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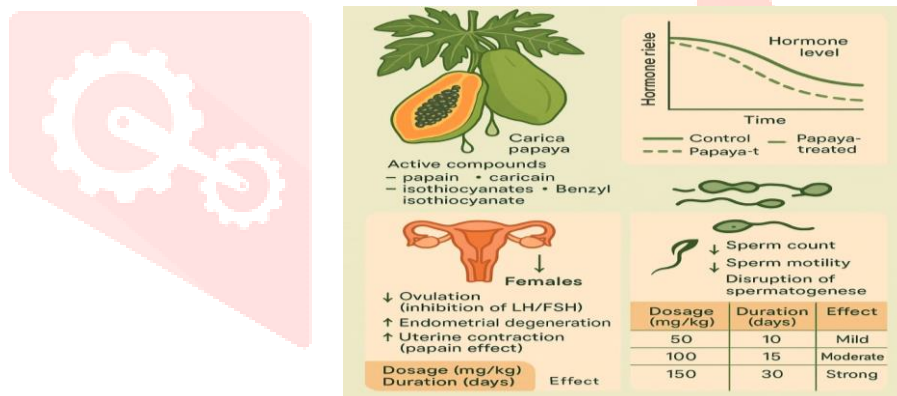
Papaya As A Natural Antifertility Agent: Myth Or Medicine?

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Abstract: The increasing global interest in natural health alternatives has renewed attention to traditional systems of medicine such as Ayurveda. Among the various plant-based remedies used historically, *Carica papaya* (papaya) has been studied for its potential antifertility properties. Synthetic contraceptives, while effective, are often accompanied by adverse effects, prompting a search for safer, plant-based alternatives. Papaya is a tropical fruit known not only for its nutritional value but also for its bioactive compounds that may exert antifertility effects. Scientific studies have indicated that papaya seeds, leaves, and unripe fruit may affect hormone levels, interfere with spermatogenesis, and hinder implantation. This review evaluates current evidence on the antifertility potential of papaya in both males and females, exploring whether it can serve as a viable natural contraceptive option or if its benefits are overstated.



Index Terms - *Carica Pappaya* ,Antifertility, Herbal Medicine, Natural Contraceptive

INTRODUCTION

Ayurveda, the ancient Indian system of medicine, is gaining widespread recognition for its holistic and preventive approach to health. Unlike modern medicine, which often targets specific symptoms or diseases, Ayurveda considers the balance of body, mind, and spirit to achieve overall well-being. It emphasizes natural dietary regimens, detoxification methods, and herbal treatments for preventing and curing illnesses.

In the realm of reproductive health, antifertility agents play a crucial role in controlling birth and managing population growth. Synthetic contraceptives, including estrogen-progesterone-based pills, are widely used to prevent ovulation, fertilization, implantation, or to induce abortion. In males, antifertility drugs may inhibit testosterone production, impair spermatogenesis, or affect sperm motility.

Although effective, synthetic contraceptives are often accompanied by side effects such as hormonal imbalances, weight gain, mood changes, cardiovascular issues, and even increased cancer risk. Consequently, there is growing interest in natural contraceptive alternatives derived from medicinal plants with fewer side effects. Ayurveda offers a wide range of herbal options for fertility regulation. Among them, *Carica papaya* (papaya) has emerged as a notable plant with significant antifertility potential in both males and females.

OVERVIEW OF CARICA PAPAYA (PAPAYA)

Papaya is an economically and nutritionally significant tropical fruit belonging to the Caricaceae family, native to the Mesoamerican region. It is cultivated globally in tropical and subtropical regions. Papaya is recognized for its rich nutritional content:

- **Vitamin C:** Provides over 100% of the daily recommended intake per 165g serving.
- **Vitamin A:** Supplies approximately 20% of daily needs.
- **Dietary Fiber:** Promotes digestive health and bowel regularity.
- **Enzymes:** Contains papain and chymopapain, which aid protein digestion.

Papaya follows the C3 photosynthetic pathway and lacks bundle sheath cells, making it sensitive to environmental conditions. Beyond its nutritional value, several parts of the papaya plant—particularly the leaves, seeds, and unripe fruit—have demonstrated medicinal properties, including antifertility effects.

