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A Review On Emerging Potential Benefits Of Pumpkin Seed, Flax Seed , Sunflower Seed , Sesame Seed And Cinnamon In Management Of Hormonal Imbalance.

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Abstract: This review examines the emerging potential benefits of pumpkin seeds, flax seeds, sunflower seeds, sesame seeds, and cinnamon in managing hormonal imbalances. Hormonal imbalances are linked to various health issues, particularly in women, including menstrual disorders, obesity, and mood disturbances. The seeds and spice discussed in this review are rich in bioactive compounds such as phytoestrogens, antioxidants, and essential fatty acids, which have been shown to positively influence hormone regulation. The review also highlights the pharmacological properties of these natural products, emphasizing their roles in antiinflammatory, anti-cancer, and metabolic regulatory effects. Additionally, lifestyle factors affecting hormonal health, including nutrition, physical activity, sleep, and stress, are explored. Overall, the study underscores the importance of these seeds and cinnamon as complementary agents for maintaining hormonal balance and addressing related disorders.

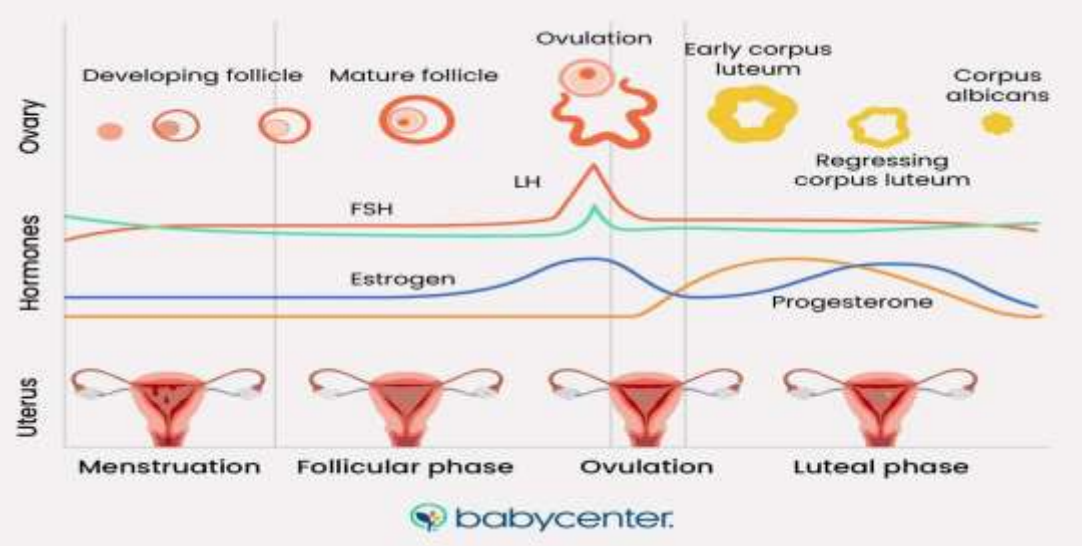
1. INTRODUCTION:

1.1. Menstrual cycle:

The menstrual cycle is the monthly series of physiological changes that occur in females.It is a natural biological process that prepares a woman's body for pregnancy. It typically lasts about 28 days, though it can vary between individuals, ranging from 21 to 35 days. [1]The cycle is divided into several phases, each characterized by specific hormonal changes and physiological events.

Menstrual cycle were used to divide in phases that is late luteal (days 25-28), mid-luteal (days 21-24), early luteal (days 17-20), per ovulatory (days 14-16), menstrual (days 14-16), early follicular (days 4 days postmenstrual), and late follicular (days between early follicular and per ovulatory). [2]

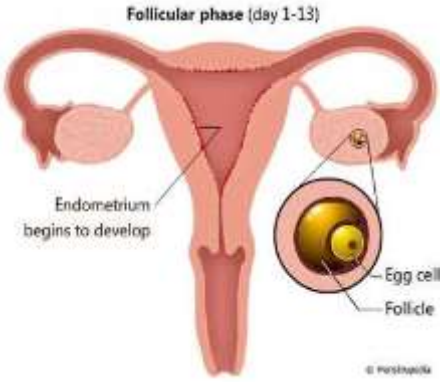
Phases of the Menstrual Cycle:



• Menstrual Phase (Day 1-5)[3]

This phase starts on the first day of menstruation (the period), where the thickened lining of the uterus (endometrium) is shed through the vagina if pregnancy has not occurred. This shedding consists of blood, mucus, and tissue from the uterus.
Hormones: Estrogen and progesterone levels are low, triggering the shedding of the uterine lining.

