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Role of seed cycling diet during menstrual dysfunction

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Abstract

The seed cycling diet has gained popularity as a potential solution for female menstrual dysfunctions, including irregular menstruation, menstrual cramps, infertility, and menopausal symptoms like hot flashes and fatigue. The increased occurrence of hormonal imbalance in women plays a role in the development of these menstrual dysfunctions. Menstruation in females is regulated by several key hormones, including progesterone, estrogen, luteinizing hormone (LH), and follicular stimulating hormone (FSH). When these hormones are not properly balanced, it can lead to a range of menstrual issues. Consuming certain seeds during different phases of the menstrual cycle (follicular and luteal) to support hormonal balance in women is referred to as the seed rotation diet for optimal nutrition, it is recommended to include pumpkin seed and flax seed in your diet during the follicular stage. Similarly, during the luteal stage, incorporating sunflower seed and sesame seed into your meals is advised. Multiple studies have demonstrated the efficacy and notable outcomes of utilizing the seed cycling approach in individuals with PCOS. It helps to balance hormonal levels in women, leading to a healthier lifestyle. Research has shown that seed therapy can lead to a significant decrease in BMI and an improvement in the menstrual cycle. The consumption of fenugreek seed has been shown to be beneficial in reducing the severity of pain and systemic symptoms associated with dysmenorrhea, including fatigue, headache, nausea, vomiting, lack of energy, and syncope. The fenugreek group did not report any side effects.