These drugs affect and are involved in the menstrual cycle and ovulation in females. Estrogen and progesterone in combined form are given as birth control pills. The antifertility substance is deemed to be active in females when it prevents fertilization, prevents ovulation, implantation and destroys the zygote or causes abortion. In males it prevents spermatogenesis, inhibits testosterone or affects the gonadotropin of the organs or the mortality of sperm. The development of fertilized ovum and the priming of the uterus for implantation there is a clear understanding of the role of estrogen-progesterone balance serve as the basis of developing an agent that would prevent pregnancy by interfering with implantation but without disturbing the hypothalamus- pituitary-ovarian axis. These drugs cause no interference in sexual activity and risk of pregnancy reduced. They might cause reduction in menstrual bleeding. they can be taken immediately after child birth. Use of these chemicals offer benefits like effective contraception and reduced menstrual bleeding, but they can also cause side effects like cardiovascular problems, increased cancer risk, and hormonal imbalances. While some side effects are rare, others, like weight gain, are more commonly reported. The synthetic products of the modern age surpassed their importance, for a while. However, the blind dependence on synthetics is over and people are returning to the naturals with hope of safety and security. To overcome these problem, use of Ayurveda system of medicine are mentioned to this review. Many plants have been reported to have sterilizing, contraceptive, and abortifacient properties. Scientific research studies on papaya (*Carica papaya* Linn.), pineapple (*Ananas comosus* L) and custard apple (*Anona squamosa* L.), etc. proved that they have abortifacient and anti-fertility action. Among them Papaya is most effective herb that showed antifertility activity in male as well as in female. Pappaya Papaya (*Carica papaya* L.) is an economically important fruit crop that belongs to the Caricaceae family and is native to the Mesoamerica region in America. It is grown worldwide in tropical and subtropical areas. Papaya has a C3 metabolism due to the absence of bundle sheath cells in its leaves. This metabolism makes the plant susceptible to environmental factors, affecting its photosynthetic processes, growth, and fruit development. Papayas are a good source of vitamin C, providing more than 100 % of the recommended daily intake in just one serving (165 g). It is also a good source of vitamin A, providing about 20 % of the recommended daily intake (USDA, 2020). This fruit is also rich in dietary fiber, aiding digestion and promoting bowel regularity. Papayas contain the digestive enzyme papain, which may aid in the digestion of proteins. Effective uses of Pappaya as an Antifertility Agent The part of papaya used for its antifertility properties is primarily the leaves, although seeds have also been studied for their potential effects. Papaya Leaves Contain compounds like papain and chymopapain, which may contribute to antifertility effects by hydrolyzing semen proteins and making them unavailable for sperm cells. Have been shown to reduce sperm count, motility, and viability in animal studies. May affect hormone levels and disrupt spermatogenesis. Papaya seeds contain various bioactive compounds, including fatty acids, alkaloids, and glycosides. Have been found to have antifertility activity in both male and female rats. May contain compounds that interfere with implantation or hormonal balance. unripe papaya fruit may exhibit antifertility activity, particularly in females. The potential mechanisms include Interference with implantation: Unripe papaya extract may interfere with the implantation of a fertilized egg in the uterus. Hormonal

disruption: Papaya may affect hormone levels, such as estrogen and progesterone, which play a crucial role in maintaining pregnancy.

ANTIFERTILITY EFFECTS OF PAPAYA

1. Papaya Leaves

Papaya leaves have been reported to possess antifertility activity primarily due to the presence of proteolytic enzymes such as papain and chymopapain. These enzymes can hydrolyze seminal proteins, rendering them ineffective for fertilization. Animal studies have demonstrated that leaf extracts can:

- Decrease sperm count and motility
- Reduce sperm viability
- Disrupt hormone levels
- Interfere with spermatogenesis

These effects are likely due to the suppression of the hypothalamic-pituitary-gonadal axis and alteration of reproductive hormone profiles.

2. Papaya seeds

It contain a variety of bioactive compounds, including alkaloids, flavonoids, fatty acids, and glycosides. Experimental studies in rats have shown that seed extracts can exert antifertility effects in both sexes:

- In males: Inhibition of spermatogenesis, reduction in sperm motility, decreased testosterone levels
- In females: Hormonal disruption, delayed ovulation, and impaired implantation

Importantly, these effects have been observed to be dose-dependent and, in some studies, reversible upon discontinuation.

3. Unripe Papaya Fruit

The unripe fruit of papaya is rich in latex, which contains compounds believed to interfere with pregnancy. The mechanisms by which unripe papaya may act as an antifertility agent include:

- Interference with implantation: Preventing the fertilized egg from embedding in the uterine lining
- Uterotonic effects: Stimulating uterine contractions, potentially leading to early miscarriage
- Hormonal disruption: Altering levels of progesterone and estrogen, essential for maintaining pregnancy

In traditional medicine, unripe papaya has been used to induce menstruation and even as a natural abortifacient.

POTENTIAL ADVANTAGES OF PAPAYA-BASED ANTIFERTILITY AGENTS

- **Natural origin:** Lower risk of severe side effects compared to synthetic contraceptives.
- **Dual effect:** Shows antifertility potential in both males and females.
- **Cost-effective and accessible:** Especially important in low-resource settings.

CONCERNS AND LIMITATIONS

- **Limited human data:** Most studies are restricted to animal models; human trials are needed to confirm efficacy and safety.
- **Dosage standardization:** Lack of clarity regarding the appropriate dose for contraceptive effects.
- **Potential toxicity:** High or prolonged intake may lead to reproductive toxicity or other adverse effects

CONCLUSION

The use of *Carica papaya* as a natural antifertility agent is supported by traditional practices and a growing body of scientific evidence. The plant's leaves, seeds, and unripe fruit contain bioactive compounds capable of disrupting reproductive processes in both males and females. While most studies have been conducted in animal models, the results are promising and warrant further investigation.

Despite its potential, several challenges must be addressed before papaya can be widely recommended as a safe contraceptive. These include:

- Lack of clinical trials in humans
- Inconsistent dosages and extraction methods
- Possible toxicity or side effects with long-term use

In conclusion, while *Carica papaya* shows genuine promise as a natural antifertility agent, more rigorous, controlled studies are needed to validate its efficacy and safety in humans. Until then, its use should be approached with caution and under professional guidance. Nonetheless, papaya remains a compelling example of how traditional knowledge and modern science can intersect in the search for safer reproductive health solutions.

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