



Research paper

Naturopaths' approach to care of women with infertility: A cross-sectional survey

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ARTICLE INFO

Keywords:

Complementary medicine
Female fertility
Integrative medicine
Naturopaths
Naturopathy
Women's health

ABSTRACT

Introduction: Infertility affects approximately one in six couples of reproductive age. Many women use traditional, complementary and integrative medicine to improve their chances of conceiving. While there is evidence of the use of naturopathy by women attempting to conceive, there is no evidence of the way that naturopaths approach and manage their treatment. This study aims to describe how naturopaths manage female infertility, including their approaches, clinical decisions, knowledge sources, and safety considerations in providing naturopathic care.

Methods: Naturopaths in Australia or New Zealand, routinely treating female reproductive health concerns and practicing for at least two years were invited to complete an online survey through their professional naturopathic associations.

Results: Data from 45 respondents were included. Women seeking preconception health and fertility promotion were frequently seen by 53 % and 44 % of the naturopaths, respectively. The naturopaths' clinical management approaches for infertility were wide-ranging and extended beyond fertility. They reported prioritising peer-reviewed journal articles in guiding clinical decisions, collaborating with health practitioners (mostly general practitioners) and reporting adverse events. Most naturopaths (95 %) utilised multiple treatment strategies, recommending dietary and lifestyle modifications and a combination of ingestible substances.

Conclusions: The naturopathic approach to management of women with infertility is holistic, considering physical, emotional, and environmental factors and promoting natural healing mechanisms. Greater knowledge of scientific methods for clinical decision-making and improved awareness of adverse event reporting would enhance naturopathic care. Additionally, evaluating the effectiveness of naturopathic treatment would improve safety, inform the profession, and clarify the role of naturopathy within a multidisciplinary approach to infertility.

1. Introduction

Infertility is defined as the inability to conceive a pregnancy after 12 months of regular unprotected sexual intercourse (or six months in women over 35) [1]. It affects approximately one in six couples of reproductive age [2]. Diminished ovarian reserve (DOR) is a significant risk factor for fertility and is characterised by a regular menstrual cycle and a decrease in the quantity of oocytes remaining in the ovary [3,4]. In developed countries, the prevalence of infertility is 15 % [5], whereas in Australia, the prevalence is estimated to be 17 % for women aged

between 28 and 33 years [6]. Infertility has wide-ranging consequences for individuals, families and society as a whole [5]. On an individual level, it negatively affects many aspects of health and well-being including physical, psychological, emotional aspects which can affect the long-term quality of life, health and well-being [7,8].

General practitioners (GPs) and gynaecologists/obstetricians are generally the healthcare professionals responsible for investigating fertility problems, with infertility being treated by fertility specialists using medically assisted reproductive (MAR) techniques [9]. However, access to medical advice and MAR may be limited by geographic, social,

Abbreviations: AE, adverse events; AFC, antral follicle count; AMH, anti-Mullerian hormone; DOR, diminished ovarian reserve; FSH, follicle-stimulating hormone; GP, general practitioner; MAR, medically assisted reproduction; TCIM, traditional complementary integrative medicine; TGA, Therapeutic Goods Administration; WHO, World Health Organization.

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<https://doi.org/10.1016/j.eujim.2023.102329>

Received 14 September 2023; Received in revised form 20 December 2023; Accepted 21 December 2023

Available online 22 December 2023

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and financial factors [10] as well as personal preferences and moral values [11,12]. According to the Australian Longitudinal Study on Women's Health ($n = 9145$), 72 % of women with infertility sought medical advice for infertility, however, only one third used MAR [6]. Despite a favourable prognosis and the financial capacity to afford treatment, many individuals using MAR choose to discontinue treatment due to the need to have a break from treatment, physical and psychological burdens, as well as relational and personal issues [11].

Many women in Australia additionally use traditional complementary and integrative medicine (TCIM) to improve their chances of having a baby [13,14]. A nationally representative sample of 13,224 Australian women indicated that those attempting to conceive were 1.3 times more likely to consult a naturopath [15]. Women's reasons for seeing a naturopath include a desire to conceive naturally, maintain their health and well-being and maximise chances of success from MAR treatment; and to explore other options after MAR has failed or is no longer indicated [13,16,17].

Naturopathy is a traditional system of medicine recognized by the World Health Organization (WHO) and defined by two core philosophies, holism and vitalism. Holism sees the 'whole' as greater than its parts, and vitalism relates to the body's natural healing capacity. Originating in Europe, naturopathy is practiced in more than 108 countries representing 40 % of all nations and includes all WHO regions [18]. In Australia, naturopathy is one of the most popular forms of TCIM with 6.2 % of the population consulting naturopaths [19]. According to Australian 2017 census data, there are an estimated 4000 naturopaths that receive 4.9 million consultations annually [20].

Naturopathic recommendations for women with gynaecological conditions are typically complex and vary according to individual needs and expectations. They may include combinations of therapies such as counselling, menstrual cycle guidance, health promotion, dietary assessment, physical activity, stress-management, and ingestible substances like nutritional supplements and herbal medicines [21,22]. Naturopathic management has been sought by women with infertility to promote reproductive potential, address negative impacts of infertility, and promote engagement with desired treatments including MAR [15].