Keywords: Seed, menstruation, dysfunctions, infertility, progesterone, headache

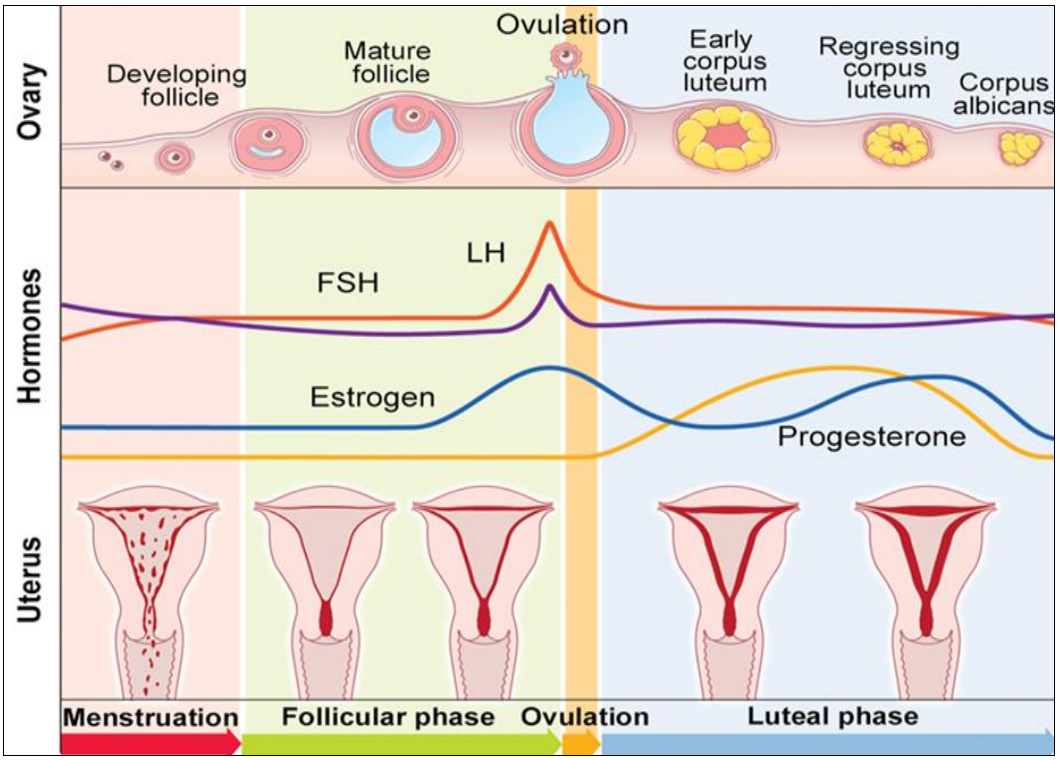
Introduction

Menstrual dysfunctions pose significant challenges for women worldwide, greatly impacting their daily lives throughout their reproductive years and even after menopause. It is common for young women in their late teens and early twenties to experience menstrual irregularities. One of the most frequently observed patterns is the irregularity of periods, which is characterized by varying cycle lengths, unpredictable ovulation, and fluctuating flow volume. These changes in flow volume are dependent on whether ovulation occurred during that particular (Adams *et al.* 2002) [3]. There are several common menstrual dysfunctions that women may experience, such as premenstrual syndrome (PMS), dysmenorrhea, amenorrhea, hypo-menorrhea, menorrhagia, poly-menorrhea and oligomenorrhea (Ekpenyong CE *et al.* 2011) [1]. Menstrual disorders are common gynecological conditions that are widely acknowledged, particularly among adolescents. Infertility and polycystic ovarian syndrome (PCOS) are currently two major challenges being addressed. The body coordinates a complex array of hormonal and physiological alterations throughout the menstrual cycle. The process commences when the brain stimulates the secretion of specific hormones that promote the growth and maturation of eggs within the ovaries. An mature egg is discharged from the ovary in response to the hormonal stimulus, and it travels through the fallopian tube and into the uterus. Menstruation is the physiological process by which the endometrial lining, which is abundant in blood, is discharged through the vaginal opening when fertilization does not occur.

Menstrual cycle

During a woman's reproductive years, there are regular monthly changes that take place in the lining of the uterus, resulting in vaginal bleeding. The menstrual cycle typically spans duration of 28 days and is divided into three distinct phases: menstrual, proliferative (follicular), and luteal (secretory).

Phases of Menstrual cycle



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During the menstrual phase, which signifies the start of the cycle, the endometrial lining is shed, leading to menstrual bleeding. During this phase, the body experiences a decline in estrogen and progesterone levels, which occurs around 24 hours prior to the start of menstruation. After menstruation, the proliferative phase starts due to the effects of estrogen. In this phase, the lining of the uterus thickens and develops an increased blood supply in anticipation of the possible attachment of a fertilized egg. Following this, the secretory phase begins, marked by a rise in the secretion of progesterone and estrogen. The hormones play a crucial role in stimulating the endometrium, preparing it for embryo implantation. They promote glandular secretion and create a supportive environment. When fertilization doesn't happen, hormone levels drop as the cycle comes to an end. This causes the shedding of the endometrial lining and marks the beginning of a new menstrual cycle (Barrett *et al.* 2012) [4].

Different common types of menstrual dysfunctions (Karki *et al.* 2017) [5]

Sl. No	Menstrual Dysfunctions	Characteristics
1.	Dysmenorrhea	Discomfort ranging from mild to intense typically experienced just before or at the beginning of menstrual bleeding.
2.	Amenorrhea	Absence of menstruation for three months or longer.
3.	Hypo-menorrhea	Limited blood flow or shortened duration (less than two days).
4.	Hyper-menorrhea	Bleeding more than eight days.
5.	Irregularity	Menstrual cycle duration less than 22 days or more than 35 days.
6.	Premenstrual syndrome	Headaches, bloating, stress, and anxiety.
7.	Metrorrhagia	Bleeding that occurs between menstrual periods.
8.	Menometrorrhagia	Bleeding that persists for an extended period and is more than usual
9.	Polymenorrhea	The menstrual cycle is shorter than 21 days.
10.	Oligomenorrhea	The menstrual cycle is more than 35 days.
11.	Mastalgia	Breast tenderness or soreness occurring just before or during menstruation

