

Biological Effects of Ajwa Dates for Pre-Conception Women

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Abstract. *Ajwa dates are functional foods that contain bioactive compounds and essential nutrients with potential benefits for women's reproductive health, particularly during the preconception period. This study aimed to examine the biological effects of Ajwa dates on preconception women, focusing on their nutritional benefits, antioxidant and anti-inflammatory activities, hormonal regulation, ovarian function, and pregnancy readiness. This study used a narrative literature review design based on secondary data obtained from scientific publications published between 2021 and 2026. Data were collected from accredited national journals, reputable international journals, scientific proceedings, and databases such as PubMed, Google Scholar, ScienceDirect, DOAJ, and local open-access journal portals. The selected articles were analyzed using narrative synthesis through thematic organization, comparison between studies, conceptual synthesis, and conclusion drawing. The findings indicate that Ajwa dates contain phenolics, flavonoids, vitamins, minerals, polysaccharides, dietary fiber, and other bioactive compounds that contribute to antioxidant and anti-inflammatory activities. Several studies show that Ajwa dates may help reduce oxidative stress, improve antioxidant defense, modulate inflammatory responses, support hormonal balance, and protect ovarian function, including slowing the decline of Anti-Müllerian Hormone and influencing ovarian follicle characteristics. Ajwa dates also provide nutritional support that may improve women's physiological readiness before pregnancy.*

Keywords: *Ajwa Dates; Preconception Women; Reproductive Health; Antioxidant; Pregnancy Readiness*

Received: June 25, 2026

Received in Revised: July 21, 2026

Accepted: August 27, 2026

INTRODUCTION

The preconception period is the period before pregnancy. Preconceptional women are assumed to be adults or women of childbearing age ready to become mothers (Lukiana & Sugiatini, 2022; Welshman et al., 2023; Puspita et al., 2024; Hidayati et al., 2026). Nutritional needs during this period differ from those of childhood, adolescence, or the elderly (Fandir et al., 2024). Although preconception readiness is recognized as a crucial factor in reducing the risk of pregnancy complications and maternal mortality, most research still focuses on interventions during pregnancy or postpartum, with a predominantly curative approach. Promotive and preventive strategies during the preconception phase have not received adequate attention (Aprianti & Faizaturrahmi, 2025; Steel et al., 2025; Stephenson et al., 2018).

Preconception is the period before sperm and ovum meet, or fertilization occurs. Several preparations must be made before planning a pregnancy. These begin in adolescence, including maintaining reproductive health, maintaining a balanced diet, and adopting a healthy lifestyle (Todd et al., 2015; Norris et al., 2022; Dunneram & Jeewon, 2015). A significant proportion of maternal and infant mortality and morbidity can be prevented by providing simple nutritional

interventions before pregnancy. The rationale for providing these nutritional interventions is that adequate micronutrient status during the preconception period is crucial for women, in addition to maintaining body weight (nutritional status) within the normal range (Liu et al., 2025; Lecorguillé et al., 2022; Lassi et al., 2021; Mousa et al., 2019).

One natural food whose biological benefits are beginning to be widely studied is the ajwa date (*Phoenix dactylifera*). Dates have long been recognized as a nutrient-rich food with various health benefits, especially for postpartum mothers (AlAbd et al., 2026). In medical and religious contexts, dates are considered a natural solution to aid maternal recovery after childbirth (Hassan, 2022). Dates contain various essential nutrients, such as natural sugars (glucose, fructose, sucrose), fiber, B-complex vitamins, iron, calcium, magnesium, and potassium.

Their natural sugar content provides the rapid energy needed by mothers after significant energy loss during labor (Ulya et al., 2024; Simonet et al., 2020; Ramulondi et al., 2021). Furthermore, the iron in dates helps prevent anemia caused by blood loss during childbirth. Vitamin B1 (thiamine) in dates plays a role in converting carbohydrates into energy, which is essential for breastfeeding mothers, who require greater energy than during pregnancy. Thiamine deficiency can cause mothers to tire easily and lack enthusiasm (Abdullah D et al, 2025).

