Cyclic perimenstrual pain and discomfort and Australian women's associated use of complementary and alternative medicine: a longitudinal study.

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A longitudinal analysis of CAM use and CPPD.

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Abstract

Objective

To examine the longitudinal change in Australian women's prevalence of cyclic perimenstrual pain and discomfort and the association between their symptoms and use of complementary and alternative medicine (CAM).

Method

Data on endometriosis, premenstrual syndrome (PMS), irregular periods, heavy periods and severe period pain were collected over a seven-year period from the Australian Longitudinal Study on Women's Health, for women aged 28 to 33 years in 2006, and at three year follow-ups. Changes in symptoms and patterns of CAM practitioner and therapy/product use associated with these symptoms were analysed using longitudinal regression modelling.

Results

Over the seven-year period, prevalence rates of PMS and heavy periods increased, whilst prevalence rates of endometriosis, irregular periods, and severe period pain remained stable. The most common use of CAM longitudinally associated with the perimenstrual symptoms were use of vitamins/minerals, yoga/meditation, massage therapy, herbal medicine and aromatherapy.

Excluding consultation with a naturopath/herbalist, over the 7-year survey women's use of all other CAM practitioners increased as did their use of vitamin/minerals, yoga/meditation and Chinese medicines, whilst aromatherapy use declined.

Conclusion

Only the prevalence of PMS and heavy periods increased with aging in this sample of women. Whilst overall use of CAM practitioner and self-prescribed products/therapies increased over time, CAM was chosen by women mainly to treat endometriosis and PMS. The extent to which this use reflects treatment efficacy is uncertain.

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Introduction

In 2002 the Association of Women's Health, Obstetric and Neonatal Nurses organized the diverse symptoms associated with perimenstrual symptoms into the concept of cyclic perimenstrual pain and discomfort (CPPD).[1] This term encompasses a cluster of symptoms commonly experienced by many women which were treated as single menstrual issues, predominantly premenstrual syndrome (PMS) and dysmenorrhoea.[1] It is now well established that between 80-97% of women experience at least one CPPD symptom between ages 12-50 years. [2, 3] For some 40% of women the symptoms are moderate[2], for up to 10% they are severe enough to interfere with normal educational, professional and/or social functions according to their menstrual cycles.[3] These life-changing disadvantages have serious ramifications for a minority of women.[3-6] Symptoms of CPPD, estimated to number over 300, may be 'affective' (emotional/mental such as irritability, anxiety and depression), physical (commonly breast tenderness, bloating, headache and cramping) or a combination.[1, 7] Symptom patterns may vary in nature, frequency, severity and/or over time for each woman. Whilst disturbances in sex hormones and their effect on neurotransmission are implicated, no single aetiology satisfactorily explains all CPPD manifestations.[2, 5, 8]

Complementary and alternative medicine (CAM) is broadly defined by the World Health Organisation as those therapies not routinely taught or used in conventional medical settings.[9] CAM use has increased world-wide[10, 11] with women identified as predominant users.[12-14] Conventional medical treatment for CPPD is wide-ranging and symptom-related, encompassing pharmaceutical, surgical and psychological treatments, none of which are wholly effective alone or in combination[1, 7], benefitting up to 60% of sufferers.[15] Indeed, studies consistently indicate that most women with CPPD seek no medical help.[16-18] At the same time various CAM clinical trials have reported benefits in CPPD treatment including herbal medicine for PMS[19, 20] and acupuncture[21] and herbs for dysmenorrhoea.[22] Data from 20 cross-sectional studies conducted since 2007 indicate prevalence of CAM use for CPPD of between 7-70% (mean=30%).[17, 23-41] Whilst these studies represent a significant increase in research into CAM use for CPPD, the data lack coherence due to enormous variations in design and methodology. Additionally, few studies have tracked changes in CPPD symptoms with aging and to-date none have examined CAM use over time amongst women experiencing CPPD. This present study

initiates the process of analysing age-related changes in CPPD and associated changes in CAM use, an important but under-studied area of research.

Materials and Methods

Sample

The Australian Longitudinal Study on Women's Health (ALSWH), initiated in 1996, aimed to assess and monitor women's health, including their health-seeking behaviour using surveys conducted at 3-yearly intervals. Over 58,000 women in three age groups ('young', 18-23 years; 'mid-age', 45-50 years; 'older', 70-75 years) were randomly selected from the national Medicare database and invited by mail to participate. The current analysis was based on the 'young' cohort of women, born between 1973 and 1978, as they represented women in the middle of the menstruating period of their lives. The baseline response rate for this cohort of 41-42% was estimated, due to uncertainty over the original Medicare database's accuracy[42], however the demographic profile indicated responders were a representative sample when compared to 1996 census data.[43] Data from surveys 4, 5 and 6, conducted in 2006, 2009 and 2012 respectively, obtained via questionnaires, were analysed. The response rates over the three surveys were 68% (n=9145) for survey 4 and 62% (n=8200) for surveys 5 and 6 (n=8010).

Ethical approval for the ALWSH was granted by the Human Ethics Committee at the University of Queensland and University of Newcastle and written consent was obtained from all participants.

Cyclic Perimenstrual Pain and Discomfort (CPPD) symptoms

Questions to participants included being diagnosed with endometriosis in the previous 3 years and the frequency of experiencing the following undefined conditions, premenstrual tension, irregular periods, heavy periods and severe period pain for 12 months prior to each survey, using the grades 'never', 'rarely', 'sometimes' or 'often'. The term 'premenstrual tension' has been used consistently in these surveys, its original reference relating to emotional changes that occurred prior to menstruation. 'Premenstrual syndrome', suggested in 1953 to take into account the physical and behavioural changes that also occur at this time, is the current terminology.[44]

Complementary and alternative medicine (CAM) use

In each survey, for the previous 12 month period, women were asked to respond to the question of whether they had consulted with a chiropractor, osteopath, massage therapist, acupuncturist and/or naturopath/herbalist for their own health. Participants were also questioned about CAM therapy and products used for their own health in the previous 12 months. Specific categories listed were 'vitamins/minerals', 'yoga/meditation', 'herbal medicines', 'aromatherapy oils' and 'Chinese medicine'; with answers graded by frequency of use as 'never', 'rarely', 'sometimes' or 'often'.

Confounders

The demographic factors 'area of residence', 'educational status', 'ability to manage on income' , 'marital status', 'body mass index' (BMI) calculated from height and weight, without shoes, ,' parity' based on live births, 'stress', 'exercise level ' , 'contraceptive use' (oral and/or implant) and 'ethnicity' as well as the co-morbidities 'insulin-dependent (Type 1) diabetes ', 'non-insulin dependent (Type 2) diabetes', 'low iron (iron deficiency or anaemia)', 'depression', 'anxiety disorder', 'asthma' and 'hypertension (high blood pressure)' were ascertained from the survey and identified as potential confounders. All co-morbidities were coded in the affirmative if diagnosed or treated in the previous 3 year period. Women who had been diagnosed with cancer in the previous three years, totalling 261 over the three surveys, were excluded from all analyses as the disease and/or its treatment may have affected symptom reporting and CAM use.