• Follicular Phase (Day 1-13):[4]



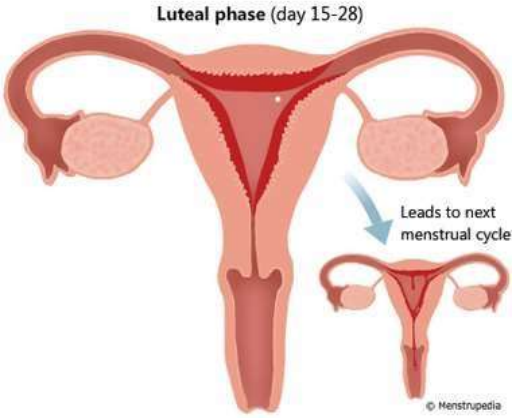
Overlaps with the menstrual phase initially, but continues after menstruation ends. The pituitary gland in the brain releases Follicle Stimulating Hormone (FSH), which stimulates the ovaries to produce around 5 to 20 small sacs called follicles. Each follicle contains an immature egg.
Dominant Follicle: By the end of this phase, one follicle becomes dominant, and the rest are reabsorbed. The dominant follicle continues to mature.
Hormones: Estrogen levels begin to rise, helping to thicken the uterine lining (endometrium) to prepare for possible pregnancy.

• Ovulation Phase (Day 14)[3]

The surge in Luteinizing Hormone (LH), triggered by the increase in estrogen, causes the dominant follicle to release a mature egg from the ovary. This is called ovulation.

Timing: Ovulation usually occurs around the middle of the menstrual cycle, around day 14 in a 28-day cycle, though it can vary.
Hormones: Estrogen peaks just before ovulation, and LH surges to cause the egg's release.

- Luteal Phase (Day 15-28)[4]



After the egg is released, the empty follicle transforms into a structure called the corpus luteum, which produces progesterone. Progesterone helps to maintain the thickened uterine lining, creating a supportive environment for a fertilized egg.
Possible Fertilization: If the egg is fertilized by sperm, it will implant in the uterine lining, leading to pregnancy.
No Fertilization: If the egg is not fertilized, the corpus luteum breaks down, leading to a drop in progesterone and estrogen levels. This hormonal drop causes the uterine lining to shed, beginning a new menstrual cycle.

1.2. Introduction to Hormones:
Hormone is an organic material generated by both plants and animals that helps to maintain homeostasis and regulate physiological processes. The way that hormones work is by triggering reactions in certain organs or tissues that have been trained to react to minuscule amounts of the hormone. [5]
The menstrual cycle is a complex process regulated by a finely tuned interplay of hormones.[1] These hormones are produced by the hypothalamus, pituitary gland, and ovaries, and they work together to prepare the body for potential pregnancy.[1] The cycle typically lasts around 28 days, but can vary from person to person. The main hormones involved in menstruation are estragon, progesterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH). [6]

1. Follicle-Stimulating Hormone (FSH) [7]
- Produced by: Pituitary Gland.
- Role: FSH is responsible for stimulating the growth of ovarian follicles in the first half of the menstrual cycle. Each follicle contains an egg, and as FSH levels rise, one of these follicles matures into a dominant follicle, ready for ovulation.

2. Luteinizing Hormone (LH) [7]
- Produced by: Pituitary Gland.
- Role: LH works in tandem with FSH to ensure the proper development of the follicles. A surge in LH levels triggers ovulation, the process by which the mature egg is released from the ovary around the middle of the cycle.

3. Estrogen [7]
- Produced by: Ovaries.
- Role: Estrogen is crucial for building up the uterine lining (endometrium) during the first half of the menstrual cycle. As the follicles develop, they secrete increasing amounts of estrogen, which helps prepare the uterus for a potential pregnancy. Estrogen also plays a role in the regulation of FSH and LH through feedback mechanisms.

4. Progesterone [7]
- Produced by: Corpus Luteum (the remnant of the follicle after ovulation)
- Role: After ovulation, progesterone levels rise, helping to further thicken and maintain the uterine lining. This hormone is essential for supporting a potential pregnancy. If pregnancy does not occur, progesterone levels fall, leading to the shedding of the uterine lining and the onset of menstruation.

1.3. Lifestyle to maintain Hormonal health:
Obesity is a complex issue with several underlying causes, such as hormone imbalances, sedentary lifestyles, heredity, and excessive food consumption. Given that obesity is seen as a complex issue, this research suggests a number of lifestyle modifications that can help people lose weight even when they are not following a rigid diet. These lifestyle determinants include meal frequency, activity, sleep patterns, and the macronutrient makeup of meals as well as psychological stress. [8]
1.3.1Macronutrient Composition of Meals: The majority of current research on the effects of eating meals with different macronutrient ratios has been on the impacts of the postprandial ghrelin and insulin response. Meal compositions that change in terms of fat, protein, and carbs influence satiety, appetite control, and ghrelin suppression. In one study, ghrelin suppression was reduced after 30 minutes after ingestion of high-fat meals (71% energy from fat) as opposed to high-carbohydrate meals (88% energy from carbs) with equivalent caloric load. [9, 10]

1.3.2 Meal Frequency: Meal frequency may contribute to weight control without necessarily lowering calorie intake. According to Solomon et al., caloric intake is influenced by food density, overall energy consumption, and meal frequency. However, feeding frequency has received less empirical investigation. [11] That nutrient-dense and low-calorie diets are gaining popularity for weight control and health benefits. The impact of meal frequency on outcomes remains unclear. As the general people would suggest three meals every day are crucial. [12]