While there is evidence of the use of naturopathy by women attempting to conceive, there is no evidence of the way that naturopaths approach and manage women with infertility. This survey aimed to study how naturopaths manage female infertility, including their approaches, clinical decisions, knowledge sources, and safety considerations in providing naturopathic care.

2. Methods

A cross-sectional survey was conducted between April and December 2021 using the Qualtrics on-line survey software [23]. Ethics approval was provided by the Western Sydney University Human Research Ethics Committee (H14256, March 2021).

2.1. Participants

Naturopaths currently practicing in Australia or New Zealand, as current members of a professional naturopathic association, having been in clinical practice for two or more years and routinely treating women with female reproductive health concerns were eligible to complete the survey. Invitations to participate in the survey were distributed through professional associations and registers of naturopaths in Australia and New Zealand including Naturopaths and Herbalists Association of Australia (NHAA), Australian register of Naturopaths and Herbalists (ARONAH), Naturopaths and Medical Herbalists New Zealand (NMHNZ). Complementary Medicine Association (CMA) and Australian Traditional Medicine Society (ATMS) were also included as multidisciplinary professional associations that explicitly include naturopaths amongst their membership. All organisations were asked to share the study invitation with their members via specific email newsletters

and posts on their social media channels. We also recruited naturopaths through word of mouth. Members of the research team, who are familiar with the Australian naturopathic community, used social media to reach their network of potential participants. This was then augmented with snowball sampling whereby potential participants shared in their own network of naturopaths. Respondents were informed that formal consent was implied upon starting the survey in covering letters on the survey landing page and the participant information sheet. All responses were anonymous.

2.2. Survey instrument

The survey was developed by the authors (AM, SA, MA, CE) who have multidisciplinary expertise including naturopathy, general practice, obstetrics/gynaecology, and fertility/women's health research and/or traditional, complementary and integrative medicine (TCIM) research. Survey questions were revised in response to feedback from three naturopathic practitioner representatives who piloted the survey. The 60-item survey covered basic demographics, numbers of patients, types of reproductive issues, consultation and practice characteristics, reasons women seek naturopathic care, tests for ovarian reserve, treatment approaches for women with infertility, treatment evaluation methods, sources of information, ingestible medicines and dietary patterns commonly prescribed for infertility and DOR, experience of adverse effects and interprofessional communications.

2.3. Statistical analysis

Data were exported from Qualtrics into Microsoft 365 Excel (version 16.69) for data cleaning and into IBM SPSS statistical software version 29.0 [24] for statistical analysis. Categorical variables were described using proportions and percentages, and continuous variables using means and standard deviations. Ranked variables were ordered according to an ordinal ranking system with items being dragged and dropped to be classified as higher or lower than the other items in the set. Complete responses were encouraged by the online survey layout to minimise missing data. Missing data were not replaced.

3. Results

3.1. Survey response and sample characteristics

A total of 45 naturopaths from Australia and New Zealand completed the survey. Table 1 describes the demographic and practice characteristics of the respondents. The majority of naturopaths were female (95.6 %, $n = 43$) with a mean age of 46.8 years, attained a Bachelor degree or higher in naturopathy (71.1 %, $n = 32$), practiced in Australia (91.1 %, $n = 41$) and had been practicing for ten years or more (77.7 %, $n = 35$). Fifteen naturopaths (33.3 %) had attained additional qualifications that encompass women's health including nursing, midwifery, and family planning.

3.2. Scope of practice

Fig. 1 reports the naturopaths' descriptions of the most common reproductive conditions of women presenting in their clinical practice. The most common concerns were menstrual cycle irregularities (82 %, $n = 37$), polycystic ovary syndrome (64 %, $n = 29$) and peri/menopause (62 %, $n = 28$). Additionally, women seeking preconception health and fertility promotion were frequently seen by 53 % ($n = 24$) and 44 % ($n = 20$) of the naturopaths, respectively. Naturopaths frequently encountered women with diminished ovarian reserve (89 %, $n = 40$) and typically used basal follicle stimulating hormone (FSH) (84 %, $n = 36$) and anti-Mullerian hormone (AMH) (71 %, $n = 31$) as biomarkers for assessing ovarian reserve (Table 2).

Clinical management approaches for infertility used by the

Table 1
Participant demographics and practice characteristics of survey respondents ($n = 45$).