Area of residence was categorised as either urban or rural. Educational status was categorised as: (1) 'No formal qualifications'/'Year 10 or equivalent (e.g. School Certificate)'/ 'Year 12 or equivalent (e.g. Higher School Certificate)'; (2) 'Trade / apprenticeship'/ 'Certificate/diploma'; and (3) 'University/Higher university degree'. Ability to manage on available income was categorised as: (1) 'It is impossible'/'It is difficult all of the time'; (2) 'It is difficult some of the time'; and (3) 'It is not too bad'/'It is easy'. Marital status was categorised as: (1) 'Never married'; (2) 'Married/De facto (opposite and same sex)'; and (3) 'Separated/Divorced/Widowed'. BMI was categorised as: 1)'$<18.5kg/m^2$'(underweight); (2) '$18.5-<25.0kg/m^2$' (normal); (3) '$=>25-<30 kg/m^2$'(overweight); (4) '$=>30 kg/m^2$'(obese). Parity was categorised as: (1) 'none'; (2) 1-2; (3) 3 or more. The mean stress level, defined, validated and calculated by ALSWH, based on stress felt in the last 12 months around 11 life domain items was categorised as: (1) 'Not applicable/Not at all stressed'; (2) 'Somewhat stressed'; (3) 'Moderately stressed'; (4) 'Very stressed'; (5) 'Extremely stressed'. Level of exercise was calculated using an algorithm based on time in last week spent in 'Walking briskly',

'Moderate leisure activity' and 'Vigorous leisure activity' data, derived from *Active Australia's National Physical Activity Survey*, categorised as: (1) 'Sedentary'; (2) 'Low'; (3) 'Moderate'; (4) 'High'. Current contraceptive use had a binary code, based on a positive response to any of the following, 'I use the oral contraceptive pill' (survey 4) and 'I use a combined oral contraceptive pill'/I use a progestogen only oral contraceptive pill/I use the oral contraceptive pill but I don't know what type' (surveys 5 &6) and/or 'I use an implant' (all surveys). Ethnicity was categorised according to country of birth as: (1) 'Australia'; (2) 'Other English speaking background'; (3) 'Europe'; (4) 'Asia' (excluding the Middle East); (5) 'Other'.

Statistical Analysis

Longitudinal regression modelling was conducted using generalised estimating equations (GEEs). GEEs are an extension of generalised linear models that allow for the analysis of data longitudinally, thus reflecting the relationship between the longitudinal development of the association between CPPD symptom and CAM practitioner or CAM therapy use in non-pregnant respondents over the different survey timeframes, taking into account the significant confounding variables identified. Analyses were achieved using the statistical package STATA 14.0 and due to the large sample size, statistical significance was set at $p < 0.005$. The Wald statistic was used to assess the fit of the multivariable models. No interactions were examined.

Results

The prevalence rates for endometriosis (mean = 4.0%), irregular periods (mean = 20.9%) and severe period pain (mean = 23.7%) recorded over the three surveys appeared largely unaffected by age change **(Table 1).** Prevalence of PMS was highest in 2012, averaged 36.0% between 2006 and 2009 and **rose** to 41.4% in 2012. Similarly, the prevalence of heavy periods showed little change between 2006 and 2009 (mean = 22.8 %) but increased to 29.9% by 2012.

All multivariate analyses were adjusted for co-morbidities of diabetes, hypertension, anaemia, asthma, depression, and anxiety and for demographics of area of residence, marital status, educational status, ability to manage on income, body-mass index, parity, stress, exercise level, oral/implant contraceptive use and ethnicity**.** Over the seven year time period women with endometriosis were more likely to have consulted with a massage therapist (OR=1.26; 95% CI: 1.08, 1.47), nearly twice as likely to have consulted with an acupuncturist (OR=1.88; 95% CI: 1.51, 2.35) and over 50% more

likely to have consulted a naturopath/herbalist (OR=1.54; 95% CI: 1.26, 1.88), compared to women who had not been diagnosed with endometriosis **(Table 2).**

Statistically significant associations were found between PMS and consultation with a naturopath/herbalist only. Specifically, these consultations were more likely for women who sometimes (OR=1.23; 95% CI: 1.09, 1.40) or often (OR=1.48; 95% CI: 1.27, 1.74) suffered PMS, compared to non-sufferers **(Table 2).**

Women who had irregular periods were no more likely to have consulted with any CAM therapist compared to those who never had irregular periods whilst those who often had heavy periods were less likely to consult with an osteopath (OR=0.64; 95% CI: 0.49, 0.83) compared to those who never had heavy periods. Women who sometimes had severe period pain were less likely to consult with a naturopath/herbalist (OR=0.78; 95% CI: 0.67, 0.91) than those women who reported they never had this symptom.

The likelihood that any woman consulted with a CAM practitioner increased from 2006 to 2009 for a chiropractor (OR=1.25; 95% CI: 1.15, 1.36), an osteopath (OR=1.64; 95% CI: 1.42, 1.90), a massage therapist (OR=1. 36; 96% CI: 1.27, 1.46) and/or an acupuncturist (OR=1.84; 95% CI: 1.59, 2.12). In 2012, across the cohort, the likelihood of CAM practitioner consultation increased for a chiropractor (OR=1.28; 95% CI: 1.17, 1.41), an osteopath (OR=1.71; 95% CI: 1.48, 1.98), a massage therapist (OR=1.41; 95% CI: 1.30, 1.52) and/or an acupuncturist (OR=1. 59; 95% CI: 1.37, 1.85) compared to 2006 data. The prevalence data for use of CAM practitioners by women with CPPD in 2012 showed that a chiropractor, an osteopath, a massage therapist, an acupuncturist and a naturopath/herbalist had been visited by 0.9%, 0.4%, 1.9%, 0.6% and 0.7% respectively by women with endometriosis; 8.4%, 3.8%, 18.8%, 4.3% and 5.8% respectively for women who sometimes or often had PMS; 4.8%, 1.7%, 10.0%, 2.2% and 3.1%, respectively for those who sometimes or often had irregular periods; 5.8%, 2.5%, 12.5%, 2.8% and 4.0% respectively for those who sometimes or often suffered heavy periods and 4.8%, 2.2%, 10.4%, 2.6% and 3.1% respectively for those who sometimes or often reported painful periods **(Table 3)**.

Women with endometriosis were significantly more likely **to have used** vitamins/minerals (OR=1.40; 95% CI: 1.17, 1.67), yoga/meditation (OR=1.35; 95% CI: 1.13, 1.60), herbal medicines (OR=1.34; 95% CI: 1.13, 1.60) and Chinese medicines (OR=1.99; 95% CI: 1.53, 2.58) compared to those without endometriosis **(Table 4).**

Compared to never sufferers of PMS those who rarely had symptoms were more likely to use herbal medicines (OR=1.21; 95% CI: 1.09, 1.34), with the likelihood increasing for sometimes sufferers (OR=1.33; 95% CI: 1.21, 1.48). Women who reported they sometimes experienced PMS were also more likely to have used yoga/meditation (OR=1.16; 95% CI: 1.05, 1.28) and aromatherapy (OR=1.26; 95% CI: 1.14, 1.40) than those who never had PMS. Most CAM therapies/products were more likely to be used by women who reported having PMS often compared to those who never suffered; specifically vitamins/minerals (OR=1.21; 95% CI: 1.08, 1.37), yoga/meditation (OR=1.27; 95% CI: 1.12, 1.45), herbal medicines (OR=1.48; 95% CI: 1.30, 1.69), and/or aromatherapy (OR=1.26; 95% CI: 1.11, 1.44).

Women who indicated sometimes or often having had irregular periods or heavy periods were not more or less likely to use any CAM therapies/products. Women who often suffered severe period pain were more likely to use aromatherapy (OR=1.34; 95% CI: 1.13, 1.58) compared to those who had not suffered from severe period pain.

From 2006, for all women, the likelihood increased in 2009 and 2012 of using vitamins/minerals (OR=1.21; 95% CI: 1.13, 1.31) and (OR=1.26; 95% CI: 1.15, 1.37) respectively, yoga/meditation (OR=1.15; 95% CI:1.05,1.26) and (OR=1.21; 95% CI:1.10,1.32) respectively and Chinese medicines (OR=1.61; 95% CI: 1.35, 1. 93) and (OR=1.49; 95% CI: 1.24, 1.79) respectively. Herbal medicine use increased slightly in 2009 only, when compared to 2006 (OR=1.17; 95% CI:1.08, 1.28). However, for aromatherapy this likelihood decreased in 2009 (OR=0.83; 95% CI: 0.76, 0.90) and declined still further in 2012 (OR=0.70; 95% CI: 0.64, 0.77), compared to 2006. Prevalence data showed that vitamins/minerals, yoga /meditation, herbal medicines, aromatherapy and Chinese medicines were used by 2.9%, 1.3%, 1.1%, 0.7% and 0.4% respectively by women with endometriosis. For those women who sometimes or often had PMS the respective prevalences of use were 29.7%, 10.9%, 10.2%, 8.3% and 2.7%; for those who sometimes or often had irregular periods these were 15.8%, 5.5%, 5.3%, 4.0% and 1.6%; for those who sometimes or often suffered heavy periods these were 20.9%, 7.1%, 7.2%, 5.8% and 1.8% and for those who sometimes or often reported painful periods these were 17.3%, 6.2%, 6.2%, 5.4% and 1.6% **(Table 5)**.