1.3.3 Exercise: Researchers have looked into how total plasma ghrelin reacts to exercise sessions in rats, horses, and people. [13, 14, 15] Studies on people have shown inconsistent amounts of ghrelin after short bursts of exercise. More precisely, in healthy, physically fit persons, ghrelin concentrations did not change throughout a single hour of treadmill running at 73.5% VO2max, [16, 17, 18, 19] nor did they change during demanding running at progressively higher intensities in endurance athletes and healthy volunteers. Acute progressive exercise and moderate-intensity resistance training including both eccentric and concentric contractions have been demonstrated to lower ghrelin concentrations in healthy males. [20, 21]

1.3.4 Sleep: Sleep time is a factor in weight control that is frequently disregarded. A negative correlation between the amount of sleep and body mass have been documented in adult and adolescent populations across many cultural contexts. This conclusion should make sense because metabolism, endocrinology, and circadian rhythms are closely related. [22, 23, 24, 25]
Studies with strict controls have shown how long people sleep affects their levels of leptin. Leptin levels in healthy individuals typically reach their peak between midnight and early morning, while their lowest point occurs between lunchtime and midafternoon.As a result, the 24-hour cycle's apex happens during the dark phase and its nadir during the bright phase. According to Sinha et al., the purpose of this nocturnal rise in leptin is to reduce hunger when you're supposed to be sleeping. Fascinatingly, it has been demonstrated that adjustments to the light/dark cycle and meal time affect plasma leptin levels. [26, 27]

1.3.5 Psychological Stress: Psychological stress is another element that might lead to weight gain and obesity. An increase in perceived stress is likely to have an impact on eating habits. In reality, according to a recent study, 40% of individuals eat more food, 40% eat less food, and 20% of people do not change their eating habits when under stress. Those receiving an exogenous glucocorticoid consumed substantially more food during the day than those receiving a placebo alone. Furthermore, some people may select comfort meals, foods heavier in fat and sugar when under a lot of stress. Eating these comfort foods is believed to elevate mood and reduce stress through opioidergic and dopaminergic neurotransmission. [28, 29, 30]

1.4. Risk factor: Hormones are chemical messengers or chemicals that are necessary for the body's numerous metabolic processes and are generated by the endocrine glands. Hormones are necessary for growth, pregnancy, sleep, and stress management in children and adults. Hormone imbalances may cause a great deal of complications that can ruin a person's life. Hormone imbalance is a silent killer that is becoming more and more common not only in India but all throughout the world. In today's rapidly expanding society, man is more prone to irritation, tension, restlessness, mood swings, rage, sadness, intolerance, and abruptness in conduct due to privatization, modernization, globalization, intense agricultural advances, overpopulation, and unemployment. A hormone imbalance has been exacerbated by all of these symptoms. These effects increase as one ages and become more pronounced and difficult to treat. [31, 32, 33]
Compared to males, women are more likely to experience these inequalities. Hormone secretion changes become more noticeable during menstruation, pregnancy, and menopause. Hormone synthesis and secretion can occasionally be disrupted and interfered with by medications used to treat specific diseases. The current study's goal is to examine the indications and symptoms of female hormone imbalance. Hormone imbalance in women has several risk factors as well as symptoms. Women who have high levels of free estrogen (hyperestrogenism) have

been linked to breast cancer, infertility, eating disorders, premenstrual syndrome, endometriosis, uterine fibroids, monthly disturbances and problems such cramping and excessive bleeding, as well as early menarche.[34,35]

Hormone imbalance, stress and sleep: Determining whether hormone imbalances induce insomnia or sleep deprivation is a challenging task. Typically, women report higher rates of sleep disorders than men do since they typically sleep more than men do during most life stages. Two times as many women as men experience sleeplessness. Sleep is closely related to the hormone estrogen. Any variation in estrogen levels brought on by physical stress, such as excessive exercise, low-fat or low-carb diets, underreacting or fasting, and drastic weight reduction, can cause anxiety, restlessness, and disturbed sleep. By changing the ovulation cycle, sleep disturbances have an impact on fertility. Hormones generated from adipocytes, such as leptin, are linked to both fertility and sleep.

Hormone disturbance, weight gain and weight loss: It is well known that thyroid hormones control the body's basal metabolic rate. Numerous physiological alterations may result from either a drop (hypothyroidism) or an increase (hyperthyroidism) in the secretion levels. Hypothyroidism cause weight gain, sadness, hair loss, low energy, constipation, dry skin and cold intolerance. Weight loss, constant body warmth from an elevated metabolism, high energy levels, and diarrhoea are all symptoms of hyperthyroidism. [36, 37, 38, 39] Weak cortisol levels also contribute to weight gain. They are linked to the dominance of estrogen. Inflammation, bone matrix deposition, muscle growth, mood and mental clarity, stamina, sex drive, and sleep cycles are all regulated by cortisol. Stress causes cortisol levels to rise and fall, which in turn causes abnormalities in insulin and blood sugar, food cravings, and inhibition of thyroid activity. This results in a decline in metabolic activities and therefore weight gain. [40, 41, 42]