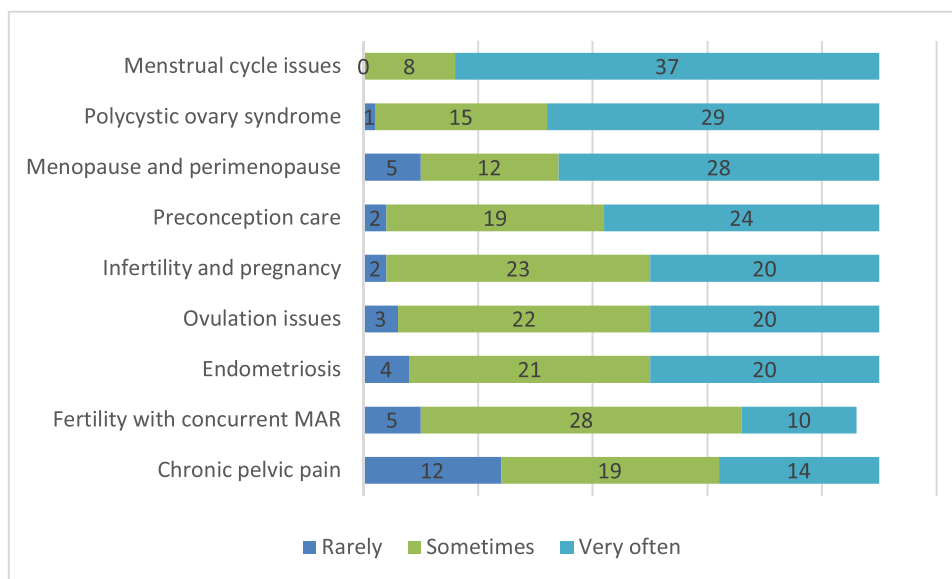
Characteristic		n (%) or mean [SD]
Age	Years	46.8 [7.84]
Gender	Female	43 (95.6)
	Non-binary or prefer not to say	2 (4.4)
Country of practice	Australia	41 (91.1)
	New Zealand	4 (8.9)
Highest qualification relevant to naturopathy	Diploma, advanced diploma or graduate certificate	13 (28.9)
	Bachelor degree	23 (51.1)
	Master degree or doctor of philosophy (PhD)	9 (20.0)
Years since highest naturopathic qualification attained	9 or less	12 (26.7)
	10 – 14	12 (26.7)
	15 or more	21 (46.6)
Additional qualifications related to women's health ($n = 15$)	Master reproductive medicine / women's health	4 (8.9)
	Natural fertility management	7 (15.5)
	Family planning / midwifery	2 (4.4)
Other health care qualifications attained	Western herbal medicine practitioner	20 (44.4)
	Massage therapist	16 (35.6)
	Reflexologist	7 (15.6)
	Meditation or yoga therapist	6 (13.3)
	Nurse / midwife	6 (13.3)
	Homeopath	4 (8.9)
	Life coach / personal trainer	4 (8.9)
	Counsellor	3 (6.7)
	Nutritionist	3 (6.7)
	Pharmacist	3 (6.7)
	Kinesiologist / energy healer	3 (6.7)
	Acupuncturist or Chinese medicine practitioner	2 (4.4)
Years in practice	0 – 9 years	10 (22.2)
	10 – 19 years	21 (46.6)
	More than 20 years	14 (31.1)
Number of patients with reproductive issues	More than 7 per week	12 (26.6)
	4 – 6 per week	23 (51.1)
	1 – 3 per week	10 (22.2)
Number of patients with infertility	More than 7 per week	6 (13.3)
	4 – 6 per week	7 (15.6)
	1 – 3 per week	32 (71.1)
How often do you ask your female patients about their reproductive life planning (in the absence of infertility complaints)? $n = 43$	Always / very often	31 (72.1)
	Sometimes / rarely / never	12 (27.9)
What are the main pathways that patients find out about you?	Word of mouth	39 (86.7)
	Clinic website	24 (53.3)
	Referral from medical health practitioners	14 (31.1)
	Social media, advertising or website promotion	11 (24.4)
	Referral from TCIM practitioners or unknown	9 (20.0)
Length of time of initial consultations	0 - 60 min	9 (20.0)
	60 – 90 min	28 (62.2)
	90 – 120 min	8 (17.7)
Length of time of follow-up consultations	30 - 45 min	28 (62.2)
	60 min	17 (37.8)
Length of period to follow-up consultation	2 – 4 weeks	36 (80.0)
	4 – 6 weeks	9 (20.0)
Type of practice	Solo practitioner	26 (57.8)
	Practice with other naturopaths	8 (17.8)
	Multi-disciplinary practice with:	8 (17.8)
	- other health practitioners (e.g. family physician, gynaecologist, physiotherapist)	3 (6.7)
	- TCIM practitioners (e.g. massage therapist, osteopath)	

Abbreviation: TCIM = traditional complementary and integrative medicine.

naturopaths are described in Fig. 2. The most utilised were assessment and recommendations of dietary patterns, assessment of the menstrual cycle and ovulation, and preconception health promotion. Most naturopaths (98 %, $n = 42$) recommended a preconception health promotion period and most (60 %, $n = 25$) recommended a timeframe of three to four months. This approach to preconception health aimed to enhance general and reproductive health and correct nutrient deficiencies (76 %, $n = 32$) (Appendix A: Table 1). The measurements that were most frequently used to assess clinical outcomes of treatment for women with infertility were menstrual cycle regularity, positive pregnancy tests, menstrual charts showing ovulation, and live births (Table 3).

Regarding sources of information, naturopaths referred to peer-reviewed journal articles, seminars/webinars/presentations by experts

in the field, and non-commercial conferences offered by professional associations (Table 4). The quality of information was assessed based on (i) the legitimacy of the organisation, group or individual authoring the content, (ii) inclusion of factual information sources (iii) citations or references supporting the information (Table 5). In terms of inter-professional communications, naturopaths reported most commonly interacting with GPs (60 %, $n = 24$), acupuncturists (53 %, $n = 21$) and gynaecologists (35 %, $n = 14$) (Fig. 3). The main reasons for referral of a patient to learn more about MAR were, in order of priority, (i) the naturopath felt the case was beyond their scope of practice, (ii) iatrogenic causes of DOR, (iii) DOR diagnosis, (iv) naturopathic treatment had not been effective for fertility within the expected timeframe (Table 2).