Discussion

Our study, based on a large, representative sample of young Australian women, was the first as far as we are aware, to have analysed changes of CAM use in relation to various menstrual problems spanning the age range from 28-33 years through to 34-39 years. CAM use by women suffering CPPD reflected the general growth in interest and information

regarding CAM, much likely derived from non-professional sources[45], over a seven year timeframe and represents important data for health care providers and policy makers.[46]

Our findings confirmed the high prevalence and consequent significance of CPPD for women's health previously reported.[1, 3, 47] Data from our young cohort, aged over the seven year time–frame, represent a valuable insight into possible changes in CPPD with age during this relatively young period of women's lives but as previous studies have largely employed longer time frames corroboration awaits further research.

Prevalence of CPPD

Across 2006 to 2012 the consistent prevalence of endometriosis (mean=4.0%) accords with a reported level of 4.8%[46], however the choice for a diagnosis made in the previous 3 years rather than the currently accepted 5-year span may have under-estimated its prevalence and may complicate comparisons. Whilst not equivocal the relationship between increasing age and endometriosis according to recently published data suggest no correlation exists.[48]

Our cohort's prevalence of irregular periods (mean=20.9%) accorded with a reported level of 25.6%[49] again showing no consistent age-related trend. Menstrual cycle irregularity may decrease with age[49] although a large European study found a consistent prevalence across age groups, rising after 42 years of age, around peri-menopause.[50]

Severe dysmenorrhoea levels over the three surveys in our study appeared unaffected by aging, the mean=23.7% compared to 2-29% previously reported.[51] Dysmenorrhoea has a high prevalence in under 30-year olds usually diminishing with age.[51] Variations in definition of 'severity', ('interfering with daily activity or efficiency'[52], 'activity inhibited and lack of relief from analgesics'[6], 'absenteeism from work'[53]) and reliance on subjective pain assessment complicates comparisons across studies relating age to dysmenorrhoea severity.[51] In addition, the scant published data on severe dysmenorrhoea reported largely on younger women than our cohort. Nevertheless, factors such as parity, age at menarche, lifestyle and weight appear to be significant determinants of changes in dysmenorrhoea, prevalence being age-related for women under 30 years old, a group mostly younger than our cohort.[52, 6, 54, 55] A longitudinal US study into dysmenorrhoea in women comparable in age with our cohort estimated severe dysmenorrhoea prevalence at 2%, and whilst it declined with age, again parity was a more significant factor.[52]

With regard to prevalence of heavy periods, a systematic review estimated this ranged between 10-30%[56], consistent with our mean of 25.2%. We found menorrhagia prevalence increased with age, supported by a French College of

Obstetricians and Gynaecologists guideline review suggesting a prevalence peak of 24% in women aged 36-40 years.[57] Pooled data from a systematic review of PMS prevalence, averaged it at 47.8%, albeit with an extremely broad range (10 -98%).[58] This average is higher than that found in our surveys, 2006 and 2009, but comparable with the 41.4% reported by the 2012 survey. Scant current prevalence data exists relating PMS to ageing but reported patterns of higher PMS levels with age[59, 60] and a recent, large general population study of UK women aged 12-50 years having a peak prevalence in the 35-39 year age-group[61] support our observed age increase.

CAM use and CPPD

Over time, our study found women with endometriosis may have been more likely to visit a massage therapist, an acupuncturist and/or a naturopath/herbalist and with the exception of aromatherapy, may also have been more likely to have used all CAM and in particular Chinese medicine, compared to those without endometriosis. Scientific validation exists for benefits from acupuncture[62] and Chinese herbal medicine[63, 64] in treating pain and poor fertility associated with endometriosis, but none to-date for therapeutic massage or naturopathic/western herbalist treatment. However a small cross-sectional study into endometriosis associated leg pain found 79%, 67% and 50% of women using massage, acupuncture and herbs respectively reported improvement in pain level.[26]

From our analysis, women with PMS appeared more likely, over time, to visit a naturopath/herbalist compared with non-sufferers. Compared to non-sufferers of PMS, women who sometimes experienced PMS were also more likely users of yoga/meditation, herbal medicine or aromatherapy, but those often suffering PMS increased their use of all CAM self-help therapies and products surveyed except Chinese medicines. CAM clinical trials have indicated supplements (calcium, magnesium[65] and fish oils [66]), herbs (*Vitex agnus castus*)[65], yoga[67] and aromatherapy (lavender)[68] are potentially helpful for PMS. Whilst evidence exists that Chinese herbal medicine may be beneficial [69] , users of this CAM with PMS in our study were too few to indicate a significant association. General support for the efficacy of CAM in treating PMS has been reported in previous surveys where between 37-97% women estimated an improvement in symptoms.[70-74] Indirect support for individual CAM modalities in PMS treatment exists from cross-sectional studies where women reported using osteopathy[74], chiropractic[74], vitamins/minerals[39, 70-73, 75-77], massage[29, 70, 75, 76], yoga/meditation[70, 76], Chinese herbs[72], acupuncture[72], aromatherapy[72] and western herbs[39, 72, 76] for symptom relief. More research into these CAM as treatment approaches appears warranted.

No published clinical evidence relates efficacy of CAM treatment to irregular periods, although national Taiwanese health database records cited 'menstruation disorders' amongst the main reasons for prescribing Chinese herbal medicine.[78] Our study found no positive association of CAM use with irregular menses or heavy periods. The physical and social discomfort associated with heavy periods may account for the reduced likely visit of women who often experience them to an osteopath, with a non-significant trend away from other forms of CAM that require particular dress codes and/or need for personal interaction such as massage therapy, chiropractic, acupuncture and yoga/ meditation. Previous studies on women with self-reported menorrhagia[79] and/or gynaecological problems associated with heavy bleeding including general pelvic problems[24] and fibroids[31,36, 37, 80], found an associated use of a variety of CAM including herbs, acupuncture, dietary supplements and Chinese medicine. Our analyses did not reflect this.

The relative lack of CAM use by those in our cohort with either irregular periods and/or heavy periods may be due to lack of knowledge in Australia about their potential benefits as in countries where CAM is part of mainstream health provision, such as Taiwan and Korea, there is a strong traditional use and acceptance of Chinese medicine to treat these problems.[33, 47] In addition, unlike PMS and dysmenorrhoea which occur commonly, both cycle irregularity and menorrhagia may be perceived as having potentially serious underlying pathologies[81, 82] and/or consequences for conception and vitality for which diagnosis and treatment are regarded as more appropriately dealt with through conventional medicine.

Scientific evaluation of CAM for dysmenorrhoea is sparse, but support does exist for yoga[83], herbs[84], aromatherapy[22] and Chinese herbal medicines.[27, 85] Cross-sectional studies suggest women use vitamins and minerals[17, 24], herbs[17, 24, 30, 32, 33, 41, 47] and massage[28, 40] regardless of scientific validation. Our study showed no associated CAM use by women with dysmenorrhoea except **a**n apparent reduction in association between dysmenorrhoea sometimes experienced and visits with a naturopath/herbalist. This finding contrasted with more widespread CAM use for endometriosis sufferers because although dysmenorrhoea is a predominant symptom it is secondary to the disease whereas primary dysmenorrhoea may be normalised in menstruation and therefore tolerated[16] and/or treated using non-CAM self-help remedies such as hot drinks, heat and exercise.[17, 24, 40, 70] The only CAM therapies and products associated with dysmenorrhoea experienced often was the use of aromatherapy, a practice for which some clinical evidence exists.[86] Regular, monthly severe pain relief may be considered too expensive for regular CAM practitioner treatment and given

its uncertain aetiology self-treatment with a wide-range of both non-pharmacological and pharmacological strategies is known to commonly occur.[16, 72]

Prevalence of CAM use

From 2006 to 2012 the significant increased visits to a chiropractor, an osteopath and an acupuncturist, by all women in our study, may relate to their subsidized coverage by Medicare and private health insurers to which an increasing number of Australians have subscribed.[87, 88] Referrals from medical practitioners to osteopaths, chiropractors, acupuncturists and massage therapists[88, 89], the relative decreased cost from 2007 to 2012 for chiropractor visits[87], increased practice of both acupuncture and massage therapy by medical professionals[88,90] and the high accessibility of massage therapists who far outnumber other CAM therapists[91] are also likely to have increased their uptake.

