Suggested Foods Based on the Temperament (Mizaj) of Infertile Women: A Qualitative Content Analysis Based on Persian Medicine Texts

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Abstract

Infertility, affecting approximately 17.5% of the global adult population, is a multifaceted issue influenced by lifestyle and dietary factors. Persian Medicine (PM), as a complementary approach, emphasizes the role of individualized dietary and lifestyle modifications based on temperament (mizaj) in addressing infertility. This study aimed to identify and categorize dietary recommendations for infertile women according to their temperaments, as outlined in authoritative PM texts. A qualitative summative content analysis was conducted using eight key PM texts—including Qanun Fi Teb and Exir-e-Azam from the 9th to 18th centuries—alongside electronic databases such as Scopus, PubMed, Web of Science, and Google Scholar were searched. Foods were categorized based on four compound temperaments—cold and dry, cold and wet, warm and dry, and warm and wet—and subcategories such as fruits, vegetables, nuts, meats, and medicinal plants. The analysis highlighted the central role of warming, nutrient-dense foods in improving reproductive health, particularly for cold temperaments. Foods such as lamb, eggs, chickpeas, milk with cinnamon or ginger, and onions were frequently recommended. Conversely, cooling foods like cucumber and lettuce were advised for warm temperaments to achieve balance. The findings underscore PM's tailored dietary strategies for enhancing fertility by aligning food recommendations with individual temperaments. This approach offers a complementary pathway to modern infertility treatments by addressing underlying imbalances through personalized nutrition.

Keywords: Food; Temperament; Persian medicine; Infertility; Female

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Introduction

Infertility is defined as the inability to achieve pregnancy after one year of unprotected sexual intercourse or after six months for individuals over 40 years of age who are not using contraceptive methods [1,2]. According to a recent report by the World Health Organization (WHO), approximately 17.5% of the adult population—almost one in six worldwide—experience infertility [3,4]. Changing lifestyles and diets are among the factors contributing to infertility. Female infertility is most commonly attributed to ovarian disorders, tubal and pelvic disorders, and uterine and cervical disorders [5].

Infertility treatment varies depending on the underlying cause [2]. For women with ovulation disorders, treatment options include ovulation induction with drugs such as clomiphene, injectable gonadotropins, and aromatase inhibitors like letrozole [5]. However, the use of these drugs carries risks, including multiple pregnancies, ovarian hyperstimulation syndrome (OHSS), and a potential increase in the risk of ovarian and breast cancer [6]. Another infertility treatment involves assisted reproductive technologies (ART), where the egg is directly manipulated outside the body. The first and most common ART method is in vitro fertilization (IVF) [7], although the success rate of IVF is estimated to be about 30% [8].

Persian Medicine (PM), as a complementary medicine, can be used alongside modern medicine to address existing gaps in disease prevention and treatment [9]. Prominent figures such as Avicenna (Ibn Sina) have proposed several causes for infertility, the most significant being issues related to the ovary and the quality and quantity of its products, referred to as disorders in semen [10,11]. PM practitioners believe that semen exists in both males and females [10,12]. According to PM, semen is the product of the fourth digestion of food [13,14]. Therefore, nutrition and lifestyle modifications significantly impact the health of the body and reproductive system, as well as healthy semen production [15,16].

Traditional medical systems, such as Persian, Chinese, and Ayurvedic medicine, have emphasized individual differences and their relationship to health for thousands of years [17]. In PM, 'temperament' (*mizaj*) refers to the unique physiological and psychological characteristics of individuals. PM posits that each person has a personal temperament [18]. Temperaments are divided into four singular types (hot, cold, dry, and wet), four compound types (hot and wet, hot and dry, cold and wet, and cold and dry), and a moderate type [17,18]. PM includes dietary and lifestyle recommendations that vary based on an individual's temperament [19,20].