Abbreviation: MAR = medically assisted reproduction.

Fig. 1. Associated reproductive conditions of women that sought naturopathic care ($n = 45$). Abbreviation: MAR = medically assisted reproduction.

Most naturopaths (91 %, $n = 39$) had received complaints of adverse effects (AEs) most often due to herbal medicines or nutritional supplements that they had prescribed. Most AEs were mild gastrointestinal symptoms (91 %, $n = 39$), were temporary and did not require further medical attention (91 %, $n = 39$) (Table 5).

3.3. Ingestible medicines and dietary patterns

A Mediterranean diet or a whole-food diet were the most frequently recommended dietary patterns for this population. Two naturopaths (5 %) did not specify a particular dietary pattern but would make a recommendation based on the clinical presentation of the individual. The most commonly recommended nutritional supplements were multivitamins formulated specifically for preconception and/or pregnancy, zinc, folate, coenzyme Q10 and vitamin D (Appendix 1: Figure 1). A wide range of herbal medicines were recommended as shown in Fig. 4. The most common herbal medicines were *Withania somnifera*, *Vitex agnus-castus*, *Paeonia lactiflora*, *Asparagus racemosus*, *Rehmannia glutinosa*. Two naturopaths (5 %) did not use herbal medicines in their treatment.

4. Discussion

Naturopaths in this survey reported that they approach the treatment of women with infertility comprehensively. They address both the specific condition and the overall well-being of the individual, considering both internal and external factors that may impact health status. The survey respondents emphasised the importance of educating patients on various fertility-related topics such as the menstrual cycle, ovulation, and optimal timing for intercourse and the fertile window. Additionally, they recommended discussing a wide range of lifestyle factors and providing information on the success and safety of naturopathic treatments. This approach to clinical care is valued by patients to achieve optimal wellness through health promotion [22] and empowerment through education and involvement in their healthcare [25]. Treatment was approached in this study according to the naturopathic philosophy that encourages the body's inherent ability to heal. While certain genetic, environmental and lifestyle factors can slow or prevent optimal healing, naturopaths follow a natural order of therapeutic intervention to identify and remove obstacles to recovery [26–28]. Survey

respondents highlighted the importance of diet, exercise, sleep, relaxation and psychological well-being in their approach, demonstrating a strategy capable of influencing and supporting this healing mechanism [26]. This study suggests that naturopathic management of women with infertility aimed to enhance overall health and well-being, and to improve self-efficacy.

The whole-person approach to healthcare was also evident in the range of measurements of clinical outcomes that naturopaths use to evaluate the efficacy of their treatments. In addition to improvements in reproductive function, naturopaths also focused on other aspects of health such as well-being, quality of life and psychological and emotional health. These results align with similar studies involving TCIM patients, highlighting their expectations of care from TCIM practitioners with emphasis on well-being and emotional support [22,29]. However, while naturopaths used subjective outcomes such as well-being and quality of life, most (79 %, $n = 34$) did not use validated questionnaires to evaluate the effectiveness of their care on these outcomes. Validated Patient Reported Outcome Measures (PROMs) are widely used in clinical practice to assess patient's experience of the care process, monitor their progress and improve communication between patients and caregivers [30] and may offer a rigorous measure to naturopaths. Further investigation of naturopaths' non-use of PROMs or other scientifically validated methods to evaluate the effectiveness of their treatment on subjective outcomes is needed.

Naturopaths reported prioritising peer-reviewed journal articles to inform their clinical decision making, however, one third did not identify the hierarchy of evidence as a method to determine the rigour of evidence of efficacy. Whilst knowledge development in research methodology may be needed, the use of scientific evidence that participants reported may be attributed to increased higher education levels and the development of the TCIM research sector [20,31]. While most naturopaths report the value of traditional evidence [32], no specific sources of traditional evidence were identified. Findings here support their inclination to verify the legitimacy of authors according to their qualifications and experience and to assess citations or references when evaluating the quality of information [32,33]. This trend is evident in recent graduates with a stronger focus placed on evidence-based medicine [34]. It may be a result of higher education levels and investment in public university research centres, which have been found to positively correlate with skills in evidence-based practice [35–37].

Table 2
Naturopath’s assessment of ovarian reserve (n = 43).