Hormone imbalance and depression : According to reports, sufficient amounts of estrogen are required to raise and sustain serotonin levels, which are a neurotransmitter that can help avoid sadness, migraines, irritability, bloating, and mood swings.[43,44] Reduced serotonin concentration brought on by a drop in estrogen levels may cause depression, anxiety, and insomnia. By reducing serotonin breakdown and changing the mRNA and protein levels of different serotonin indicators, estrogen treatment is said to boost serotonin availability.[45,46] These impacts might directly affect female mood disorders, including depression during pregnancy, the postpartum period, and the menopausal transition, as well as premenstrual disorders.[47]

2. DETAIL PLANT STUDIES:

2.1 PUMPKIN SEED:

2.1.1 Taxonomical classification:

Kingdom	Plantae
Division	Magnoliopyta
Class	Magnoliopsida
Order	Cucurbitales
Family	Cucurbitaceae
Genus	Cucurbita
Species	C.pepo,C.maxima,C.Moschata

2.1.2 Vernacular Name of pumpkin seed:

Sanskrit: Kusmandaka
Hindi: Kaddu
English: Pumpkin
Gujarati: Bhopala Biya

2.1.3 Geographical distribution:

Worldwide, more than 3 million hectares of pumpkins are grown, producing more than 27 million tons of the crop. With a yearly production rate of 58%, China is the world's largest pumpkin grower. Approximately 5 million metric

tons of pumpkins, weighing 8 to 10 kg on average, are produced annually in India's 45,000 hectares of pumpkin agriculture. For the majority of kinds, summer and rainy seasons are also India's primary growing seasons; however, the winter varieties are grown in the country's southern and western regions during the winter. The output of pumpkins has grown by 5000 hectares in 2018 compared to the previous two decades, according to a research done. When the Maha season is upon Sri Lanka.
[48]
Globally, 24.62 million metric tons of pumpkin, squash, and gourds are produced from 5,10,0000 hectares of land; in India, the total output is 49, 00,000 tons from 45,000 ha of land. Fruits may weigh anything from 8 to 10 kg on average, and occasionally even up to 20 kg. One of the wealthy is pumpkin. Sources of phytonutrients and an important source of useful ingredients, namely vitamin, zeaxanthin, and carotenoids. E, phytosterols, selenium, ascorbic acids, and linoleic acid, which functions in human nutrition as an antioxidant. Pumpkin possesses broad range of applications for its use in production diversification of commercial goods such puree, jam, jelly, and marmalades, sauces, pickles, halwa, chutney, biscuits, and weaning mix drinks and pies. Drinks other than water are lethal. [49]

2.1.4 Botanical description: [50]
Understanding the variations and methods for acquiring the by-products of the maximum Cucurbita species requires an understanding of its botany. The study of botany provides crucial insights into the structure and function of vegetables at the macroscopic level. As a result, a description of the plant will help you grasp its primary by-products, the seeds.
With an inferior, rectangular or unipolar ovary, 3-6 pluriovulated placentas, shirt-styled stigma, and 3-5 lobes, the female flowers are short pediculate. For twelve hours after the entomophily form is pollinated, the stigma is open and responsive. The fruit is an indehiscent berry that is unilocular and has several seeds that vary in size and colour. It contains an interior cavity that houses the seeds and fibres.
Seed: The large, flat, oval-shaped seeds have a point at the end. They have both little and large fruits, with an approximate weight of 50 to 250 mg. The huge size offers a great reserve that promotes seed germination and establishment18. Endosperms are not present in mature seeds. The reserves are deposited in the cotyledons18 and take the form of lipids in little spherical entities called spherosomes and proteins in protein organelles. The embryo fills the seed coat entirely. Germination is best suited for temperatures between 25 and 30^{o}C, and it is inhaled at temperatures lower than 15^{o}C.

2.1.5 Phytochemical profile: [51]
Organic compounds called phytochemicals are produced from plants and have physiological effects that are advantageous to human health and nutrition.12 but because they protect plants from disease and other unfavourable outcomes, they also improve the colour, flavour, and aroma of the plants. Phytochemicals are the collective term for plant constituents that protect plants from environmental threats such as pollution, stress, dehydration, UV radiation, and disease assault. Thirteen According to the results of the present study, eating a lot of pumpkin can protect human health from many ailments.14 Constitutive metabolites known as phytochemicals help plants withstand both short- and long-term environmental stressors by regulating vital reproductive and development processes.15 Depending on how they function in plant metabolism, phytochemicals are frequently divided into major and secondary metabolites. Common sugars, amino acids, proteins, and nucleic acids are among the common metabolites.