Over the study period visits decreased overall by 13% to a naturopath/herbalist, a practitioner-based CAM requiring either private health insurance or out-of-pocket funding in Australia and for which over-the-counter products are easily self-prescribed. Against this background, women with endometriosis and/or PMS in our study were more likely to have increased their visits to a naturopath/herbalist compared to women not suffering these symptoms, strongly suggesting significant treatment benefits associated with women receiving this professional guidance. An anomalous UK finding noting prescription-related PMS diagnoses by general practitioners decreased four-fold between 1993-1998, whilst PMS was the second most common condition treated by UK herbalists in 1998, led its authors to suggest women were by-passing conventional medicine in favour of CAM treatment.[92] An updated survey showed levels of conventional prescriptions in the UK for CPPD-related problems were still declining [61],indicating women may be continuing to self-treat or to seek help beyond conventional medicine. It is possible that herbal medicine has been an effective option for PMS, explaining its increased uptake. Whilst aromatherapy use declined substantially over the timeframe of our study, this was not mirrored by women suffering PMS, suggesting it too may be an effective treatment. Clearly more research is needed into the role of these CAM in PMS treatment.

According to data from our study, the use of self-prescribed CAM was higher than the use of CAM practitioner services, behaviour identified elsewhere.[13,76,78] Chinese medicine practitioners' registration by the Australian government in 2005[93], officially 'recognising' this modality, may explain our finding that Chinese medicine use increased.

Acupuncture use is possibly under-reported in our data. Two-thirds of Chinese Medicine Board of Australia registered practitioners use acupuncture with Chinese herbal medicine, a category not identified in ALSWH surveys. Additionally other practitioners such as osteopaths, chiropractors, medical doctors and physiotherapists also administer acupuncture but may have been unidentified by survey respondents as acupuncture-orientated visits.[94]

Health policy implications

CAM use is higher amongst chronic ill-health sufferers, women and those whose medical problems are not well addressed by conventional treatment.[95] Women suffering CPPD clearly satisfy these criteria and are likely to continue using CAM. Medical reviews acknowledge that CPPD treatment is largely functional or symptomatic relying on hormone replacement therapy, surgery, angiogenesis inhibitors, immune modulators, anti-depressants and/or analgesics with limited efficacy, possible side-effects and most importantly perhaps, for this cohort, are often unsuitable for women intending to conceive.[96, 97] Over 300 treatment strategies are currently offered by conventional health practitioners for CPPD indicating their complexity and individual nature.[7, 92] At the same time traditional Chinese[27, 78] and Western conventional medical practitioners recommend CAM such as vitamin B_6, herbal, homeopathic and nutritional supplements, to their CPPD patients.[70, 72, 92, 98] It is therefore in the interest of women, health providers and health policy makers to investigate the role of CAM in this significant area of women's health.

Study limitations

When interpreting these study findings, readers should be mindful of some limitations. Whilst the demographic profile of 'young' age participants initially recruited by ALWSH was considered representative when compared to 1996 consensus data it is possible, due to the relatively poor retention rate from the original sample, that some bias has been introduced and that our cohort may be viewed as unrepresentative thereby reducing the generalizability of our results and possibly distorting prevalence of CPPD data and the associated CAM use. Retrospective reporting by ALSWH participants regarding both CPPD symptoms and CAM use raises possible recall bias. Reporting of CPPD symptoms was subjective and the lack of standardised instruments and CAM terminology in the surveys may have resulted in classification errors and difficulties in cross study comparisons. In particular PMS was used interchangeably with PMT which may have led to its under-estimation or incorrect classification. Also, the use of other contraceptive devices and medications that could potentially alter menstrual symptoms could not be assessed as these data were not collected. Some response bias is recognised in baseline recruitment because women with tertiary education were over-

represented and some ethnic groups under-represented. Due to lack of relevant data the study was unable to track direct changes in CPPD symptoms after CAM use. However, the large, representative sample and data tracking this important timeframe in women's reproductive lives provide strong support for the validity of our findings.

Conclusion

Large numbers and proportions of women suffer CPPD with prevalence of PMS and heavy periods apparently increasing with age. This study demonstrates many women with CPPD symptoms are self-medicating, using a range of CAM, possibly without professional oversight. Increasing use of specific CAM by women with CPPD from 2006 to 2012 suggests some CAM has untapped potential to significantly benefit these prevalent, disruptive health problems. Given the large cost to women, their families and society it is important for health carers and policy makers to gain information into the types of alternative treatments being adopted, their efficacy and risk factors. CAM is a promising area of treatment for chronic CPPD and there is much to be gained by further research.

Ethics approval and consent to participate

Ethical approval for the ALSWH was gained from the Human Ethics Committees at the University of Queensland and University of Newcastle. The study participants provided written consent.

Author Disclosure Statement

No competing financial interests exist.

References

1. Sharp BA, Taylor DL, Thomas KK, Killeen MB, Dawood MY. Cyclic perimenstrual pain and discomfort: the scientific basis for practice. *Journal of obstetric, gynecologic, and neonatal nursing : JOGNN / NAACOG.* 2002;31(6):637-649.

2. Milewicz A, Jedrzejuk D. Premenstrual syndrome: From etiology to treatment. *Maturitas.* 11/1/ 2006;55, Supplement 1:S47-S54.

3. Wittchen HU, Becker E, Lieb R, Krause P. Prevalence, incidence and stability of premenstrual dysphoric disorder in the community. *Psychological Medicine.* 2002;32(1):119-132.

4. Nevatte T, O'Brien P, Bäckström T, et al. ISPMD consensus on the management of premenstrual disorders. *Archives of Women's Mental Health.* 2013/08/01 2013;16(4):279-291.

5. Halbreich U. The etiology, biology, and evolving pathology of premenstrual syndromes. *Psychoneuroendocrinology.* 8// 2003;28, Supplement 3:55-99.

6. Sundell G, Milsom IAN, Andersch B. Factors influencing the prevalence and severity of dysmenorrhoea in young women. *BJOG: An International Journal of Obstetrics & Gynaecology.* 1990;97(7):588-594.

7. Kaunitz KM RE, Schnare SM. . Quick Reference Guide for Clinicians *Managing Premenstrual Symptoms*Association of Reproductive Health Professionals at publications@arhp.org; 2008.

8. Bancroft J. The menstrual cycle and the well being of women. *Social Science and Medicine.* 1995;41(6):785-791.

9. WHO. World Health Organisation (2004) Guidelines on developing consumer information on proper use of traditional, complementary and alternative medicine (WHO). Available at: http://apps.who.int/medicinedocs/pdf/s5525e/s5525e.pdf.

10. Harris PE, Cooper KL, Relton C, Thomas KJ. Prevalence of complementary and alternative medicine (CAM) use by the general population: a systematic review and update. *International Journal Of Clinical Practice.* 2012;66(10):924-939.

11. Thomson P, Jones J, Browne M, Leslie SJ. Why people seek complementary and alternative medicine before conventional medical treatment: A population based study. *Complementary Therapies in Clinical Practice.* 2014.

12. Sibbritt DW, Adams J, Young AF. A longitudinal analysis of mid-age women's use of Complementary and Alternative Medicine (CAM) in Australia, 1996-1998. *Women and Health.* 2004;40(4):41-56.

13. Kristoffersen AE, Stub T, Salamonsen A, Musial F, Hamberg K. Gender differences in prevalence and associations for use of CAM in a large population study. *BMC Complementary and Alternative Medicine.* 2015:1-9.

14. Steinsbekk A, Rise MB, Aickin M. Cross-cultural comparison of visitors to CAM practitioners in the United States and Norway. *Journal of Alternative and Complementary Medicine.* 2009;15(11):1201-1207.

15. Freeman EW. Therapeutic management of premenstrual syndrome. *Expert Opinion on Pharmacotherapy.* 2010;11(17):2879-2889.