Ovarian reserve		n (%)
Have you treated women with DOR	Yes	40 (88.9)
	No	5 (11.1)
Biomarkers used to assess ovarian reserve	Elevated follicle stimulating hormone (FSH)	36 (83.7)
	Low anti-Mullerian hormone (AMH)	31 (72.1)
	Menstrual cycle length	28 (65.1)
	Low antral follicle count (AFC) < 7 follicles	25 (58.1)
	< 4 oocytes/eggs retrieved in a MAR ovulation stimulation cycle	14 (32.6)
Other indicators	Basal body temperature, thyroid health, patient’s age, fertility history	
	Strengths of AMH test	
Strengths of AMH test	Provides information for planning future reproduction	23 (53.5)
	Raises a discussion with your patient about options including seeing a fertility specialist for MAR	20 (46.5)
	Best available measure of ovarian reserve	14 (32.6)
	Assists in calculating time to conception	7 (16.3)
	Not sure	1 (2.3)
Limitations of AMH test	Other – PCOS marker, medication dosing during MAR	3 (6.9)
	Causes women unnecessary distress about fertility	29 (67.4)
	Reflects the quantity but not the quality of eggs	27 (62.8)
	Not a true indication of ovarian reserve	23 (53.5)
Discussion on seeking information about MAR with woman with DOR	Other – potential individual variability	1 (2.3)
	- Always or very often	32 (78.1)
Methods to seek reports of recent AMH levels	- Sometimes	9 (22.0)
	- Rarely or never	0 (0.0)
	Order of priority	
Reasons for discussing with and/or referring a women with infertility for information regarding MAR	Women present with copies of pathology reports	1
	Sharing reports with other medical providers	2
	Women provide access to pathology reports	3
	Order the test	4
Reasons for discussing with and/or referring a women with infertility for information regarding MAR	Patient presentation is beyond the scope of practice	1
	Iatrogenic causes of DOR (such as ovarian surgery, chemotherapy and radiation)	2
	DOR diagnosis	3
	Patient’s condition becomes more serious	4
	Naturopathic treatment has not been effective for fertility	5
	Patient’s age and a limited time to conceive	6
	Patient unable to comply with naturopathic treatment	7
	Other reasons: to give the patient options, other fertility limiting factors, the patient’s request, the need for diagnostic tests,	8

Abbreviations: DOR = diminished ovarian reserve, AMH = anti-Mullerian hormone, FSH = follicle-stimulating hormone, AFC = antral follicle count, MAR = medically assisted reproduction, PCOS = polycystic ovary syndrome.

Naturopaths in our study collaborated in multidisciplinary healthcare by referring women with infertility to medical practitioners and other TCIM practitioners. Previously, naturopaths have been found to work closely with medical practitioners, mostly in response to patient demand [38]. However, Steel et al. found that complementary medicine practitioners providing care to women through preconception to the postnatal period were more likely to communicate with other TCIM practitioners than medical practitioners [39]. While we did not report the number of referrals that were received by the naturopaths from other health professionals, it is important to note that interprofessional communication between conventional and TCIM healthcare practitioners is impacted by several factors including medical dominance, clarity of roles and cultural differences of the health professions [40]. Importantly, it remains a priority for patients who report desires for greater integration between conventional and TCIM healthcare [41]. The engagement of naturopaths in interprofessional communication within our study shows promise for fostering collaboration among healthcare professionals to benefit women with infertility, a condition that is expected to benefit from multi-disciplinary approaches.

Although TCIM patients generally consider naturopathic treatment safe [29], it is important to note that adverse events reported by respondents were not minor. The adverse events from herbal medicines or nutritional supplements included severe gastrointestinal symptoms, central nervous system effects and hepatotoxicity. One was a serious adverse event that required hospitalisation. Based on previous workforce survey data, it is estimated that practitioners will identify one serious adverse event in their patients every 11 months of full-time practice, with 2.3 adverse events for every 1000 consultations

(excluding mild gastrointestinal effects) [42]. Most naturopaths were reporting the adverse events when required, however, four naturopaths found the reporting system too complex. Adverse events were notified to a variety of agencies, although it is of concern that these reports were largely to the manufacturer (43 %) or supplier of the product (28 %) rather than the Therapeutic Goods Administration (TGA) which administers the adverse drug reporting system in Australia. Further training of naturopaths to report adverse drug reactions is needed and naturopaths should facilitate informed decision-making about the potential benefits and risks of naturopathy.

The most highly recommended dietary patterns were a Mediterranean diet and a whole-food diet. This is consistent with research that found a Mediterranean diet, high in mono and polyunsaturated fats, whole grains, vegetables, and fish, is associated with improved fertility in women [43] and may also increase the chances of pregnancy and live birth for women undergoing MAR [44]. A recent systematic review of preconception diets of couples undergoing MAR included 13 studies (n = 3638) and found weak evidence that maternal intake of four dietary patterns [Mediterranean diet (RR: 1.22; 95 % CI: 1.05, 1.43), novel profertility diet (OR: 1.43; 95 % CI: 1.19, 1.72), Iranian traditional medicine diet (OR: 3.9; 95 % CI: 1.2, 12.8), Dutch national dietary recommendations diet (OR: 1.65; 95 % CI: 1.08, 2.52)] was associated with increased likelihood of achieving a clinical pregnancy, while two dietary patterns [novel profertility diet (OR: 1.53; 95 % CI: 1.26, 1.85), Mediterranean diet (RR: 1.25; 95 % CI: 1.07, 1.45)] were associated with increased probability of live birth [45]. Meta-analyses showed an association between adherence to the Mediterranean dietary pattern and live birth across two studies (OR: 1.98; 95 % CI: 1.17, 3.35; I² = 29 %, n