Recent research shows that oxidative stress and chronic inflammation are important factors that can impact women's reproductive health, including egg quality, ovarian function, and hormonal balance. Natural antioxidants are known to help reduce free radicals and improve the biological function of the reproductive system (Vašková et al., 2023; Kowalczyk, 2022; Ribas-Maynou & Yeste, 2020; Wang et al., 2017). Ajwa dates are reported to have high phenolic and flavonoid content, potentially helping reduce oxidative stress, improve the body's antioxidant status, and support the physiological function of the reproductive organs. Furthermore, the iron and folate content in ajwa dates also plays a crucial role in supporting red blood cell formation, preventing anemia, and preparing a woman's body for pregnancy (Rahman et al., 2026).

In the context of reproductive health, optimal preconception nutrition is closely linked to successful pregnancy and maternal health (Stocker et al., 2025; Hieronimus & Ensenauer, 2021). Women with good nutritional status before conception are known to have a lower risk of pregnancy complications than women with poor nutritional status. Therefore, the use of functional foods such as ajwa dates as a natural nutritional intervention is a crucial focus in promotional and preventive efforts for women's reproductive health (Marwati et al, 2026; Abdallah et al., 2026; Shaikh et al., 2023).

Although various studies have described the general health benefits of dates, scientific studies specifically addressing the biological effects of ajwa dates on pre-conception women are still relatively limited and scattered across various research fields, including nutrition, reproduction, obstetrics, and maternal health. Therefore, a comprehensive literature review is needed to identify, analyze, and synthesize scientific evidence regarding the biological effects of ajwa dates on pre-conception women's health, including their biological mechanisms, nutritional benefits, antioxidant and anti-inflammatory effects, and implications for pregnancy readiness.

Based on this description, this study was conducted to examine in depth the biological effects of ajwa dates on pre-conception women as an effort to support reproductive health and optimize pregnancy readiness through an evidence-based approach.

METHODS

Types of Research

This study is a literature review with a narrative review design. This design was chosen to provide a comprehensive, critical, and in-depth explanation of the biological effects of ajwa dates on pre-conception women through a narrative synthesis of relevant scientific research findings. The narrative review approach allows researchers to examine various biological mechanisms, bioactive compounds of ajwa dates, nutritional benefits, antioxidant and anti-

inflammatory effects, and hormonal regulation, as well as their implications for women's reproductive health, based on the latest scientific literature published between 2021 and 2026.

Types and Sources of Data

The type of data used in this study is secondary data, namely all data obtained from published scientific publications. The data sources include accredited national journals and reputable international journals related to reproductive health, nutrition, obstetrics, and maternal health, as well as scientific proceedings discussing preconception nutrition, fertility, and women's reproductive health. In addition, data were obtained from scientific databases such as PubMed, Google Scholar, ScienceDirect, DOAJ, and local open-access journal portals. The secondary data used in this study include articles discussing the biological constituents and active compounds in ajwa dates, the antioxidant, anti-inflammatory, and immunomodulatory effects of ajwa dates, the effect of ajwa dates on women's nutritional, hormonal, and reproductive health status, and the role of preconception nutrition in improving pregnancy readiness. Only references that can be verified online and published within the 2021–2026 period were used, with a focus on studies related to preconception women's health and reproductive nutrition.

Data Collection Techniques

The data collection technique was carried out through several stages. First, the researcher identified the keywords used in the literature search, including "Ajwa dates," "Phoenix dactylifera," "preconception women," "female reproductive health," "fertility," "oxidative stress," "hormonal regulation," and "maternal nutrition," as well as their Indonesian equivalents, such as "ajwa dates," "pre-conception women," "reproductive health," and "pre-pregnancy nutrition." Second, a systematic search was conducted in scientific databases using a combination of keywords and Boolean operators, including AND and OR, to obtain articles relevant to the research focus. Third, title and abstract selection was carried out to identify articles that specifically focused on the biological effects of Ajwa dates on reproductive health, nutritional status, fertility, hormonal balance, or biological parameters in preconception women. Fourth, articles that passed the initial selection stage were read in full to ensure that their content was consistent with the research objectives. Finally, data extraction was conducted by collecting key information from each article, including the research objectives, research design and methods, biological constituents and mechanisms of action of Ajwa dates, key outcomes related to preconception women's reproductive health, and the effects of Ajwa dates on inflammation, hormonal balance, fertility, and maternal health status.