Based on the principles of PM, dietary and lifestyle measures differ according to a person's temperament [20,21]. Several studies have discussed suggested foods for the treatment of infertility based on PM principles [16,22-24], but these have not been categorized according to temperament. Given the significance of infertility and the

limitations and side effects often associated with conventional drug treatments, PM offers a valuable complementary approach through its emphasis on lifestyle and dietary adjustments. PM tailors lifestyle recommendations, particularly dietary advice, to individual temperaments. Currently, a gap exists in the literature regarding the classification of dietary recommendations for infertility treatment based on these individual temperaments. Therefore, this study aims to address this gap by providing dietary recommendations for infertile women, informed by Persian medical texts and categorized by temperament.

Materials and Methods

Ethics approval and consent to participate

This study was approved by the Ethics Committee in the Research Deputy of Mazandaran University of Medical Sciences (IR.MAZUMS.REC.1402.388).

This qualitative study employs summative content analysis [25] based on PM texts and electronic sources. The study consists of seven stages:

1. Research Question: The primary question of this study is how to comply with suggested dietary recommendations, according to the temperament of infertile women, to increase fertility rates. This involves extracting relevant information from authentic PM texts to help resolve infertility.

2. Selection of Sources: The most authoritative and well-known textbooks of PM from the 9th to 18th centuries were investigated. The inclusion criteria for the study were books that were sufficiently reliable and had the original Arabic text available. Additionally, the selected books focused on explaining dietary measures in the treatment of infertility. A group of PM experts and university faculty members approved these criteria and selected the books accordingly.

Eight books were selected based on these criteria. They included Qanun Fi Teb (the Canon of Medicine) [10], Zakhireh Khwarazmshahi [26], Kamel al-Sana'a al-Tebbiya [27], Exir-e-Azam [12], Kholasat Al Hekma [27], Teb-e-Akbari [28], Romouz Azam [29], Al-Mukhtar Men Al Aghzieh [30]. In addition, electronic databases such as Scopus, PubMed, Web of Science, and Google Scholar were searched. Data published prior to April 2024 were collected, and modern and traditional information was analyzed and compared.

3. Definition of Terms: In the texts of PM and Noor software, the topic of infertility causes under the headings of ' aqr ' or ' aqm ' (inability to pregnant), ' osr-al-Habal ' (difficulty getting pregnant), hefz al-seha (lifestyle modifications), and food recommendations; while in electronic databases keywords such as food, temperament, Persian Medicine, and female infertility were searched.

4. Coding: The coding process in this study follows an inductive approach, involving the extraction of codes and categories from PM texts. According to the main purpose

of the study, keywords and the order of disease classification in the therapeutic books of PM were identified. The extracted codes include 'aqr' or 'aqm' (inability to become pregnant), 'osr-al-Habal' (difficulty getting pregnant), temperament (mizaj), food recommendations, and related treatments. These codes were used to search and categorize all sources, which were then checked and identified according to the headings in the classification section. The codes were extracted using Noor software and then categorized using Microsoft OneNote.

5. Category Classification: The findings from a search of PM texts and articles reviewed in the mentioned databases are presented as recommended foods based on the temperaments of infertile women. Recommended foods for the four mixed temperaments—cold and dry, hot and dry, cold and wet, and hot and wet—in infertile women are discussed. The recommended foods for each of these four mixed temperaments fall into the following subcategories: Fruits, Vegetables, Nuts and Seeds, Meat and Legumes, and Medicinal Plants.

6. Reliability and Validity: To enhance reliability and validity of findings, the study employed methods such as data triangulation by involving multiple researchers in the analysis to cross-check findings, incorporating expert reviews, and external validation. Additionally, to boost confidence in the findings, to enhance the reliability of the coding process, a second researcher reviewed the coding and any discrepancies were discussed and resolved. The team utilized several reliable sources and references from PM to review and compare codes and labels. Following a meeting where the research team analyzed the final results, two faculty members specializing in PM, who were not part of the research team, reviewed the findings. After their reviews, a final conclusion was drawn.

7. Transfer and Presentation of Results: Considering that the results are in the medical language of ancient texts and sometimes in Arabic, for the better use of all colleagues in other medical subgroups, the concepts of PM were translated and presented in English.