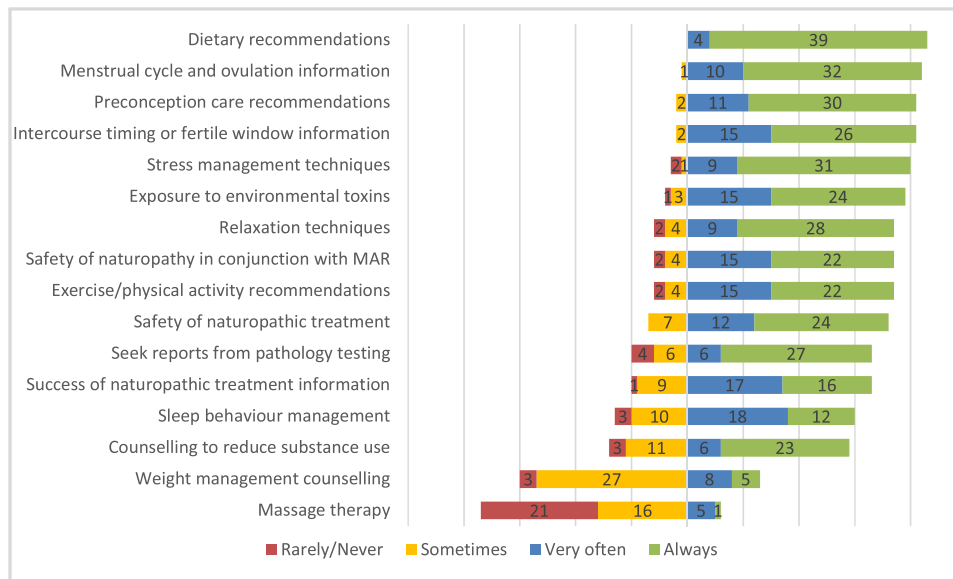


Fig. 2. Naturopaths' recommendations for women presenting with infertility (n = 43).

Table 3

Clinical outcomes assessed by naturopaths in their management of women with infertility (n = 42).

Measurements to assess clinical outcomes from treatment	n (%)
Menstrual cycle regularity	38 (90.5)
Positive pregnancy test	35 (83.3)
Menstrual chart shows ovulation	33 (78.6)
Live birth	33 (78.6)
On-going pregnancy from 12 weeks	31 (73.8)
General well-being	31 (73.8)
Quality of life	30 (71.4)
Psychological improvement	29 (69.0)
On-going pregnancy from 20 weeks	28 (66.7)
Health or symptom improvements	27 (64.3)
Basal FSH and/or oestrogen for comparison	26 (61.9)
Improved MAR results	26 (61.9)
Mid-luteal progesterone for comparison	22 (52.4)
Improvements in body composition	14 (33.3)
Measurement of AMH for comparison	13 (31.0)
Utilisation of patient reported outcome measures (PROMs)	
Always / very often	8 (18.6)
Sometimes	21 (48.8)
Rarely / never	13 (30.3)
Timeframe to measure clinical outcomes	
At follow-up appointment	31 (72.1)
After 1 - 3 months	4 (9.3)
After 4 - 6 months	3 (7.0)
Other - depends on the individual case	4 (9.3)

Abbreviations: AMH = anti-Mullerian hormone, FSH = follicle stimulating hormone.

= 355), but no association with clinical pregnancy [45]. While it has been reported that women consulting naturopaths are more likely to engage and be open to positive health behaviours [46], further research is needed to understand the effectiveness of naturopaths' counselling in achieving change in patients' dietary patterns, and the methods used to evaluate adherence to healthy lifestyle practices.

The majority of naturopaths (95 %, n = 40) recommended dietary modifications, lifestyle modifications and a combination of ingestible substances, in the management of women with infertility. Utilising multiple treatment strategies is typical in naturopathic practice [47]. Several observational studies found that naturopathic care included dietary education and counselling, stress reduction techniques, exercise, nutritional and herbal supplementation and other lifestyle behaviours

Table 4

Sources of information used to inform decisions regarding women's reproductive health (n = 42).

External sources of information	Order of priority*
Peer-reviewed journal articles	1
Seminars, webinars or presentations by experts in the field	2
Conferences (non-commercial, offered by professional associations)	3
Inter-professional networks such as Fertility Society of Australia	4
Textbooks	5
Clinical practice guidelines	6
Supplement company sponsored conferences, seminars, webinars	7
On-line consumer education platforms such as Jean Hailes for Women's Health	8
Naturopathic networks	9
Magazines published by professional associations	10
Peer support	11
Blog posts, forums or email lists	12
Factors that are used to appraise the quality of the information	
Legitimacy of the organisation, group, company or individual authoring the content	39 (90.7)
Sources for factual information is clearly listed or referenced	39 (90.7)
Citations or references support the information	35 (83.3)
Author's qualifications for writing on a particular topic	35 (83.3)
Author is independent of a sponsoring or hosting organisation	32 (74.4)
Author's academic or professional credentials	31 (73.8)
Assessing content for evidence of biases	30 (71.4)
Qualifications of experts giving endorsements	30 (71.4)
Information content and advertising are clearly differentiated	28 (66.7)
Hierarchy of evidence of research methods	27 (64.3)
Content is devoid of emotional testimonies, personal anecdotes or disturbing images	27 (64.3)
Date or last revision date of authorship	21 (50.0)
Disclaimers (eg on a web page)	18 (42.9)

* most commonly used = 1.

relevant to particular conditions such as diabetes [48,49], and hypertension [50]. Naturopaths in this study emphasised lifestyle adjustments that have positive associations with preconception health promotion,

Table 5
Clinical experience and reporting methods of adverse effects to herbal medicines or nutritional supplements (n = 40).