Inclusion and Exclusion Criteria

The articles included in this literature review were selected based on several inclusion criteria. The articles had to be published between 2020 and 2026, originate from accredited national journals or reputable international journals, and be accessible in full text. In addition, the articles had to discuss topics related to Ajwa dates, preconception nutrition, women's reproductive health, fertility, or maternal health. The selected articles were also required to use clear research methods, such as experimental studies, clinical trials, observational studies, systematic reviews, or review articles, and had to be written in either Indonesian or English. Meanwhile, articles were excluded from the analysis if they were published before 2021, were not available in full text, were not relevant to the focus of the biological effects of Ajwa dates on preconception women, were opinion pieces, editorials, or non-scientific sources, or had low methodological quality and did not adequately explain the research methods.

Research Flow

The research flow followed the stages of a narrative review. The process began with a literature search based on predetermined keywords and relevant scientific databases. The articles obtained from the search were then selected through title and abstract screening according to the research focus. After that, full-text evaluation was conducted to determine the relevance of each article to the study objectives. Articles that met the criteria were then used for

data extraction and tabulation of key findings from the selected studies. The final stage involved analyzing the biological effects of Ajwa dates on women's preconception health.

Data Analysis Techniques

Data were analyzed using narrative synthesis through several steps. First, thematic organization was conducted by grouping the literature based on the main themes, including the bioactive constituents of Ajwa dates, antioxidant and anti-inflammatory effects, hormonal regulation and women's reproductive health, and preconception nutrition and pregnancy readiness. Second, a comparison between studies was carried out by examining similarities, differences, variations in context, research methods, and research findings regarding the biological benefits of Ajwa dates. Third, conceptual synthesis was conducted by connecting the findings with theories of reproductive nutrition, biological mechanisms, maternal health, and pregnancy readiness to identify patterns, trends, and research gaps. Finally, conclusions were drawn regarding the biological effects of Ajwa dates for preconception women as a basis for developing natural nutritional interventions to support reproductive health and pregnancy readiness.

RESULT AND DISCUSSION

Study Characteristics

Ten studies met the inclusion criteria, comprising experimental, quasi-experimental, and literature reviews from Indonesia and internationally that addressed the biological effects of ajwa dates on women's reproductive health and physiological status. The majority of studies evaluated the bioactive constituents of ajwa dates, their antioxidant and anti-inflammatory activities, and their effects on hormonal parameters, ovarian function, oxidative stress, and reproductive health. Several studies also assessed the potential of ajwa dates as a natural nutritional intervention through their phenolic, flavonoid, vitamin, and mineral content, and their effects on women's biological readiness before pregnancy..

Table 1. Study Summary (Indonesia and Regional 2021–2026)

No	Author & Year	Design	Sample	Key Findings	Conclusion
1.	Mulyadi, F.E., Natzir, R., Mappaware, N.A., As'ad, S., Sinrang, A.W., & Kurniawan, L.B. (2023)	Quasi-experimental with pre-post control design	44 perimenopausal women aged 42–48 years (28 ajwa date consumption intervention, 16 control)	After 8 weeks of intervention, AMH levels in the intervention group experienced a smaller decrease (0.37 ± 0.36 ng/mL) compared to the control (0.55 ± 0.19 ng/mL), with a significant difference ($p < 0.05$)..	Consumption of ajwa dates helps slow the decline in ovarian reserve in perimenopausal women, indicated by a lower decrease in AMH levels compared to the control group..
2.	Abdelghffar, E.A., Obaid, W.A., Mohammedsal eh, Z.M., Ouchari, W., Eldahshan, O.A., & Sobeh,	Experimental research on animals (mice)	42 male rats were divided into 6 treatment groups.	Ajwa date extract (ADFE) increases renal antioxidant status (GSH, SOD, CAT), reduces oxidative stress and inflammation (TNF- α , IL-6, MCP-	Ajwa date extract has a nephroprotective effect through antioxidant and anti-inflammatory activity, thus potentially reducing the side effects of