Findings

Initially, the chapter on infertility was examined using the keywords "aqr," "aqm," (inability to become pregnant) and "'osr-al-Habal " (difficulty getting pregnant) in eight authoritative PM texts from the 9th to 18th centuries. Among the causes mentioned for infertility, three were related to temperament (*mizaj*): changes in the temperament or dystemperament (*sue mizaj*) of the uterus, alterations in the quantity and quality of semen due to changes in temperament, and amenorrhea caused by changes in an individual's temperament. Temperaments were described in four simple categories, four compound categories, and one balanced category.

In treating each temperament, foods and herbal medicines were mentioned, either as single herbs or combinations. In PM, as the renowned Persian physician Rhazes (Mu-

hammad ibn Zakariya al-Razi) stated in his book Al-Hawi, the basis of treating diseases is through diet. Therefore, in treating infertility and increasing the quantity and quality of semen, food plays a central role, according to PM physicians such as Hakim Azam Khan, the author of the book Exir-e-Azam.

The foodstuffs and traditional foods mentioned in these eight books were extracted according to the treatment of each temperament. Considering that most temperaments today are compound, falling into the four categories of cold and wet, cold and dry, warm and wet, and warm and dry, the focus was placed on foods specifically mentioned for treating these temperaments.

Foods included complete foods such as mutton, light poultry like partridge, wheat flour, eggs, and milk, as well as medicinal foods like fruits such as figs, grapes, pears, carrots, legumes such as chickpeas, and vegetables such as onions and leeks. To balance the foods according to each temperament, specific medicinal herbs were added in small amounts as spices or seasonings, such as ginger, cinnamon, or saffron. These were also extracted and listed according to each temperament.

The inclusion criteria included foods that were repeated in at least two of the eight books, foods that are currently consumable and accessible, and foods that were explicitly mentioned in the treatment of infertility related to the corresponding temperament. The exclusion criteria included herbal medicines, whether single or in combination, and foods mentioned in only one source.

Infertility in all eight PM texts, including "The Canon" (Qanun Fi Teb) and "Kamel al-Sana'a al-Tebbiya", a higher prevalence is observed in individuals with cold temperaments, especially those with cold and moist temperaments. All the reviewed texts emphasize consuming complete foods that are easily digestible and promote the production of healthy blood. Specifically, in texts such as "Exir-e-Azam," or "Teb-e-Akbari," it is mentioned that individuals with warm and wet temperaments do not require dietary interventions to enhance semen quantity and quality, as they naturally possess good semen characteristics; no specific dietary treatments are mentioned for them.

Generally, to increase semen production, foods with warming properties that may cause flatulence but are highly nutritious should be consumed. Chickpeas are considered particularly effective. The combination of onions with eggs and warming spices like pepper or cinnamon is also noted in most texts, notably in Ibn Sina's "The Canon of Medicine". Another key point is to incorporate foods that introduce contrasting qualities to balance each temperament. For instance, using spices such as cinnamon or ginger to counteract cold-tempered foods, and consuming foods like lettuce, pomegranate, or squash to balance warm-tempered ones.

In "the Canon of Medicine" and "Exir-e-Azam," it is suggested that combining onion juice with honey increases

semen production in individuals with cold temperaments. Additionally, the use of taranjabin, especially with milk, is recommended in "Al-Mukhtar Men Al-Aghzieh " and other books like "Exir-e-Azam" and "the Canon of Medicine" to strengthen semen in warm temperaments. Most texts, including "Teb-e-Akbari," regard mint as particularly beneficial for strengthening the uterus. "Zakhireh Khwarazmshahi" states that regular consumption of a mixture of milk and rice promotes pregnancy; while the consumption of cold water and vinegar is considered detrimental to the uterus in most texts, including "Teb-e-Akbari."

"Al-Mukhtar Men Al-Aghzieh" advises avoiding spices that dry semen, such as thyme and cumin, a point echoed in other texts like "Exir-e-Azam." For cold and dry temperaments, there is a greater emphasis on nutrient-dense foods, as highlighted in all eight PM texts recommending the consumption of lamb and well-baked bread made from wheat flour, or incorporating milk. Many texts, such as "the Canon of Medicine" or "Exir-e-Azam" suggest combining milk with ginger or cinnamon; whereas "Zakhireh Khwarazmshahi" also considers combining milk with dates beneficial.