2.1.6 Pharmacological Profile: [52]
Pumpkin, a popular edible plant, belongs to the Cucurbitaceae family and is widely cultivated in Bangladesh, China, India, Malaysia, Myanmar, Papua New Guinea, and some African coastal areas. Pumpkin seeds, particularly C. pepo, C. moschata, and C. maxima, have been found to have various health benefits, including anti-diabetic, antimicrobial, antioxidant, antiinflammatory, anti-cancer, anti-tumour, antimutagenic, and anti-ulcer effects. Pumpkin seedrich meals also have been linked to a lower risk of cancer, with studies showing that pumpkin seed extracts can prevent the spread of certain cancers.
Pumpkin extracts also contain antimicrobial proteins. Due to the possibility that their polar isopropyl functionality contributes to bacteriostatic activities, previous research has shown that phenolic compounds found in fruits and vegetables are important for their antibacterial activity. Xanthomonas campest is, Bacillus subtilize, E. coli, and Proteus mirabilis are just a few of the microorganisms that pumpkin seed oil may fight off with its antibacterial properties. A number of fungi, including Rhizopus stolonifera, Trichoderma herzianum, Pythium ultimum, and Paecilomyces lilaceous, can also be killed by the seed oil.

2.2 FLAX SEED:

2.2.1 Taxonomical classification:

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Linales
Family	Linaceae
Genus	Linum
Species	Usitatissimum

2.2.2 Vernacular Name of Flaxseed:
Sanskrit: Nilapushpika, Atasi, Ksuma, Budrapatni, Tailottama, Parvathi, Masrina
Hindi: Alsi, Tisi
English: Flax
Gujarati: Alsi

2.2.3 Geographical distribution: [53]
Flax plant, native to Egypt, has uncertain origins and is cultivated in two geographical groups: Mediterranean coastal lands, Asia Minor, Egypt, Algeria, Tunisia, Spain, Italy, and Greece, and south-west Asia, including Turkestan, Afghanistan, and India. In these areas, only fibreflaxes are grown, while in Asia Minor and south Russia, transitional forms are cultivated for both fibre and oil. Linseed is extensively cultivated in India, up to 2000 meters above sea level, and is not grown in Kerala, Madras, Delhi, Manipur, Tripura, Andaman, and Nicobar Islands.
Uttar Pradesh and Madhya Pradesh account for nearly two-thirds of the total production.

2.2.4 Botanical description: [54]
Flax (Linum Usitatissimum), also known as common flax or linseed, is a fibrous crop and dicotyledonous plant belonging to the Linaceae family with potential economic value. It is a bluish-flowered plant that has been used for fibre and food purposes in cooler regions of the world. It is an annual herbaceous plant found significantly in countries like China, Russia, and Canada. Flax is one of the oldest fibrous crops, having been cultivated in China and India for 5000 years and in Egypt and Samaria 10,000 years ago. The first cultivations of flax in European countries were in Switzerland, Scotland, and Poland.
Flax is also grown as an ornamental plant in gardens due to its attractive flowers. It has been used as fibre and for the flaxseed. Flax fibre, which is three times stronger than cotton, is used to make linen in many textile industries due to its natural ability to straighten. Flax fibre is very long and used for the manufacture of decorative fabrics, solid yarn, cordage, and tires. Flaxseeds have many nutritional characteristics and contain a high concentration of short-chain omega-3 fatty acids.
Flax is mainly cultivated for its fibre but its seeds are edible and can prevent heart disease, cancer, strokes, and diabetes. Flaxseed contains 20-25% protein and 40-45% fatty acids. Flaxseed oil, also known as 'linseed oil', is an edible oil considered one of the oldest commercial oils and is used for pharmaceutical purposes. Flaxseed oil is used as a drying oil agent in many counties in the form of processed solvents. Flaxseed is also used commercially as varnishes and paints.
The major producers of flax are Canada, Russia, China, Kazakhstan, the United States of America, and India. The study aims to explore the mechanisms of different types of phytoremediation in plants and their management.

2.2.5 Phytochemical profile:
Flaxseed (Linum Usitatissimum) is well-known for its preventive and nutritional qualities, which are linked to the presence of alpha-linoleic acid (ALA), phenolic, lignin, carotenoids, and tocopherols, as well as high-quality omega-3 unsaturated fatty acids.

Due to its numerous health benefits, including a lower risk of cardiovascular disease and cancer (particularly of the prostate and mammary glands), flaxseed is growing in popularity every day. It has a laxative effect and anti-inflammatory qualities. Additionally, it appears to be beneficial for osteoporosis and for lessening menopausal symptoms. [55]

A rich source of lignans, also known as phytoestrogens, such as matairesinol and secoisolariciresinol, is whole or ground flaxseed. It is acknowledged that these lignans have phytoestrogen effects and apply cell reinforcement. In the colon, they are transformed into the active metabolites enterodiol and enterrolactone by microscopic organisms. Compared to the parent lignin secoisolariciresinol diglucoside, these metabolites are thought to have stronger antiplatelet and cancer-prevention agent actions (antioxidant activities). They may also have weaker estrogenic or antiestrogenic effects, depending on the natural levels of estradiol. [56]

2.2.6 Pharmacological Profile: [57]

As the richest known source of soluble fibre and phytoestrogen lignans, as well as alphalinoleic acid, flaxseed has recently attracted attention in the field of heart and blood vessel disease. There is still much to learn about the various chemical components that make up flaxseed. Studies have allocated different attributes to the plant, seed, oil, and particular plant components. Seeds and oil from plants include polyunsaturated lipids including linoleic acid and ALA. Furthermore there are monounsaturated fatty acids like oleic acid. Two essential fatty acids that are also present are linoleic acid and alpha lipoic acid (ALA). As essential fatty acids, linoleic acid and ALA cannot be produced in the body.