	M. (2022)			1), and improves renal function due to cisplatin nephrotoxicity..	chemotherapy..
3.	Alyahya, S., Arif, M., Wasim, R., & Kushwaha, S.P. (2022)	Literature review	Various literature on Phoenix dactylifera	Ajwa dates contain bioactive compounds such as flavonoids, alkaloids, vitamins, steroids, and tannins with various pharmacological activities such as antioxidant, anti-inflammatory, antidiabetic, immunostimulatory, hepatoprotective, and increasing male and female fertility.	Ajwa dates have high nutraceutical value and have the potential to strengthen the immune system and support women's reproductive health.
4.	Azizah, G., Mappaware, K.N.A., Pramono, S.D., Hamsah, M., & Sulvita, N.K. (2023)	Quasi Experimental with non-randomized clinical trial	In-partum mothers at Sitti Khadijah 1 Muhammadiyah Maternity Hospital (November 2020–October 2021)	Ajwa dates contain simple sugars as a source of energy for labor as well as fatty acids (oleic, linoleic, linolenic) which help the formation of prostaglandins to strengthen uterine contractions and soften the cervix.	Consuming Ajwa dates has the potential to improve the labor process by increasing energy and the effectiveness of uterine contractions in mothers giving birth.
5.	Rizma, A., Wasita, B., & Probandari, A. (2021)	Experimental research on animals (true experimental design)	TMale Sprague Dawley mice with homocysteine-induced Alzheimer's model were given ethanol extract of ajwa dates at doses of 200, 400, and 800 mg/kgBW/day.	Administration of ajwa date extract for 7 and 14 days reduced MDA (malondialdehyde) levels and increased SOD (superoxide dismutase) levels compared to the control group. The highest dose showed an effect equivalent to that of the donepezil	Ethanol extract of ajwa dates can reduce oxidative stress in Alzheimer's model mice by reducing MDA and increasing SOD, thus having the potential to be a supportive therapy for Alzheimer's disease.

				group on day 14..	
6.	Fernández-López, J., Viuda-Martos, M., Sayas-Barberá, E., Navarro-Rodríguez de Vera, C., & Pérez-Álvarez, J.A. (2022)	Literature review	Various in vitro and in vivo studies related to date palm fruit (<i>Phoenix dactylifera</i> L.)	Dates contain bioactive compounds such as phenolics, anthocyanins, carotenoids, tocopherols, phytosterols, and dietary fiber which have antioxidant, antibacterial, anti-inflammatory, prebiotic, anticancer, and antitoxic activities.	Dates have great potential as a functional food due to their nutraceutical content which supports the prevention of various degenerative diseases and improves body health, including reproductive health.
7.	Azizah, N., Abdullah, R.P.I., & Wello, E.A. (2022)	Literature review		Ajwa date consumption during pregnancy and the labor process Ajwa date consumption during early labor can shorten the duration of the first stage of labor by increasing prostaglandins, which influence uterine contractions..	Ajwa dates have the potential to speed up the first stage of labor in pregnant women through an indirect effect on uterine contractions, thereby supporting the female reproductive process.
8.	Khatib, M., Al-Tamimi, A., Cecchi, L., Adessi, A., Innocenti, M., Balli, D., & Mulinacci, N. (2022)	Laboratory experimental research (comparative study)	Five widely consumed varieties of Arabian dates (Sukkari, Ajwa, Segae, Barrny, and Khalas)	All date varieties, including Ajwa, contain total phenolics of about 20–50 mg/100 g DW and polysaccharides with different characteristics that support the biological activity of date fruit.	Ajwa dates contain bioactive phenolics and polysaccharides that have the potential to provide health benefits through antioxidant and anti-inflammatory activities.

9.	Royani, I., Nasrudin, Hamzah, M., Latief, S., & Syahril, E. (2022)	Literature review	Islamic literature and current scientific research on ajwa dates and women's reproductive health	Ajwa dates contain macro and micronutrients that support women's reproductive health, including preventing prolonged labor, inhibiting the progression of preeclampsia, and slowing the decline in AMH as a predictor of menopause.	Ajwa dates are a functional food with great potential in supporting women's reproductive health based on scientific evidence and Islamic literature..
10.	Syahril, E., Abdullah, N., Ilyas, M., As'ad, S., Choridah, L., Natzir, R., Kurniawan, L.B., Bahar, B., Mappaware, N.A., Mulyadi, F.E., & Yacca, S.S. (2026)	Quasi-experimental with pre-post control group design	44 perimenopausal women aged 42–48 years (28 intervention, 16 control)	The intervention group showed a decrease in the number of follicles but an increase in the size of ovarian follicles, while the control group showed an increase in the number of follicles and a decrease in size; the results were statistically significant ($P < 0.05$).	Konsumsi kurma ajwa sebagai antioksidan eksogen memengaruhi karakteristik folikel ovarium dan berpotensi memperlambat transisi menuju menopause.