Seed cycling

Seed cycling, a dietary approach that has gained attention focuses on improving hormonal balance, reproductive health, and managing menstrual irregularities in women during their reproductive years or transitioning into menopause. This diet plan incorporates the consistent intake of particular seeds like flaxseeds, pumpkin seeds, sesame seeds, and sunflower seeds, strategically timed based on different phases of the menstrual cycle. The nutrients and bioactive compounds found in these seeds have the potential to impact hormone production and metabolism, which may lead to more regular menstrual cycles and improved reproductive well-being. Advocates aim to maximize the benefits of certain seeds by aligning their consumption with the natural hormonal changes that happen during the menstrual cycle. This approach is believed to promote hormonal balance and enhance female reproductive function (Lestari *et al.* 2018) [9].

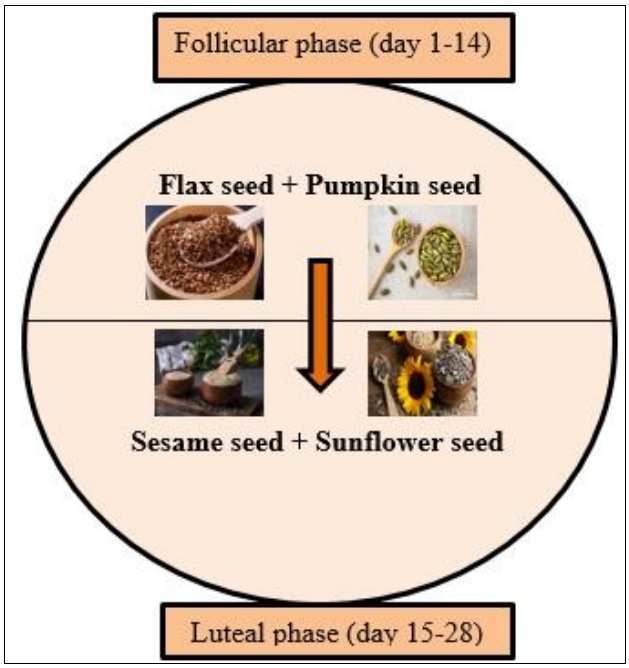
Flaxseed

Flaxseed, scientifically known as *Linum usitatissimum* L., is gaining significance in the manufacturing of functional foods. It has a high concentration of bioactive compounds such as lignans, polyphenols, omega-3 fatty acids, alpha-linolenic acid (ALA), and dietary fiber (Sharma *et al.* 2021) [10]. A variety of foods, including cereals, vegetables, tea, coffee, chocolate, seeds, and homemade beverages, are rich in polyphenols (Noreen *et al.* 2023) [11]. In addition, fiber is gaining popularity for its ability to alleviate the symptoms of polycystic ovarian syndrome (PCOS) (Aslam *et al.* 2021) [12]. Many different components of flaxseed have been extensively studied for their ability to prevent and treat various illnesses and non-communicable diseases (NCDs). These include dyslipidemia, obesity, diabetes mellitus, kidney and renal disorders, irritable bowel syndrome, immune system support, different types of cancers, atherosclerosis, arthritis, osteoporosis, autoimmune disorders, and neurological problems (Matar *et al.* 2021) [13]. Along with the benefits of reducing cholesterol levels, incorporating a high-fiber diet and promoting weight loss may have a positive impact on insulin resistance. This is significant because insulin resistance is associated with the development of type 2 diabetes mellitus and its related consequences (Aslam *et al.* 2021) [12]. Flaxseed is a valuable nutritional component due to its significant amounts of lignans, proteins, dietary fiber, and ALA omega-3 fatty acids.