2.3 SUNFLOWER SEED:

2.3.1 Taxonomical classification:

Kingdom	Plantae
Divison	Tracheophyta
Class	Magnoliopsida
Order	Asterales
Family	Asteraceae
Genus	Helianthus
Specie	Annuus

2.3.2 Vernacular Name of sunflower seed:

Sanskrit: Suryakamal beej
Hindi: Soorajmukhi ke beej
English: Annual sunflower; common sunflower; wild sunflower
Gujarati: Soorajmukhi Na beej

2.3.3 Geographical distribution:

The FAOSTAT report shows Russia Federation is the top producer of sunflower seeds, accounting for 26% of the world's total. Ukraine and Argentina follow with 8.6 and 3.6 tons respectively. Other countries include France, Romania, China, Bulgaria, Hungary, Turkey, and Spain. The United States ranks eleventh with 1.0 million tons, accounting for 5% of the world's total sunflower seed production. South Africa ranks twelfth with 0.9 million tons. [58]

2.3.4 Botanical description: [58]

Helianthus Annuus is the botanical classification for sunflowers. Due to their relatively short growing season, these huge plants are grown all over the world. A sunflower is an annual herb that grows to a height of 3 to 12 feet. It has rough, hairy stems, broad leaves that are coarsely serrated, and round flower heads that are 3 to 6 inches wide in wild specimens and frequently a foot or more in cultivation. The flower-heads are made up of numerous tiny

tubular flowers compactly packed on a flat disk; the long, strap-shaped corollas of the flowers in the outer row form the composite flower's rays. There are two different kinds of flowers that make up each inflorescence, or head, of a sunflower.
Individual ray blooms surround the border of the head, which gives the appearance of yellow petals. Hundreds of disk flowers, each of which develops into a seed, make up the head's face. For the Helianthus genus, there are 17 basic chromosomes. There exist tetraploid, hexaploid, and diploid species. Helianthus is comprised of just 14 annual species. Plant breeders have crossed different species within the genus to convey beneficial traits to commercial sunflower, such as a higher oil content, cytoplasmic male sterility for hybrid production, and resistance to disease and insects.

2.3.5 Phytochemical profile: [59]
Antioxidants including phenolic acids, vitamins, trace minerals, and flavonoids can be found in edible seeds and sprouts. In the last few decades, it has been demonstrated that the sunflower seed and sprout contain flavonoids (heliannone, quercetin, kaempferol, luteolin, and apigenin) and phenolic acids (cafeic acid, chlorogenic acid, cafeoylquinic acid, Gallic acid, protocatechuic, coumaric, ferulic acid, and sinapic acids) that are responsible for the plant's medicinal properties. The structures of the phenolic acids and flavonoids found in the Asteraceae family. The two most prevalent flavonoid structural categories in the Asteraceae family are flavones and flavones. The substitution patterns for flavones that occur most frequently are 5, 7, 4′-trioxygenation (type apigenin) and 5, 7, 3′, 4′tetraoxygenation (type luteolin). The two most prevalent forms of flavone oxygenation are 3, 5, 7, 4′-tetraoxygenation (kaempferol type) and 3, 5, 7, 3′, 4′-pentaoxygenation (quercetion type).

2.3.6 Pharmacological Profile: [60]
Anti-inflammatory and analgesic effects: All of the compounds tested showed significant anti-inflammatory activity, with ID50 values in the range of 65-262 n mole per year. The antiinflammatory effect of helianthosides compounds, which were isolated from an n-butanolsoluble fraction of a methanol extract of sunflower, was investigated against 12-Otetradecanoylphorbol-13-acetate [TPA]-induced inflammation [1.7 nmol/year] in mice.

Antimicrobial effects:Researchers has examined the effects of topical application of sunflower seed oil three times a day on skin condition, incidence of nosocomial infections, and mortality in preterm infants <34 weeks gestation. When compared to infants not receiving topical prophylaxis, treatment with sunflower seed oil produced a highly significant reduction in the incidence of nosocomial infections [adjusted incidence ratio: 0.46; 95%, confidence interval: 0.26-0.81; P= 0.007] and a significant improvement in skin condition [P=0.037]. There were no side effects associated with topical treatment.

Antioxidant effect: When Helianthus annuus seeds were extracted using methanol, the antioxidant activity of the extract was examined. The results showed that the extract had much more DPPH [1, 1-diphenyl-2-picrylhydrazyl] radical scavenging activity than standard antioxidant.
With increasing concentration, the extract's capacity to scavenge DPPH radicals increased.