The consumption of fruits like coconut and banana is mentioned in most PM texts, with mango also referenced in "Exir-e-Azam." When considering appropriate foods for cold and moist temperaments, the criteria are foods that are nutritious without being excessively moist, such as consuming light fowl like quail and partridge. Conversely, fruits and milk are mentioned less frequently for cold and dry temperaments. Warm and dry temperaments are advised to consume foods that are moist and cooling while providing adequate nutrition, such as combining light fowl with pomegranate seeds as a seasoning, as mentioned in " Zakhireh Khwarazmshahi". Consumption of moist and cooling fruits like cucumber, lettuce, and squash is also noted.

For warm and wet temperaments, a diet consisting of foods with moderate and cooling properties, without excessive moisture, is recommended, with emphasis on weight loss if the individual is overweight.

Finally, fertility-enhancing foods identified from PM sources are classified based on four mixed temperaments: cold and dry, cold and wet, warm and dry, and warm and wet and subcategory (fruits, vegetables, nuts and seeds, etc.)

Fertility food for cold and dry temperament
Milk with dates [26], milk with cinnamon or ginger [10,11,16,27], milk with honey [26], young chicken, partridge, pheasant [10,11,28], young rooster [10,11], lamb, shrimp [11,26,29], fish eggs [11,29], walnuts [10,11,27], almonds [11,26,30], pistachios [10,11,23], hazelnuts [10,11,23,29], poppy seeds [10,11], sesame seeds [10,29], fresh coconut kernels [10,11,23], whose nuts are powdered and combined with raisins or sugar [10,11],

asparagus [10,11], grapes [11,30], banana [11,23,29], mango [11,31], figs [11,23,30], raisins [11,29], carrots [10,11,16], melons [16,22]. Wheat sprouts, alfalfa and clover sprouts [16,22], bread with white and low-wheat flour [10,29, 30] , onions [10,11], garlic, dill, celery, tarragon [11,26,27], fenugreek [10,23], leeks, turnips, mint [10,11], beans, fava bean, chickpeas [10,11,23], assa-foetida, saffron, Cinnamon [10,11,28], piper cubeba [11,28], ginger [10,11,16], parsnip [10,28,29], sesame oil [10,11].

Fertility food for cold and wet temperament
Bananas [11,29,30], apples, sweet pomegranates, pears, mangoes [10,11], figs [11,23,30] that are consumed in dried form, meat of light-winged birds [10,11,28] such as sparrows, pigeons [11,28], chickens [10,11,28,29], partridges, pheasants [11,28,29], roosters [11], walnuts [11,29], pistachios, hazelnuts [10,11,29], fenugreek, garden cress [10,11,23], leeks, mint [10,11], garlic, dill, celery, tarragon [11,26,27], bread with white and low-wheat flour [10,29,30], chickpeas [10, 11,26,27], red beans [10,26,29], cinnamon, saffron [10,11,28], ajwain [11], ginger [10,11,28,29], parsnip [10,28,29] assa-foetida [10,11], cubeb, anise [11,28], olive oil [11,31].

Fertility food for hot and dry temperament
Cow's milk with sugar or manna of hedysarum (taranjebin) [10,11,28], goat, lamb, chicken [11,28], fish [10, 11,26], poppy seeds, watermelon seeds, pumpkin seeds [10,11], butternut squash [10,11,28], juicy fruits such as peaches and apricots [10,11], sweet pomegranate [11,26,28], watermelon [10,11], cucumber [10,11,28], spinach [11,28], purslane [10,11,28], lettuce [10,11], bread with white flour and low bran [10,29,30], sesame oil [11,26], almond oil [11,26,31]. Avoid using hot and dry spices in food preparation [11,28].