16. Hylan TR, Sundell K, Judge R. The impact of premenstrual symptomatology on functioning and treatment-seeking behavior: Experience from the United States, United Kingdom, and France. *Journal of Women's Health and Gender-Based Medicine.* 1999;8(8):1043-1052.

17. Chia CF, Lai JHY, Cheung PK, et al. Dysmenorrhoea among Hong Kong university students: Prevalence, impact, and management. *Hong Kong Medical Journal.* 2013;19(3):222-228.

18. Pitts MK, Ferris JA, Smith AMA, Shelley JM, Richters J. Prevalence and correlates of three types of pelvic pain in a nationally representative sample of Australian women. *Medical Journal of Australia.* 2008;189(3):138-143.

19. Schellenberg R. Treatment for the premenstrual syndrome with agnus castus fruit extract: Prospective, randomised, placebo controlled study. *British Medical Journal.* 2001;322(7279):134-137.

20. Chou PB, Morse CA, Xu H. A controlled trial of Chinese herbal medicine for premenstrual syndrome. *Journal of Psychosomatic Obstetrics & Gynecology.* 2008/01/01 2008;29(3):189-196.

21. Witt CM, Reinhold T, Brinkhaus B, Roll S, Jena S, Willich SN. Acupuncture in patients with dysmenorrhea: a randomized study on clinical effectiveness and cost-effectiveness in usual care. *American Journal of Obstetrics and Gynecology.* 2// 2008;198(2):166.e161-166.e168.

22. Sadeghi Aval Shahr H, Saadat M, Kheirkhah M, Saadat E. The effect of self-aromatherapy massage of the abdomen on the primary dysmenorrhoea. *Journal of Obstetrics and Gynaecology.* 2015/05/19 2015;35(4):382-385.

23. Gold EB, Bair Y, Block G, et al. Diet and lifestyle factors associated with premenstrual symptoms in a racially diverse community sample: Study of Women's Health Across the Nation (SWAN). *Journal of Women's Health.* 2007;16(5):641-656.

24. Kuppermann M, Learman LA, Schembri M, et al. Effect of noncancerous pelvic problems on health-related quality of life and sexual functioning. *Obstetrics and Gynecology.* 2007;110(3):633-642.
25. Lee AM, So-Kum Tang C, Chong C. A culturally sensitive study of premenstrual and menstrual symptoms among Chinese women. *Journal of Psychosomatic Obstetrics and Gynecology.* 2009;30(2):105-114.
26. Missmer SA, Bove GM. A pilot study of the prevalence of leg pain among women with endometriosis. *Journal of Bodywork and Movement Therapies.* 2011;15(3):304-308.
27. Pan JC, Tsai YT, Lai JN, Fang RC, Yeh CH. The traditional Chinese medicine prescription pattern of patients with primary dysmenorrhea in Taiwan: A large-scale cross sectional survey. *Journal of Ethnopharmacology.* 2014;152(2):314-319.
28. Seven M, Güvenç G, Akyüz A, Eski F. Evaluating dysmenorrhea in a sample of Turkish nursing students. *Pain Management Nursing.* 2014;15(3):664-671.
29. Tolossa FW, Bekele ML. Prevalence, impacts and medical managements of premenstrual syndrome among female students: cross-sectional study in college of health sciences, Mekelle University, Mekelle, Northern Ethiopia. *BMC Women's Health.* 2014;14(1):1-9.
30. Abdul-Razzak KK, Ayoub NM, Abu-Taleb AA, Obeidat BA. Influence of dietary intake of dairy products on dysmenorrhea. *Journal of Obstetrics and Gynaecology Research.* 2010;36(2):377-383.
31. Borah BJ, Nicholson WK, Bradley L, Stewart EA. The impact of uterine leiomyomas: A national survey of affected women. *American Journal of Obstetrics and Gynecology.* 2013;209(4):319.e311-319.e320.
32. Cheng HF, Lin YH. Selection and efficacy of self-management strategies for dysmenorrhea in young Taiwanese women. *Journal of Clinical Nursing.* 2011;20(7-8):1018-1025.
33. Cheng HF. Management of perimenstrual symptoms among young Taiwanese nursing students. *Journal of Clinical Nursing.* 2011;20(7-8):1060-1067.
34. Eladawi N, Abdel-Hady D, El-Gilany AH, Gibreel A. Mastalgia in female medical students, Mansoura University, Egypt. *TAF Preventive Medicine Bulletin.* 2014;13(4):307-314.
35. Ohde S, Tokuda Y, Takahashi O, Yanai H, Hinohara S, Fukui T. Dysmenorrhea among Japanese women. *International Journal of Gynecology and Obstetrics.* 2008;100(1):13-17.
36. Tanaka E, Momoeda M, Osuga Y, et al. Burden of menstrual symptoms in Japanese women - An analysis of medical care-seeking behavior from a survey-based study. *International Journal of Women's Health.* 2014;6(1):11-23.
37. Adegbesan-Omilabu MA, Okunade KS, Gbadegesin A. Knowledge of, Perception of, and Attitude towards Uterine Fibroids among Women with Fibroids in Lagos, Nigeria. *Scientifica.* 2014:1-5.
38. Sharma A, Taneja DK, Sharma P, Saha R. Problems related to menstruation and their effect on daily routine of students of a medical college in Delhi, India. *Asia-Pacific Journal of Public Health.* 2008;20(3):234-241.
39. Hamaideh SH, Al-Ashram SA, Al-Modallal H. Premenstrual syndrome and premenstrual dysphoric disorder among Jordanian women. *Journal of Psychiatric and Mental Health Nursing.* 2014;21(1):60-68.
40. Brito SA CMC, Santos Alves D, da Silva AC. . Prevalence of Dysmenorrhea in Undergraduate Health Courses at an Institution of Higher Education. . *Revista de Enfermagem.* 2012 Jun;6(6):1386-1394.
41. Tariq NM HJ, Jaffery T, Ijaz S, Sami SA, Badar S, et al. . Impact and healthcare-seeking behaviour of premenstrual symptoms and dysmenorrhoea. *Br J Med Prac.* 2009;2(4):40-43.
42. Lee C, Dobson AJ, Brown WJ, et al. Cohort Profile: The Australian Longitudinal Study on Women's Health. *International Journal of Epidemiology.* 2005;34(5):987-991.
43. Brown WJ, Dobson AJ, Bryson L, Byles JE. Women's Health Australia: On the progress of the main cohort studies. *Journal of Women's Health and Gender-Based Medicine.* 1999;8(5):681-688.
44. Ussher JM. Premenstrual syndrome. *Cambridge Handbook of Psychology, Health and Medicine, Second Edition*; 2014:830-832.
45. Frawley J, Adams J, Broom A, Steel A, Gallois C, Sibbritt D. Majority of Women Are Influenced by Nonprofessional Information Sources When Deciding to Consult a Complementary and Alternative Medicine Practitioner During Pregnancy. *Journal of Alternative & Complementary Medicine.* 2014;20(7):571-577.
46. Vos T, Barber RM, Bell B, Salomon JA, Murray CJL. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet.* 2015;386.
47. Lee DY, Koo YA, Yoon BK, Choi D. Reproductive health characteristics of urban South Korean Women. *Gynecologic and Obstetric Investigation.* 2010;70(3):154-159.
48. Viganò P, Parazzini F, Somigliana E, Vercellini P. Endometriosis: epidemiology and aetiological factors. *Best Practice & Research Clinical Obstetrics & Gynaecology.* 4// 2004;18(2):177-200.
49. Hahn KA, Wise LA, Riis AH, et al. Correlates of menstrual cycle characteristics among nulliparous Danish women. *Clinical Epidemiology.* 2013;5(1):311-319.
50. Svanes C, Gomez Real F, Gislason T, et al. Association of asthma and hay fever with irregular menstruation. *Thorax.* 2005;60(6):445-450.

51.   Ju H, Jones M, Mishra G. The Prevalence and Risk Factors of Dysmenorrhea. *Epidemiologic Reviews.* January 1, 2014 2014;36(1):104-113.

52.   Weissman AM, Hartz AJ, Hansen MD, Johnson SR. The natural history of primary dysmenorrhoea: A longitudinal study. *BJOG: An International Journal of Obstetrics and Gynaecology.* 2004;111(4):345-352.