Adverse reactions	n (%)
Mild gastrointestinal symptoms	39 (90.7)
Headaches	13 (30.2)
Menstrual irregularities	13 (30.2)
Severe gastrointestinal symptoms	5 (11.6)
Central nervous system effects	4 (9.3)
Significant skin reactions	2 (4.7)
Hepatotoxicity	1 (2.3)
Not a serious adverse event	39 (90.7)
Requiring patient to go to a medical practitioner	1 (2.3)
Requiring hospitalisation of patient	1 (2.3)
Frequency of reporting of negative reactions	
Every time	6 (15.0)
Usually	13 (32.5)
No, due to lack of time	1 (2.5)
No, due to the complexity of the reporting process	4 (5.0)
Unsure where and when to report	1 (2.5)
The reactions were not severe enough to report	14 (35.0)
Where do you report these reactions?	
The manufacturer of the product	17 (42.5)
Medical regulatory bodies	12 (30.0)
The supplier of the product	11 (27.5)

including avoiding exposure to environmental toxins [51] and supporting endogenous and environmental detoxification systems [52] to prevent damage to gametes. Currently there is no evidence of the effectiveness of whole-system naturopathy for infertility, hence further research is warranted. While the naturopaths provided a diverse range of measurements of clinical outcomes including subjective well-being, future research should approach consumers to determine their values in terms of the range of outcomes of treatment and consider how to evaluate the effects of individualised treatment. The authors have conducted a separate study seeking the views of women to this effect with the manuscript currently under peer-review.

4.1. Limitations

This survey represents an initial exploration of naturopaths’ treatment patterns in their care of women with infertility, and therefore the

results are preliminary. It is important to acknowledge the limitation of low respondent numbers which may restrict the generalisability of the findings to the broader population of naturopaths. Low response rates are common among healthcare professionals [53] and the number of naturopaths practicing in a specialising area of fertility is unknown. However, the number of responses is consistent with those in other surveys of naturopaths [54,55]. The regulation of naturopathic medicine varies both between countries and within countries, leading to differences in the scope of practice and the generalisability of findings. Some regions may include treatment modalities that are not available or commonly used in other areas, due to historical, legal, or educational reasons. Nevertheless, recent studies indicate a high level of global consistency in the fundamental concepts that define naturopathic medicine and the modalities employed [56,57]. Another limitation was the small number of respondents from NZ. This might be attributed to several factors including the relatively small number of practitioners (2013 census, n = 490) [33], recruitment was conducted through one naturopathic association and word-of-mouth recruitment was unlikely to have reached naturopaths in NZ. Additional limitations are noted regarding participation bias and recall bias due to the self-administered design of the survey, and the validity of the survey data that could not be independently confirmed due to anonymity of participants. There were limitations with the survey instrument. We did not report (i) the measurements used to assess subjective measures such as quality of life and (ii) interprofessional referrals and communications from other health professionals to naturopaths.

Despite these limitations, this is the first study of its type and provides novel insights into the way naturopaths manage the care of women with infertility within Australia and New Zealand. However, further research is needed to examine this topic in greater detail. Research reporting on naturopathic perspectives in healthcare is in its infancy and currently there is no evidence of the effectiveness of naturopathy for women with infertility. The investigation of patient desired outcomes from naturopathic care for infertility requires attention. Further research is also needed to explore the role and value that naturopathic care could play in a multidisciplinary team approach to the management of women with infertility.

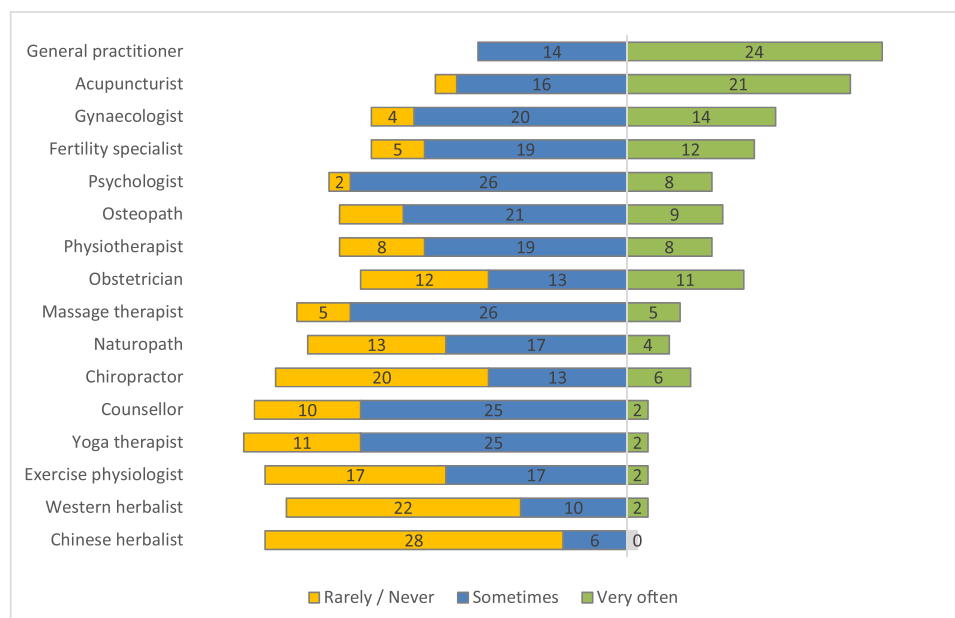


Fig. 3. Interprofessional communications (n = 40) and frequency.

