysmenorrhea, the results are limited by a number of factors. Firstly, the studies included had small sample sizes, ranging from 22-150 subjects. Six of the seven RCTs were reported to exhibit low to moderate risk of bias. Furthermore, authors reported an asymmetrical funnel plot was produced by the meta-analysis, indicative of publication bias. The authors note that the RCTs included did not analyse the constituents of the ginger used, nor reported whether the powders were prepared in a standardized manner, making it difficult to draw conclusions about particular constituents. Authors highlighted that as the efficacy was demonstrated with presumably different ginger preparations, the activity may thus be due to a variety of bioactive components having overlapping or synergistic effects. Accordingly, until more is known about individual constituents, highly purified ginger preparations may risk removing important bioactive compounds.

This first systematic review and meta-analysis to report on the subject concluded the evidence is suggestive of effectiveness of 750-2000mg ginger powder during the first 3-4 days of the menstrual cycle, for relief of pain and discomfort associated with primary dysmenorrhea. More high quality studies with larger cohorts will further establish the benefit and effect of ginger treatment.

Curcumin alleviates symptoms of PMS

Khayat S, Fanaei H, Kheirkhah M, Moghadam ZB, Kasaeian A, Javadimehr M. 2015. Curcumin attenuates severity of premenstrual syndrome symptoms: A randomised, double-blind, placebo-controlled trial. *Complement Ther Med* 23; 318-324.

Premenstrual syndrome (PMS) is one of the most common health problems affecting women during their reproductive years. Defined as recurrent mood and physical symptoms, usually in the luteal phase of the cycle, PMS has a high prevalence worldwide. Changes of prostaglandin levels and neurotransmitter levels play a major role in the pathophysiology of PMS symptoms, with prostaglandins mostly associated with physical symptoms and neurotransmitters more associated with the incidence of mood and behavioural symptoms. Whilst pharmaceutical medications, including fluoxetine and mefenamic acid, are sometimes used in the management of PMS, they are associated with side effects and often reserved for more severe cases.