2.4 SESAME SEED:

2.4.1 Taxonomical classification:

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Lamiales
Family	Pedaliaceae
Species	Sesamum indicum

2.4.2 Vernacular Name of sesame seed:
Sanskrit: Tila, Pitratarpana
Hindi: Till
English: Sesame
Gujarati: Tal

2.4.3 Geographical distribution: [61]
The world's biggest producer of sesame is India. In 2004, India accounted for 26.75% of the world's total production of sesame seeds and 20.75% of the total area planted with them. It has been observed that in 2003–2004, Gujarat accounted for thirty percent of the overall production. West Bengal (17.8%), Rajasthan (17.6%), Tamil Nadu (7.6%), Andhra Pradesh (5.4%), and Madhya Pradesh (5.2%) followed Gujarat in that order. In terms of area, Gujarat topped the list with 22.7%, followed by Madhya Pradesh (7.4%), Rajasthan (17.6%), West Bengal (9.2%), and Andhra Pradesh (9%). But when it came to productivity, West Bengal came in first place with 876 kg per hectare, followed by Gujarat with 598 kg and Rajasthan with 453 kg.

2.4.4 Botanical description: [62]
Sesamum belongs to the Pedaliaceae family, which includes the genus Sesame. Sesame can be divided into three categories based on the colour differences in the germplasm: white, black, and yellow. Black and white sesame are the most prevalent and extensively farmed dominating species, as illustrated in Figure 1. White sesame has the most oil content and quality, as well as the greatest planting area and distribution, but black sesame has strong growth potential, lodging resistance, and drought tolerance. The plants of other variegated types, like yellow sesame, are primarily branching. Generally speaking, when the colour of the germplasm intensifies, the oil content steadily drops.

2.4.5 Phytochemical profile: [63]
In the Middle East, sesame seeds are considered a health food that can assist the human body both physiologically and nutritionally. Sesame seeds' nutritional makeup is displayed in Table 1. 83–90% of the oil in sesame seeds is unsaturated fatty acid. Sesame seeds also contain a variety of minerals, including calcium, magnesium, iron, phosphorus, and copper. Significantly, sesame enhances a number of phytochemicals, such as phospholipids, flavonoids, phytosterols, and lignans.

2.4.6 Pharmacological Profile: [64]
Anti-cancer activity: Studies have looked into the potential anticancer effects of sesame seeds and their lignans, both directly and indirectly. Studies have demonstrated that intestinal micro flora in humans can transform the sesamin lignan into the mammalian lignans enter lactone and enterodiol, which may offer protection against diseases linked to hormones, like breast cancer. Sesamol lignan was shown in one study to inhibit cancer cell development and induce apoptosis, or programmed cell death. An additional study including 220 premenopausal women found that when enter lactone concentrations increased, so did the risk of breast cancer. A recent study revealed a potential mechanism by which the same lignans may slow the progression of cancer. It was demonstrated that sesamin inhibited the proliferation of cancer cells during the G1 phase of the cell cycle by down regulating the protein cycling D1. The floral extract from sesame oil has antitumor (tumour-inhibiting) properties. Alcohol extract from the Sesamum indicum flower was found to have an inhibitory effect on tumour growth in tumour-genic mice and to have no discernible effect on the weight of the spleen and thymus in mice. It also showed no effect on the weight of immunological organs.
Anti-aging activity: Additionally, a different study found that vitamin E increases the body's ability to absorb gamma tocopherols by preventing its degradation. In this study, a single dosage of sesame oil, which contained 136 mg of sesame lignans in addition to beta tocopherols, decreased the amount of the vitamin excreted in the urine and increased the body's levels of both the alpha and beta forms, which are linked to anti-aging effects.

Hepatic lipid lowering effect: Sesamin, a lignan derived from sesame seeds, affects hepatic fatty acid metabolism by changing the expression of the gene encoding paroxysmal acyl-CoA oxidase, which is responsible for this process. It also reduces the amount and activity of the fatty acid synthase enzyme in the liver. The fatty acid metabolism is changed, which has a lipid-lowering impact.

2.5 CINNAMON:

2.5.1 Taxonomical classification:

Kingdom	Plantae
Division	Tracheophyta
Class	Magnoliopsida
Order	Laurales
Family	Lauraceae
Genus	Cinnamomum Zeylanicum
Species	Cinnamomum verum

2.5.2 Vernacular Name of Cinnamon:
Sanskrit: Tvak
Hindi: Daalacheenee
English: Cinnamon
Gujarati: Taja

2.5.3 Geographical distribution: [65]
Most cinnamon is grown in the Malagasy Republic, Sri Lanka, and the Seychelles. It originated in Sri Lanka's central hills. It is grown in one or two places in Kerala, India. Because it is a durable plant, cinnamon is grown in Sri Lanka in a variety of environments, from semi-dry to wet zones. For best results, growers should aim for temperatures between 20 and 30 degrees Celsius and rainfall between 1250 and 2500 mm. At 300–350 meters above mean sea level, it grows well as a forest tree.