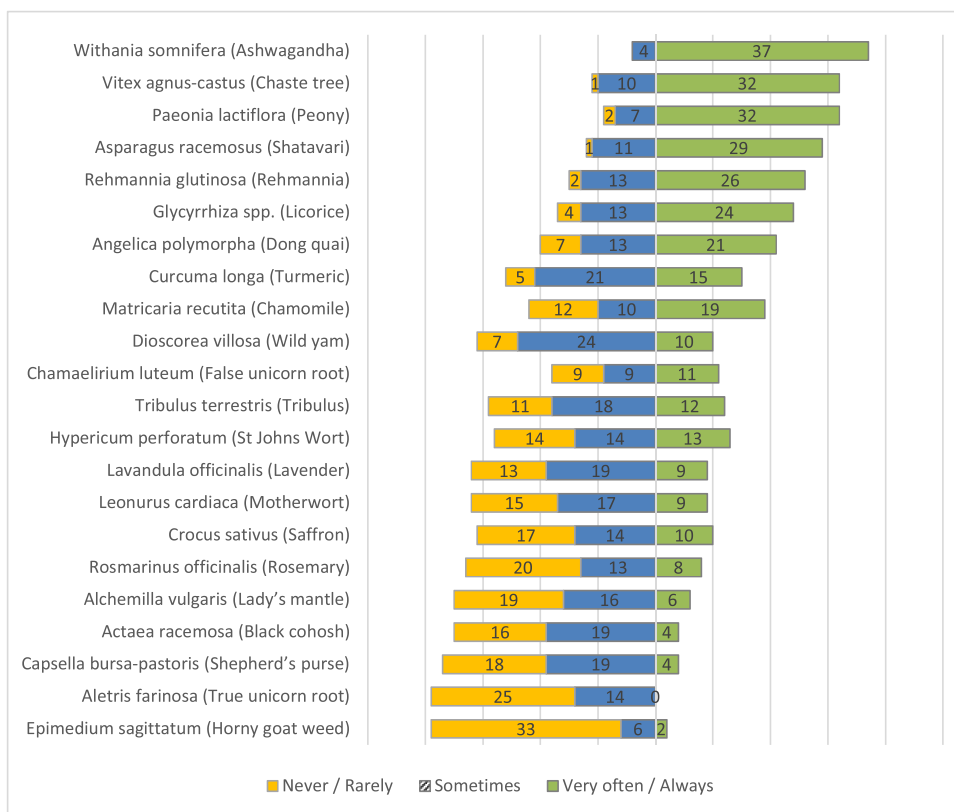


Fig. 4. Herbal medicines commonly used for women with infertility (n = 42).

5. Conclusion

This study is the first to evaluate the approach of naturopathic management for women with infertility. The findings describe clinical approaches, measurements used to assess clinical outcomes, knowledge sources, interprofessional communications, and reporting of adverse events by naturopaths. The naturopathic approach to women with infertility is characteristically holistic and vitalistic, considering physical, emotional, and environmental factors while supporting the body's natural healing mechanisms. Whilst some clinical decisions were informed by evidence, further development of knowledge in scientific methods is needed. Adverse event reporting should be strengthened with professional associations working with the TGA to increase awareness of reporting mechanisms among members. Evaluation of the effectiveness of naturopathic treatment would improve safety, inform the profession, and assess the role of naturopathy within a multidisciplinary approach to infertility.

Financial support

AM is the recipient of a scholarship from the Jacka Foundation of Natural Therapies for her PhD. The funding body had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

CRedit authorship contribution statement

Alison Maunder: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Susan Arentz:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Mike Armour:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Michael**

F Costello: Conceptualization, Writing – review & editing, Supervision. **Carolyn Ee:** Writing – review & editing, Supervision, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Alison Maunder reports financial support was provided by Jacka Foundation of Natural Therapies. The funding body had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

Authors AM, CE, SA and MA are academic researchers at NICM Health Research Institute. As a medical research institute, NICM Health Research Institute receives research grants and donations from foundations, universities, government agencies, and industry. Sponsors and donors provide untied and tied funding for work to advance the vision and mission of the Institute.

AM declares that she is a naturopathic practitioner at a clinic in Sydney, Australia. CE declares that she is the Jacka Foundation Senior Research Fellow, Chair of the RACGP Integrative Medicine Specific Interest Network (voluntary role), Program Lead of an academic integrative healthcare centre (no financial interest), and past GP Advisory Board member for Blackmores Research Institute. SA declares that she is a naturopathic practitioner at an obstetrics and gynaecology clinic in Sydney, Australia. MA declares that he is the chair of two committees for Endometriosis Australia. He works in private clinical practice at Sydney Endometriosis. CE, MA & SA have received industry funding to conduct clinical trials, and have had expenses covered for presenting at complementary medicine events all outside the submitted work. MC has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. Consent was not sought to share data on a repository.

Acknowledgements

The authors gratefully acknowledge the individual people involved as practitioner representatives and participants in the survey. Informed consent was provided with the understanding that participants will remain anonymous.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.eujim.2023.102329](https://doi.org/10.1016/j.eujim.2023.102329).

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