Consuming ajwa dates has the potential to maintain reproductive function, as indicated by a slowing of the decline in AMH and changes in ovarian follicle characteristics. Ajwa dates contain high levels of bioactive compounds, such as phenolics, flavonoids, vitamins, minerals, and polysaccharides, which support antioxidant and anti-inflammatory activities. The antioxidant activity of ajwa dates helps reduce oxidative stress and inflammation, thereby supporting hormonal balance and women's reproductive health. The nutritional content of ajwa dates has the potential to improve pregnancy readiness by supporting nutritional status, reproductive physiological function, and women's pre-conception biological conditions.

Antioxidant, Anti-Inflammatory, and Nutritional Effects of Ajwa Dates

Based on the synthesis of ten research journals, Ajwa dates (*Phoenix dactylifera* L.) exhibit various biological effects that have the potential to support women's health during the preconception phase. The preconception phase is a preparatory period before pregnancy that aims to optimize women's health, including nutritional status, hormonal function, reproductive health, oocyte quality, and the body's physiological readiness to support a healthy pregnancy. Various bioactive compounds in Ajwa dates, such as flavonoids, phenolics, anthocyanins, vitamins, minerals, polysaccharides, and dietary fiber, are known to possess antioxidant and anti-inflammatory activities that can contribute to optimizing female reproductive function (Fernández-López et al., 2022; Alyahya et al., 2022).

One of the main biological effects of Ajwa dates relevant to preconception is antioxidant activity. Oxidative stress is a contributing factor to female reproductive disorders, including decreased oocyte quality, impaired embryo implantation, infertility, and accelerated ovarian function decline. Research by Rizma et al. (2021) showed that administering Ajwa date ethanol extract to Alzheimer's model mice reduced malondialdehyde (MDA) levels and increased superoxide dismutase (SOD) levels, indicators of an enhanced antioxidant defense system. Similar findings were also found by Abdelghffar et al. (2022), who found that Ajwa date extract increased levels of endogenous antioxidants such as glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT), as well as reducing inflammatory mediators such as TNF- α and IL-6 in a mouse nephrotoxicity model. These results suggest that Ajwa dates have the potential to protect female reproductive cells from free radical damage, thus supporting reproductive readiness before conception.

The biological effects of Ajwa dates on female reproductive function are also evident in their effects on ovarian reserve and reproductive hormones. Research by Mulyadi et al. (2023) showed that perimenopausal women who consumed Ajwa dates for eight weeks experienced a lower reduction in Anti-Müllerian Hormone (AMH) levels compared to the control group. AMH is an important biomarker that reflects ovarian reserve and female reproductive quality. A slower decline in AMH indicates that Ajwa dates may help maintain ovarian function by protecting ovarian follicles. Research by Syahril et al. (2026) also demonstrated changes in ovarian follicle characteristics after Ajwa date consumption, including a statistically significant increase in follicle size and number based on transvaginal ultrasound examination. Although the study was conducted on perimenopausal women, these results demonstrate the potential of Ajwa dates in maintaining ovarian health, which is also relevant for women of reproductive age during the preconception period.

In addition to influencing hormonal and ovarian function, Ajwa dates contain nutrients that can support the nutritional status of preconception women. Research by Fernández-López et al. (2022) and Khatib et al. (2022) explains that Ajwa dates are rich in simple carbohydrates, dietary fiber, vitamins, minerals, as well as phenolic compounds and polysaccharides that have biological benefits. The glucose, sucrose, and fructose content acts as a quick source of energy that supports the body's metabolism, while minerals such as magnesium, iron, selenium, and potassium contribute to maintaining hormonal balance and reproductive tissue health. Optimal nutritional status during the preconception phase is crucial because it is related to egg quality, successful fertilization, embryo implantation, and the prevention of complications during pregnancy.