2.5.4 Botanical description: [65]
Evergreen, the Cinnamomum verum tree reaches a maximum height of around 10 m (30 ft.). Its bark is smooth and yellowish in colour, and its branches are robust. It has pointed-tipped, leathery leaves that are 11–16 cm (4.5–6.25 in) long. On top of the leaf, the colour is dark green; on the bottom, it is light green. Grown in panicles (clusters) as long as the leaves, the little yellow flowers have an unpleasant smell and are tubular with six lobes. The fruit is a tiny, fleshy berry that grows to a length of 1 to 1.5 cm (0.25 to 0.5 in), and it is partially encircled by a cup-shaped perianth that forms from the outer sections of the flower as it ripens to black. The inner bark of the cinnamon tree is scraped off and dried before being ground into a powder. This produces the cinnamon spice form. Coppicing is another method of cultivating trees that allows for the harvesting of the coppiced shoots by cutting them back to promote shoot development. The leaves and twigs are steam-distilled to extract cinnamon oil.

2.5.5 Phytochemical profile: [66]
The powdered sample of Cinnamomum verum bark extracted in aqueous was subjected to phytochemical screening, which revealed the presence of tannins, flavonoids, glycosides, and phenols. In contrast, the methanolic extract revealed the presence of numerous bioactive compounds, including proteins, carbohydrates, tannins, flavonoids, steroids, phenols, terpenoids, and saponins.
2.5.6 Pharmacological Profile: [67]
Analgesic, antipyretic and diaphoretic actions: A reduction of body temperature in mice was observed by the administration of a decoction of the dried twigs of cinnamon. The same result was obtained using cinnamaldehyde or sodium cinnamate (Chinese Materia Medica). Cinnamaldehyde provides a hypothermic and antipyretic action. Cinnamaldehyde produced analgesic effects when tested in acetic acid-induced writhing in mice. The cinnamon bark give analgesic activity, but no experimental details were given. Anti-nociceptive activity (noiceptor – a receptor which transmits painful stimuli) of the ethanol extract and reported that C. verum possessed an analgesic effect

against both acetic acid-induced writhing and hot plate induced thermal stimulation. It also give analgesic and antipyretic activity. Cinnamon is a mild diaphoretic agent due to the vasodilators effect it produces.

Anti-inflammatory action: Cinnamon have anti-inflammatory properties. It reduces pulmonary inflammation. Due to a number of tannins, the Japanese shrub Cinnamomum seiboldii has been demonstrated to have anti-inflammatory properties. A study on mice treated with a 70% ethanolic extract of cinnamon produced encouraging outcomes regarding acute inflammations. The extract prevented acetic acid from increasing vascular permeability. It was ineffective against inflammations produced by bradykinin and histamine, but it did decrease paw oedema caused by carragenan and serotonin. The development of adjuvant-induced arthritis was found to have minimal impact on subsequent lesions. It helps with lung inflammations as well. When evaluated on rabbit ocular inflammations, the herbal ophthalmic medication Ophthacare, which contains 0.5% cinnamon, had good anti-inflammatory action (Mitra et al., 2000).

Antioxidant action: It has long been known that adding spices and the essential oils they contain to food might help keep it from going bad. Antioxidant /or antibacterial activity is the basis of action. In mammalian systems, antioxidants regulate lipid peroxidation and scavenge free radicals. Lipid peroxidation is a cyclic reaction that produces free radicals constantly, which in turn cause more peroxidation. Food degrades because of this cycle. It damages tissue in vivo, which can result in aging, atherosclerosis, cancer, and inflammatory illnesses, among other things. Free radicals have the ability to peroxide polyunsaturated fatty acids in phospholipid membranes, produce cytotoxic peroxides, oxidize proteins, and denaturize DNA within the cell. These occurrences are linked to aging, actual death, and death.

Antiulcer genic effects: The primary function and application of cinnamon in Ayurveda scriptures and other publications on medicinal plants is as a digestive aid. Cinnamon is listed as an approved medication for gastrointestinal issues and carminative activity in several pharmacopoeias, including "Martindale." The several forms of cinnamon that are utilized in various countries' medicinal practices and that are detailed in "Martindale" are mostly used to treat gastrointestinal ailments. In traditional medicine, cinnamon is utilized for its carminative properties and as a treatment for dyspepsia and diarrhoea. It is recognized as a stomachic and carminative in contemporary medicine. According to the "Materia Medica of India," cinnamon is a medication that is effective against dysentery and diarrhoea.

CONCLUSION: The seeds discussed in this review pumpkin, flax, sunflower, sesame, and cinnamon have shown significant potential in the management of hormonal imbalances, particularly in women. Their rich composition of bioactive compounds, including phytoestrogens, omega-3 fatty acids, lignans, and antioxidants, contributes to their ability to regulate hormonal functions, reduce inflammation, and offer protection against diseases such as cancer and cardiovascular issues. The integration of these natural seeds into a balanced diet may provide an accessible and effective approach to supporting hormonal health. Further research and clinical studies are recommended to better understand their long-term effects and specific mechanisms in managing hormone-related disorders.

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