Nutritional composition of Flaxseed

Flaxseeds are well acknowledged as a nutritional powerhouse, containing an abundance of high-quality components that are helpful for health. Bioprocessing techniques have been used to improve the availability of important components, including carbohydrates, dietary fiber, proteins, and healthy fats, particularly polyunsaturated fatty acids (PUFA) like alpha-linolenic acid. Flaxseed generally consists of about 42% fat, 18-20% protein, 28% dietary fiber, 7.7% moisture, and 3-4% ash. Flaxseed oil contains roughly 73% polyunsaturated fatty acids (PUFA), which comprise up 35-45% of the seed's total weight. In contrast, saturated fatty acids such as palmitic and stearic acids are less abundant, accounting for around 9-10% (Sharma *et al.* 2021) [10].

Phases of seed cycling



Role of flaxseed

Flaxseed enhances the duration of the luteal phase, enhances ovulation, and alleviates common premenstrual syndrome (PMS) symptoms like cyclic breast pain (mastalgia), cramps, and monthly abnormalities, due to its unique lignin component (Oner *et al.* 2013) [14]. Mastalgia commonly occurs during the latter part of the luteal phase and before menstruation. It is characterized by high levels of estrogen, low levels of progesterone, and higher amounts of prolactin. Hence, it is recommended to incorporate flaxseed into the diet on the first to the fourteenth day of the menstrual cycle as a component of a seed cycling program (Kataria *et al.* 2014) [15].

Pumpkin seed

The pumpkin, scientifically known as *Cucurbita maxima* L., has been a widely consumed food for many centuries across the globe. Pumpkin seeds are highly prized and widely enjoyed in Arabian countries, typically prepared by roasting and adding salt for flavor (Alfawaz, 2004) [16].

Nutritional composition of Pumpkin seed

Pumpkin seeds contain a high amount of proteins. The analysis of the nutrient and oil composition of pumpkin seed kernels reveals that they have a crude protein content of 39.25%, crude oil content of 27.83%, crude fiber content of 4.59%, and crude fiber content of 16.84%. The percentages for the kernels were 39.22%, 43.69%, 5.14%, and 2.13%, respectively (Alfawaz, 2004) [16]. Pumpkin seeds also contain various minerals including zinc, copper, phosphorus, potassium, and magnesium (Alfawaz, 2004) [16]. They have a high potassium content, comparable to that of

pumpkin pulp (5790 mg/kg), and are a great source of magnesium. The concentration of iron is lower at 106 mg/kg, while zinc is present at 113 mg/kg and calcium at 346 mg/kg. The potassium content of pumpkin seed flour was found to be remarkably high, measuring at 982 mg per 100 g.

Role of Pumpkin seed

Pumpkin seeds are rich in phytoestrogens and minerals like zinc, magnesium, copper, manganese, iron, and phosphorus (Datta *et al*. 2019) [17]. Pumpkin seeds contain a significant amount of zinc, which is crucial for the development of the corpus luteum in the uterus. This is important for the production of progesterone and the thickening of the uterus, which prepares it for potential implantation (Tian *et al.* 2012) [18]. The substantial amount of zinc present in this supports the body's need for progesterone during the menstrual cycle, thereby aiding in the natural increase of progesterone levels (Bartosz *et al.* 2019) [19].

Sesame seed

Sesame, scientifically known as *Sesamum indicum* L., belongs to the Pedaliaceae family and is one of the most ancient oilseed crops in the world. It is grown in nations such as China, Burma, India, and Sudan. Sudan holds the position of being the third-largest producer and the foremost exporter on a global scale. The predominant cultivars are white and brown sesame seeds. Sesame is becoming more widely acknowledged for its exceptional protein content and edible oil, making it an essential element of human diet. Although a considerable proportion of sesame seeds are utilized for the purpose of extracting oil, the remaining seeds are consumed in their original form. Sesame oil, known for its exceptional taste, is considered the second most nutritious oil after olive oil. Sesame plants are widely recognized for their economic, nutritional, and therapeutic importance as oilseed crops. They generate a range of bioactive compounds, particularly lignans and free fatty acids, which have been extensively researched for their positive effects on health.