53.   Dawood MY. Primary dysmenorrhea: Advances in pathogenesis and management. *Obstetrics and Gynecology.* 2006;108(2):428-441.

54.   Harlow SD, Park M. A longitudinal study of risk factors for the occurrence, duration and severity of menstrual cramps in a cohort of college women. *British Journal of Obstetrics and Gynaecology.* 1996;103(11):1134-1142.

55.   Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors predisposing women to chronic pelvic pain: Systematic review. *British Medical Journal.* 2006;332(7544):749-751.

56.   Liu Z, Doan QV, Blumenthal P, Dubois RW. A systematic review evaluating health-related quality of life, work impairment, and health-care costs and utilization in abnormal uterine bleeding. *Value in Health.* 2007;10(3):183-194.

57.   Marret H, Fauconnier A, Chabbert-Buffet N, et al. Clinical practice guidelines on menorrhagia: management of abnormal uterine bleeding before menopause. *European Journal of Obstetrics & Gynecology and Reproductive Biology.* 10// 2010;152(2):133-137.

58.   Direkvand-Moghadam A, Sayehmiri K, Delpisheh A, Kaikhavandi S. Epidemiology of Premenstrual Syndrome (PMS)-A Systematic Review and Meta-Analysis Study. *J Clin Diag Res.* 2014;8.

59.   Adewuya AO, Loto OM, Adewumi TA. Pattern and correlates of premenstrual symptomatology amongst Nigerian University students. *Journal of Psychosomatic Obstetrics and Gynecology.* 2009;30(2):127-132.

60.   Merikangas KR, Foeldenyi M, Angst J. The Zurich Study - XIX. Patterns of menstrual disturbances in the community: results of the Zurich Cohort Study. *European Archives of Psychiatry and Clinical Neuroscience.* 1993;243(1):23-32.

61.   Sammon CJ, Nazareth I, Petersen I. Recording and treatment of premenstrual syndrome in UK general practice: a retrospective cohort study. *BMJ Open.* March 1, 2016 2016;6(3).

62.   Lund I, Lundeberg T. Is acupuncture effective in the treatment of pain in endometriosis? *Journal of Pain Research.* 2016;9:157-165.

63.   Ding Z, Lian F. Traditional Chinese medical herbs staged therapy in infertile women with endometriosis: A clinical study. *International Journal of Clinical and Experimental Medicine.* 2015;8(8):14085-14089.

64.   Wieser F, Cohen M, Gaeddert A, et al. Evolution of medical treatment for endometriosis: Back to the roots? *Human Reproduction Update.* 2007;13(5):487-499.

65.   Fugh-Berman A, Kronenberg F. Complementary and alternative medicine (CAM) in reproductive-age women: A review of randomized controlled trials. *Reproductive Toxicology.* 2003;17(2):137-152.

66.   Perry M, Judge M, Millar D, McDonald D. An exploratory pilot of factors associated with premenstrual syndrome in minority women. *International Journal of Nursing Sciences.* 2015;2(2):118-122.

67.   Wu WL, Lin TY, Chu IH, Liang JM. The acute effects of yoga on cognitive measures for women with premenstrual syndrome. *Journal of Alternative and Complementary Medicine.* 2015;21(6):364-369.

68.   Matsumoto T, Asakura H, Hayashi T. Does lavender aromatherapy alleviate premenstrual emotional symptoms?: A randomized crossover trial. *BioPsychoSocial Medicine.* 2013;7(1).

69.   Huang XC, Liu J, Yang HY, Feng DN, Wang XY. A randomized controlled study of TCM psychosomatic therapy for the treatment of PMS. Paper presented at: IET Conference Publications, 2012.

70.   Pullon SR, Reinken JA, Sparrow MJ. Treatment of premenstrual symptoms in Wellington women. *NZMJ.* 1989;102.

71.   Corney RH, Stanton R. A survey of 658 women who report symptoms of premenstrual syndrome. *Journal of Psychosomatic Research.* 1991;35(4-5):471-482.

72.   Domoney CL, Vashisht A, Studd JWW. Use of complementary therapies by women attending a specialist premenstrual syndrome clinic. *Gynecological Endocrinology.* 2003;17(1):13-18.

73.   Leather AT, Holland EFN, Andrews GD, Studd JWW. A study of the referral patterns and therapeutic experiences of 100 women attending a specialist premenstrual syndrome clinic. *Journal of the Royal Society of Medicine.* 1993;86(4):199-201.

74.   Brown MA, Zimmer PA. Help-seeking for premenstrual symptomatology: A description of women's experiences. *Health Care for Women International.* 1986;7(1-2):173-184.

75.   Campbell EM, Peterkin D, O'Grady K, Sanson-Fisher R. Premenstrual symptoms in general practice patients: Prevalence and treatment. *Journal of Reproductive Medicine for the Obstetrician and Gynecologist.* 1997;42(10):637-646.

76.   Sternfeld B, Swindle R, Chawla A, Long S, Kennedy S. Severity of premenstrual symptoms in a health maintenance organization population. *Obstetrics and Gynecology.* 2002;99(6):1014-1024.

77. Kraemer GR, Kraemer RR. Premenstrual syndrome: Diagnosis and treatment experiences. *Journal of Women's Health.* 1998;7(7):893-907.

78. Hsieh SC, Lai JN, Lee CF, Hu FC, Tseng WL, Wang JD. The prescribing of Chinese herbal products in Taiwan: A cross-sectional analysis of the national health insurance reimbursement database. *Pharmacoepidemiology and Drug Safety.* 2008;17(6):609-619.

79. Chapple A. Menorrhagia: women's perceptions of this condition and its treatment. *Journal of Advanced Nursing.* 1999;29(6):1500-1506.

80. Kronenberg F, Cushman LF, Wade CM, Kalmuss D, Chao MT. Race/ethnicity and women's use of complementary and alternative medicine in the United States: Results of a national survey. *American Journal of Public Health.* 2006;96(7):1236-1242.

81. Busby G. Menstrual dysfunction. *Obstetrics, Gynaecology & Reproductive Medicine.* 10// 2013;23(10):307-311.

82. Busby G. Menstrual dysfunction. *Obstetrics, Gynaecology & Reproductive Medicine.* 5// 2016;26(5):149-154.

83. Rakhshaee Z. Effect of Three Yoga Poses (Cobra, Cat and Fish Poses) in Women with Primary Dysmenorrhea: A Randomized Clinical Trial. *Journal of Pediatric and Adolescent Gynecology.* 2011;24(4):192-196.

84. Pattanittum P, Kunyanone N, Brown J, et al. Dietary supplements for dysmenorrhoea. *Cochrane Database of Systematic Reviews.* 2016;2016(3).

85. Zhu X, Proctor M, Bensoussan A, Smith CA, Wu E. Fitoterapia china para la dismenorrea primaria. *Revista Internacional de Acupuntura.* 12// 2008;2(4):242-244.

86. Ou MC, Hsu TF, Lai AC, Lin YT, Lin CC. Pain relief assessment by aromatic essential oil massage on outpatients with primary dysmenorrhea: A randomized, double-blind clinical trial. *Journal of Obstetrics and Gynaecology Research.* 2012;38(5):817-822.

87. Engel RM, Brown BT, Swain MS, Lystad RP. The provision of chiropractic, physiotherapy and osteopathic services within the Australian private health-care system: A report of recent trends. *Chiropractic and Manual Therapies.* 2014;22(1).

88. Xue CCL, Zhang AL, Lin V, Myers R, Polus B, Story DF. Acupuncture, chiropractic and osteopathy use in Australia: A national population survey. *BMC Public Health.* 2008;8.

89. Wardle JL, Sibbritt DW, Adams J. Referrals to chiropractors and osteopaths: A survey of general practitioners in rural and regional New South Wales, Australia. *Chiropractic and Manual Therapies.* 2013;21(1).

90. Cohen MM, Penman S, Pirotta M, Da Costa C. The integration of complementary therapies in Australian general practice: Results of a national survey. *Journal of Alternative and Complementary Medicine.* 2005;11(6):995-1004.