Fertility food for hot and wet temperament
Sweet pomegranate [11,23], apple [11,16], lettuce [10,11,27], dried figs [11,23,30], poppy seed powder [10,11], pistachios, hazelnuts [10,11,29], walnuts [11,29], chicken [11,26,28], partridge, pheasant, lamb [11,28], bread with whole wheat flour [10,29,30], olive oil [11,31].

Discussion
Infertility has been specifically stated in PM [10,11,26,28]. These texts divide the causes of infertility into three categories related to women, men, and common causes [11,24, 26,28]. Infertility caused in a woman is further divided into three sub-categories: disorders in a woman's "semen" (egg and its accompanying secretions), weakness, and disorders in other body organs, especially the main organs that are effective in the production of a woman's "semen" (brain, liver, heart), and female reproductive organ dysfunction (ovaries, fallopian tubes, and uterus) [11, 24,26,31].

Table 1. Recommended foods for women fertility

Temperament	Fruits	Vegetables	Nuts and seeds	Meat and legumes
Cold and dry	Coconut, grapes, figs, raisins, mangoes, melons, wheat, alfalfa and clover sprouts	Asparagus, carrots, parsnip, dill, celery, tarragon, fenugreek, leeks, turnips, mint onions, garlic,	Walnuts, almonds, pistachios, hazelnuts, poppy seeds, Sesame seeds	Chicken, partridge, lamb, pheasant, young rooster, shrimp, fish eggs, chickpeas, beans, fava bean
Cold and wet	Bananas, apples, sweet pomegranates, pears, mangoes, figs (dried form)	Fenugreek, chives, leeks, mint, garlic, dill, celery, tarragon	Walnuts, pistachios, hazelnuts	Chickens, partridges, pheasants, sparrows, pigeons, roosters, chickpeas, red beans
Hot and dry	Butternut squash, juicy fruits such as peaches and apricots, sweet pomegranate, watermelon, cucumber	Spinach, purslane, lettuce	Poppy seeds, watermelon seeds, pumpkin seeds,	Chicken, goat, lamb, fish
Hot and wet	Sweet pomegranate, apple, dried figs	Lettuce, carrot	Poppy seed, pistachios, hazelnuts, walnuts	Chicken, partridge, lamb, pheasant

One of the most important factors leading to disorders in the female reproductive organs and causing infertility is the temperament (*mizaj*) of the uterus and ovaries, and the change in the quality of the ovum resulting from this imbalance (*sue mizaj*). Among the nine types of temperaments (*mizaj*) mentioned, four are mixed and include cold and wet, hot and wet, cold and dry, and hot and dry [10,11,24,26,30,32]. Meanwhile, infertility due to the prevalence of cold and wet is more treatable [10,33]. Cold and wet temperament is also associated with polycystic ovary syndrome in infertile women [33-35].

In the texts of PM, the treatment and prevention of diseases first requires observing the principles under the title of "*hefz al-seha*" (lifestyle modification) and related measures [10,36]. Nutrition has a special place among these principles [22,23]. The authentic texts of PM suggest specific foods in the treatment of infertility related to temperament [11,28]. In PM, the treatment of infertility with food is emphasized [10,11,16].

Several factors limit the effectiveness of dietary recommendations for fertility enhancement mentioned in PM, known as confounding factors. Overall diet or general dietary habits of an individual can significantly influence fertility outcomes. Environmental factors, such as stress levels and physical activity play a crucial role in fertility and may overshadow the effects of specific dietary interventions. Genetic factors can impact fertility and reduce the efficacy of dietary recommendations [15]. Medical conditions, such as polycystic ovary syndrome (PCOS) [37], thyroid disorders [38], or endometriosis [39] contribute to infertility and often require medical interventions alongside lifestyle modifications [40].

A noteworthy point in the review of food products, as stated by Aghili Khorasani in the Kholase al-Hekmah and Ibn Nafis Qarshi in Al-mukhtar men al-Aghzieh, and in the authentic texts of PM, is that absolute food, medicinal foods, and food medicines are suggested to strengthen "semen" and fertility. These include foods that are easily digested and produce good blood, such as well-cooked wheat bread, one-year-old lamb, poultry such as partridges and chickens, grapes, and figs [29,36]. Modern medicine also uses food to treat and improve fertility, and many studies have investigated the effect of food on the treatment of infertility. This aligns traditional medicine, which is several thousand years old, with modern medicine [41-44].