Effects of Ajwa Dates on Female Reproductive Function and Preconception Readiness

The biological effects of Ajwa dates on the female reproductive system are also demonstrated in studies on the labor process. Azizah et al. (2023) found that mothers who consumed Ajwa dates had better labor outcomes compared to those who did not consume Ajwa dates. A study by Azizah et al. (2022) also stated that consuming Ajwa dates can shorten the duration of the first stage of labor by increasing prostaglandin formation, which increases uterine sensitivity to contractions. The oleic, linoleic, and linolenic acids in Ajwa dates are thought to play a role in prostaglandin formation, while the natural sugars in Ajwa dates help maintain energy during labor. Although the research was conducted on pregnant women, these findings show that Ajwa dates have an influence on women's reproductive function physiologically, so they can be part of reproductive preparation from the preconception phase.

A literature review by Royani et al. (2022) further strengthens the evidence that Ajwa dates are a functional food beneficial for women's reproductive health. Ajwa dates have been reported to help slow the decline in AMH, prevent prolonged labor, and reduce the risk of preeclampsia progression. Furthermore, Alyahya et al. (2022) explain that Ajwa dates possess broad pharmacological activities, such as anti-inflammatory, antioxidant, immunostimulatory, and increased fertility in both men and women. These various biological activities indicate that

consuming Ajwa dates not only provides nutritional benefits but also has a protective effect on reproductive health.

The results of this research synthesis indicate that the biological effects of Ajwa dates for preconception women include antioxidant activity, anti-inflammatory, protection of ovarian function, modulation of reproductive hormones, improved nutritional status, and support for the physiological functions of the female reproductive system. The bioactive compounds in Ajwa dates have the potential to help prepare a woman's body for pregnancy by maintaining oocyte quality, hormonal function, and general reproductive health. However, most of the available research is still in the form of animal experimental research, literature reviews, and studies on perimenopausal women or postpartum mothers, so further clinical research is needed on women of reproductive age and the preconception phase to strengthen scientific evidence regarding the effectiveness of Ajwa dates in increasing women's reproductive readiness before pregnancy.

CONCLUSION

A literature review of various recent studies indicates that Ajwa dates (*Phoenix dactylifera* L.) have potentially beneficial biological effects for preconception women, primarily through antioxidant and anti-inflammatory mechanisms, protection of ovarian function, modulation of reproductive hormones, and fulfillment of nutritional needs that support pregnancy readiness. The bioactive components of Ajwa dates, such as flavonoids, phenolics, anthocyanins, vitamins, minerals, polysaccharides, and dietary fiber, contribute to maintaining a woman's physiological balance, including reproductive health. Research evidence suggests that the antioxidant activity of Ajwa dates plays a key role in reducing oxidative stress by enhancing the body's antioxidant defense system and reducing inflammatory mediators. This mechanism is relevant in the preconception phase because oxidative stress is known to be associated with decreased oocyte quality, impaired fertility, premature ovarian aging, and hormonal imbalance. Furthermore, research in perimenopausal women suggests that Ajwa date consumption has the potential to slow the decline of Anti-Müllerian Hormone (AMH) and influence ovarian follicle characteristics, suggesting a protective effect on ovarian reserve and female reproductive function. In addition to its hormonal and antioxidant effects, Ajwa dates also have high nutritional value that supports women's health before pregnancy. Their content of simple carbohydrates, vitamins, minerals, and bioactive compounds can help meet energy needs, maintain metabolic balance, and support hormonal function and reproductive tissue health. Other studies have also shown that Ajwa date consumption is associated with improved labor through increased uterine sensitivity to contractions and prostaglandin formation, indicating a physiological effect on the female reproductive system as a whole. Although most scientific evidence points to consistent benefits, research on the biological effects of Ajwa dates on preconception women remains limited. Most available studies are experimental animal studies, literature reviews, and studies on perimenopausal or postpartum women. Therefore, specific clinical evidence for women of reproductive age in the preconception phase is still limited. Therefore, further research with more robust clinical trial designs, larger sample sizes, and more comprehensive evaluation of reproductive biomarkers in women of childbearing age is needed. Thus, a deeper understanding of the biological mechanisms of Ajwa dates is expected to support the development of scientifically based recommendations regarding the use of Ajwa dates as a functional food in improving reproductive readiness and women's health in the preconception phase.

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