91. Grace S. CAM practitioners in the Australian health workforce: an underutilized resource. *BMC Complementary and Alternative Medicine.* 2012;12:205-205.

92. Wyatt KM, Dimmock PW, Frischer M, Jones PW, O'Brien SPM. Prescribing patterns in premenstrual syndrome. *BMC Women's Health.* 2002;2.

93. Zhou W, Zhang AL, May BH, Lin VK, Carlton A-L, Xue CC. The Victorian experience of transitional registration for Chinese Medicine practitioners and its implications for national registration. *Australian Health Review.* 2012;36(1):61-67.

94. Zheng Z. Acupuncture in Australia: regulation, education, practice, and research. *Integrative Medicine Research.* 9// 2014;3(3):103-110.

95. Williams AM, Kitchen P, Eby J. Alternative health care consultations in Ontario, Canada: A geographic and socio-demographic analysis. *BMC Complementary and Alternative Medicine.* 2011;11.

96. Vercellini P, Somigliana E, Viganò P, Abbiati A, Daguati R, Crosignani PG. Endometriosis: current and future medical therapies. *Best Practice & Research Clinical Obstetrics & Gynaecology.* 4// 2008;22(2):275-306.

97. Prast J, Oppelt P, Shamiyeh A, Shebl O, Brandes I, Haas D. Costs of endometriosis in Austria: A survey of direct and indirect costs. *Archives of Gynecology and Obstetrics.* 2013;288(3):569-576.

98. Gordon NP, Sobel DS, Tarazona EZ. Use of and interest in alternative therapies among adult primary care clinicians and adult members in a large health maintenance organization. *Western Journal of Medicine.* 1998;169(3):153-161.

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Table 1. The Prevalence of Menstrual Problem in non-pregnant women in 2006, 2009 and 2012.

Menstrual Problem	Survey 4 (2006) (n=9145)	Survey 5 (2009) (n=8200)	Survey 6 (2012) (n=8010)
Endometriosis			
Sample size	7704	6835	7340
Prevalence (%)	3.8	4.4	3.7
PMS			
Sample size	8105	7286	7426
Prevalence (%)	36.9	35.0	41.4
Irregular periods			
Sample size	8109	7267	7429
Prevalence (%)	21.1	19.3	22.2
Heavy periods			
Sample size	8108	7267	7438
Prevalence (%)	23.1	22.5	29.9
Severe period pain			
Sample size	8117	7279	7436
Prevalence (%)	24.7	22.2	24.2

PMS – premenstrual syndrome.

Table 2. The odds ratio[*] for association of cyclic perimenstrual pain and discomfort and consultations with complementary and alternative medicine practitioners.

Cyclic Perimenstrual Pain and Discomfort Symptom	Chiropractor	Osteopath	Massage Therapist	Acupuncturist	Naturopath/herbalist
	Odds Ratio (C.I.) (n=9719)	Odds Ratio (C.I.) (n=9716)	Odds Ratio (C.I.) (n=9717)	Odds Ratio (C.I.) (n=9717)	Odds Ratio (C.I.) (n=9716)
Endometriosis					
No (reference)	1.00	1.00	1.00	1.00	1.00
Yes [C,D,E]	1.21 (1.01,1.43)	1.13 (0.86,1.48)	1.23 (1.07,1.43)	1.97 (1.59,2.44)	1.54 (1.27,1.87)
PMS[**]					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.03 (0.93,1.13)	1.14 (0.98,1.32)	1.11 (1.02,1.19)	1.07 (0.93,1.25)	1.15 (1.02,1.31)
Sometimes [C,E]	0.97 (0.89,1.07)	1.02 (0.88,1.19)	1.14 (1.06,1.23)	1.11 (0.96,1.28)	1.30 (1.15,1.47)
Often [C,E]	0.95 (0.84,1.08)	1.27 (1.04,1.54)	1.25 (1.12,1.38)	1.28 (1.07,1.55)	1.60 (1.38,1.86)
Irregular cycle					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	0.94 (0.85,1.04)	1.00 (0.85,1.18)	0.95 (0.87,1.03)	1.07 (0.91,1.25)	1.06 (0.93,1.22)
Sometimes [E]	1.08 (0.98,1.21)	0.91 (0.76,1.09)	1.06 (0.97,1.16)	1.04 (0.88,1.23)	1.25 (1.09,1.42)
Often [E]	0.95 (0.83,1.08)	1.03 (0.84,1.26)	0.99 (0.89,1.10)	1.17 (0.97,1.41)	1.28 (1.10,1.49)
Heavy periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.02 (0.92,1.13)	0.86 (0.73,1.02)	0.97 (0.89,1.06)	0.96 (0.82,1.14)	0.95 (0.83,1.10)
Sometimes	0.96 (0.86,1.08)	0.82 (0.68,0.98)	0.91 (0.83,1.00)	0.85 (0.71,1.02)	1.00 (0.86,1.15)
Often [B,C]	0.90 (0.77,1.05)	0.64 (0.49,0.82)	0.80 (0.70,0.91)	0.76 (0.60,0.95)	0.90 (0.75,1.09)
Painful periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely [C]	0.99 (0.90,1.10)	1.01 (0.86,1.18)	1.13 (1.04,1.22)	1.13 (0.97,1.32)	0.98 (0.86,1.11)
Sometimes	1.07 (0.95,1.21)	1.02 (0.84,1.24)	1.03 (0.94,1.14)	1.11 (0.92,1.32)	0.83 (0.71,0.96)
Often	0.98 (0.82,1.16)	1.38 (1.07,1.78)	1.09 (0.95,1.25)	1.30 (1.02,1.65)	1.13 (0.93,1.37)
Time					
Survey 4 (reference)	1.00	1.00	1.00	1.00	1.00
Survey 5 [A,B,C,D]	1.20 (1.12,1.28)	1.39 (1.24,1.57)	1.15 (1.09,1.22)	1.45 (1.28,1.63)	0.91 (0.83,1.00)
Survey 6 [A,B,C,D,E]	1.34 (1.25,1.43)	1.65 (1.46,1.84)	1.22 (1.15,1.29)	1.48 (1.31,1.66)	0.85 (0.78,0.94)

[A] statistically significant association with chiropractor
[B] statistically significant association with osteopath
[C] statistically significant association with massage therapist
[D] statistically significant association with acupuncturist
[E] statistically significant association with naturopath/herbalist

[*]Adjusted for co-morbidities of diabetes, hypertension, anaemia, asthma, depression, anxiety and cancer and for demographics of area of residence, marital status, educational status and ability to manage on income. **All models have a Wald statistic p value <0.005.**

[**]PMS (premenstrual syndrome) - the emotional, physical and behavioural changes that occur in the luteal phase of menstruation and which subside with the onset of, or after, menstruation.

Table 3. Prevalence of cyclic perimenstrual pain and discomfort symptom and use of complementary and alternative medicine practitioners in 2012.

Cyclic Perimenstrual Pain and Discomfort Symptom	Chiropractor		Osteopath		Massage therapist		Acupuncturist		Naturopath/Herbalist	
	No (n=5,980)	Yes (n=1,493)	No (n=6,849)	Yes (n=624)	No (n=4,305)	Yes (n=3,168)	No (n=6,799)	Yes (n=674)	No (n=6,628)	Yes (n=845)
	%	%	%	%	%	%	%	%	%	%
Endometriosis										
No	77.3	19.0	88.3	8.0	55.9	40.5	87.8	8.5	85.6	10.7
Yes	2.8	0.9	3.3	0.4	1.8	1.9	3.1	0.6	3.0	0.7
PMS										
Never	30.3	7.2	34.7	2.8	22.9	14.6	34.7	2.8	34.2	3.2
Rarely	16.7	4.4	19.3	1.8	12.0	9.1	19.2	1. 9	19.0	2.2
Sometimes	22.5	5.8	26.0	2.4	15.7	12.7	25.5	2.8	24.9	3.5
Often	10.5	2.6	11.6	1.4	6.9	6.1	11.6	1.5	10.7	2.3
Irregular Periods										
Never	49.0	12.3	56.0	5.3	35.4	25.9	56.0	5.2	55.0	6.2
Rarely	13.5	2.9	15.1	1.3	9.8	6.6	14.9	1.6	14.5	2.0
Sometimes	10.3	3.0	12.3	1.0	7.1	6.2	12.1	1.2	11.5	1.8
Often	7.2	1.8	8.3	0.7	5.2	3.8	8.0	1.0	7.7	1.3
Heavy Periods										
Never	42.4	10.3	48.1	4.5	30.4	22.2	48.0	4.7	47.4	5.2
Rarely	13.6	3.9	16.2	1.3	9.7	7.8	16.0	1.5	15.4	2.1
Sometimes	15.0	3.5	16.9	1.6	10.6	7.9	16.8	1.7	16.2	2.3
Often	9.0	2.3	10.5	0.9	6.8	4.6	10.2	1.1	9.7	1.7
Painful Periods										
Never	42.5	10.6	48.8	4.3	31.5	21.7	48.8	4.3	47.7	5.4
Rarely	17.9	4.7	20.8	1.8	12.4	10.3	20.5	2.1	19.9	2.8
Sometimes	13.2	3.1	14.9	1.4	9.2	7.0	14.7	1.6	14.5	1.7
Often	6.3	1.7	7.2	0.8	4.5	3.4	7.0	1.0	6.6	1.4