Nutritional composition of Sesame seed

Sesame seeds are known for their impressive nutritional composition, which is packed with essential nutrients. Sesame seeds provide a valuable protein source that aids in tissue building and repair. They are also rich in healthy fats, particularly unsaturated fats, which promote heart health (Saeed *et al*. 2015) [20]. These minerals are essential for important bodily functions like maintaining strong bones, supporting energy metabolism, and boosting the immune system. In addition to their nutritional value, sesame seeds contain a variety of vitamins, including vitamin B6, niacin, and vitamin E. These vitamins serve as antioxidants and contribute to maintaining good health (El Khier *et al.* 2008) [21].

Role of Sesame seed

Sesame seeds are rich in omega-3 and omega-6 fatty acids, as well as vitamin E. These nutrients play a role in enhancing hormone production and follicle function. Additionally, the presence of zinc in sesame seeds strengthens the corpus luteum in the uterus. This gland produces progesterone and promotes the thickening of the uterus, preparing it for potential pregnancy (Tian *et al.* 2012) [18]. Furthermore, sesame seeds contain lignans, similar to flax seeds and pumpkin seeds, which help regulate estrogen levels during the luteal phase (Habib *et al.* 1980) [22].

Sunflower seed

The sunflower (*Helianthus annuus* L.,) is one of the most important oilseed crops in the world, producing almost as much oil as soybeans combined. For the appropriate design of equipment for handling, conveying, separation, dehulling, drying, mechanical expression of oil, storage, and other processes, a few physical characteristics of this seed (Kachru *et al*. 1994) [28].

Nutritional composition of Sunflower seed

Sunflower seeds are abundant in minerals, B-group vitamins, and vital amino acids like lysine, methionine, cysteine, and tryptophan. Additionally, they demonstrate potent antioxidant characteristics, rendering them exceptionally appropriate for human ingestion. In addition, sunflower seeds include anti-nutrients such as saponins, arginase inhibitors, and protease inhibitors.

Role of Sunflower seed

Sunflower seeds are rich in selenium and vitamin E, which enhance progesterone levels during the second menstrual cycle, reduce symptoms of premenstrual syndrome (PMS), and promote regular and healthy menstrual periods by preventing excessive bleeding or clotting. In addition, sunflower seeds possess anti-obesity characteristics. It is advisable to consume sunflower extract in order to raise body weight, decrease fat mass, and improve lipid profile.

Sunflower seeds are a rich source of vitamin E and important minerals like calcium, iron, magnesium, phosphorus, potassium, sodium, zinc, copper, manganese, and selenium (Nandha *et al.* 2014) [24]. Vitamin E and selenium are essential for maintaining menstrual health when adhering to a seed cycling diet. Selenium facilitates the process of eliminating estrogen from the liver (Hodges *et al.* 2015) [25], Helping to regulate hormone levels during the luteal phase by assisting in the binding of excess estrogen as progesterone levels rise and estrogen levels decline (Lee *et al.* 2005) [26]. Additionally, vitamin E, a crucial nutrient found in sunflower seeds, can help relieve symptoms associated with PMS (Dadkhah *et al.* 2016) [27].

Conclusion

Seed cycling is a method that involves incorporating certain seeds into your diet at different times throughout your menstrual cycle. The goal is to help regulate hormone levels and provide relief from symptoms like irregular periods, PMS, and menstrual cramps. Seeds such as flaxseeds, pumpkin seeds, sesame seeds, and sunflower seeds are rich in nutrients that can help maintain hormone balance and support menstrual health. These seeds are packed with a wide range of beneficial nutrients, including lignan, phytoestrogen, antioxidants, omega-3 and omega-6 fatty acids, protein, carbohydrates, fiber, and various essential minerals such as calcium, sodium, manganese, iron, zinc, and copper.

Seed cycling has shown promising results in improving the regularity of menstrual cycles and promoting hormonal balance. It has been found to have a positive impact on reducing testosterone, estrogen, LH, and insulin levels, which in turn supports follicular maturation and helps reduce ovarian volume through its anti-inflammatory properties.

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