As in PM, consumption of wheat bread, cow's milk, legumes such as peas, seafood such as fish, shrimp, and fish eggs, birds and chicken, egg yolk, vegetables and fruits such as lettuce, carrots, spinach, asparagus, fig, banana, mango, nuts and seeds, olive oil, sesame, and sweet almonds are effective for increasing fertility and increasing the quality and quantity of oocytes [10,11,16,23]. In modern medicine and popular medicine, the consumption of whole grains, seafood, milk, vegetables, and chicken, and the Mediterranean diet are also recommended, as they are known to be effective in fertility [42,44-46].

Paying attention to the balance between a person's temperament and the temperament of food is very important in fertility [10,24,33]. For example, in the treatment of heat and dryness of the uterus, special emphasis is placed on the consumption of lettuce, pumpkin, and cucumber, which have a cold and moist temperament and are easily digested [11,28]. It is important to pay attention to the nutritional value of food as one of the factors to strengthen "semen," especially in cases of cold and dry temperament

of the reproductive organs (uterus and ovaries), which is related to premature ovarian failure. In these cases, high-nutrition foods such as peas, egg yolk, milk, and lamb should be used [11,29].

Today, the use of nutritional supplements is effective for the treatment of infertility, the most important of which are folate and omega-3 [47,48]. The foods recommended for fertility in PM, in addition to being rich in folate, such as egg yolk [49], asparagus [50], chickpeas [51], and nuts [52], have other vitamins and minerals effective in fertility [16], which are easier and more accessible to consume as food compared to pharmaceutical supplements.

Most of the treatment recommendations mentioned in the texts for the treatment of genital dystemperament are based on food, with the addition of medicine to moderate and strengthen it, such as adding warming spices (*mosakhen*) to foods for patients with a cold and dry uterus, like consuming milk with cinnamon. Rhazes confirms this statement, saying that the main treatment is food [10,11,53]. Currently, in modern medicine, herbal medicines such as ginger, cinnamon, and mint are used in the treatment of infertility [54-57].

In the review of the studies conducted so far, some studies have dealt with the etiology and explanation of the causes of infertility in women based on PM texts, but they have not focused on the classification of food items according to the temperament of infertile women [24,32]. Another study has provided the recommended foods in the treatment of female infertility based on the texts of PM in the form of meals, but it has not been stated in the form of separate food packages according to the temperament [16,22].

Studies examining historical texts, especially those pertaining to PM, are susceptible to biases and errors in areas like source selection, transcription, or the interpretation of historical terminology, which can compromise the results and conclusions.

To mitigate bias, this study employed triangulation methods, with multiple researchers cross-referencing findings. Expert reviews and external validation were implemented to bolster reliability. Discrepancies in coding were resolved through collaboration among researchers; however, due to the unavoidable constraints of working with historical sources and translations, these issues cannot be entirely eradicated.

Table 2. Recommended Medical plants for women fertility

Cold and dry temperament	Cinnamon, saffron, ginger, parsnip, assa-foetida, cubeb
Cold and wet temperament	cinnamon, saffron, ginger, parsnip, assa-foetida, cubeb, anise, ajwain

Conclusion

This study reviews previous research on female infertility and examines reliable PM sources to identify fertility-enhancing foods suited to women's temperaments. A healthy lifestyle, especially a diet tailored to individual characteristics, is essential for preventing and treating many diseases, including infertility. To validate the findings and treatments described in PM texts, clinical trials are necessary. These trials should investigate the effects of nutrition on female infertility based on temperament and PM; while controlling for confounding factors.

It is suggested that clinical trial studies be conducted on the treatment of diseases, including infertility, based on dietary recommendations given in traditional medicine texts, including PM. This would allow the therapeutic aspects of this holistic medicine, which is several thousand years old, to become more visible and help bridge the gaps in conventional medicine.

Conflict of Interests

None.

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