Table 4. The odds ratio[*] for association between cyclic perimenstrual pain and discomfort and use of complementary and alternative medicine therapies and products.

Cyclic Perimenstrual Pain and Discomfort Symptom	Vitamins/minerals Odds Ratio (C.I.) (n=9268)	Yoga/meditation Odds Ratio (C.I.) (n=9267)	Herbal medicines Odds Ratio (C.I.) (n=9264)	Aromatherapy Odds Ratio (C.I.) (n=9264)	Chinese medicines Odds Ratio (C.I.) (n=9263)
Endometriosis					
No (reference)	1.00	1.00	1.00	1.00	1.00
Yes[A,B,C,E]	1.43 (1.19,1.71)	1.33 (1.12,1.59)	1.34 (1.12,1.59)	1.12 (0.93,1.35)	1.98 (1.51,2.59)
PMS**					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely[C,]	0.96 (0.88,1.04)	1.08 (0.98,1.20)	1.21 (1.09,1.35)	1.09 (0.98,1.21)	1.17 (0.95,1.43)
Sometimes,[B,C,D]	1.04 (0.95,1.13)	1.16 (1.05,1.28)	1.34 (1.21,1.49)	1.28 (1.15,1.41)	1.19 (0.98,1.45)
Often [A,B,C,D]	1.21 (1.08,1.37)	1.27 (1.11,1.45)	1.49 (1.30,1.69)	1.27 (1.11,1.45)	1.32 (1.04,1.69)
Irregular Periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.08 (0.98,1.18)	0.98 (0.88,1.09)	1.03 (0.93,1.15)	1.04 (0.93,1.16)	1.04 (0.84,1.28)
Sometimes	1.11 (1.00,1.23)	1.13 (1.01,1.27)	1.07 (0.95,1.20)	1.09 (0.98,1.23)	1.29 (1.05,1.59)
Often	1.10 (0.98,1.25)	1.02 (0.89,1.17)	1.08 (0.94,1.23)	0.95 (0.83,1.09)	1.21 (0.95,1.54)
Heavy Periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.02 (0.93,1.13)	1.01 (0.90,1.12)	0.97 (0.87,1.09)	0.97 (0.87,1.09)	1.01 (0.81,1.25)
Sometimes	0.95 (0.86,1.06)	0.99 (0.88,1.12)	1.04 (0.92,1.17)	0.93 (0.83,1.05)	0.88 (0.70,1.10)
Often	0.91 (0.79,1.05)	0.85 (0.72,1.00)	1.05 (0.90,1.23)	0.91 (0.78,1.07)	0.84 (0.63,1.13)
Painful Periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	0.90 (0.83,0.99)	0.97 (0.88,1.08)	0.97 (0.87,1.08)	1.02 (0.91,1.13)	1.07 (0.87,1.31)
Sometimes	0.96 (0.86,1.07)	1.00 (0.89,1.13)	0.96 (0.85,1.09)	1.10 (0.97,1.24)	1.05 (0.83,1.33)
Often [D]	0.96 (0.82,1.12)	1.24 (1.05,1.47)	1.19 (1.00,1.40)	1.33 (1.13,1.58)	1.47 (1.09,1.99)
Time					
Survey 4 (reference)	1.00	1.00	1.00	1.00	1.00
Survey 5 [A,B,C,D,E]	1.21 (1.12,1.31)	1.16 (1.06,1.27)	1.18 (1.08,1.29)	0.83 (0.76,0.91)	1.63 (1.36,1.95)
Survey 6 [A,B,D,E]	1.25 (1.15,1.36)	1.20 (1.10,1.32)	1.06 (0.97,1.17)	0.70 (0.64,0.77)	1.51 (1.26,1.81)

[A] statistically significant association with vitamins/minerals [D] statistically significant association with aromatherapy oils
[B] statistically significant association with yoga or meditation [E] statistically significant association Chinese medicines
[C] statistically significant association with herbal medicines

[*]Adjusted for co-morbidities of diabetes, hypertension, anaemia, asthma, depression and anxiety and for demographics of area of residence, marital status, educational status, ability to manage on income, body-mass index, parity, stress, level of exercise, oral/implant contraceptive use and ethnicity. **All models have a Wald statistic p value <0.005.**

PMS (premenstrual syndrome) - the emotional, **physical and behavioural changes that occur in the luteal phase of menstruation and which subside with the onset of, or after, menstruation.**

Table 5. Prevalence of cyclic perimenstrual pain and discomfort symptom and use of complementary and alternative medicine therapies and products in 2012.

Cyclic Perimenstrual Pain and Discomfort Symptom	Vitamins/Minerals		Yoga/Meditation		Herbal medicines		Aromatherapy oils		Chinese medicines	
	No (n=2,384)	Yes (n=5,043)	No (n=5,713)	Yes (n=1,714)	No (n=5,927)	Yes (n=1,500)	No (n=6,224)	Yes (n=1,203)	No (n=7,024)	Yes (n=403)
	%	%	%	%	%	%	%	%	%	%
Endometriosis										
No	31.2	65.1	74.5	21.8	77.1	19.2	80.8	15.5	91.2	5.1
Yes	0.8	2.9	2.4	1.3	2.6	1.1	3.0	0.7	3.3	0.4
PMS										
Never	13.1	24.3	29.9	7.5	31.6	5.8	32.7	4.7	35.7	1.6
Rarely	7.3	13.9	16.5	4.7	17.1	4.1	18.0	3.2	20.1	1.1
Sometimes	8.3	20.1	21.4	7.1	21.9	6.5	23.0	5.4	26.8	1.7
Often	3.4	9.6	9.1	3.8	9.3	3.7	10.1	2.9	12.0	1.0
Irregular Periods										
Never	20.6	40.6	47.4	13.9	49.8	11.4	51.9	9.3	58.3	2.9
Rarely	5.0	11.5	12.8	3.7	13.1	3.4	13.6	2.9	15.6	0.9
Sometimes	3.8	9.6	9.8	3.5	10.1	3.2	11.0	2.4	12.4	0.9
Often	2.7	6.2	6.9	2.0	6.9	2.1	7.3	1.6	8.3	0.7
Heavy Periods										
Never	17.6	35.0	40.8	11.8	43.2	9.4	45.0	7.6	49.9	2.7
Rarely	5.5	12.0	13.3	4.2	13.9	3.6	14.6	2.9	16.6	0.9
Sometimes	5.6	12.9	14.1	4.5	14.4	4.1	15.0	3.5	17.6	1.0
Often	3.4	8.0	8.7	2.6	8.3	3.1	9.1	2.3	10.5	0.8
Painful Periods										
Never	17.5	35.6	41.6	11.6	44.0	9.1	45.9	7.2	50.6	2.5
Rarely	7.6	15.1	17.4	5.2	17.9	4.8	19.0	3.6	21.4	1.3
Sometimes	4.8	11.4	12.3	3.9	12.5	3.7	12.9	3.4	15.3	0.9
Often	2.1	5.9	5.7	2.3	5.5	2.5	6.0	2.0	7.3	0.7