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Review Article

A Review on Nutritional Composition of Phoenix Dactylifera L. And Its Pharmacological Functions

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ABSTRACT

Ajwa dates are a soft dry fruit mainly cultivated in Medina al Munawara. It was used to cure different diseases and was also used for protection against evil. The use of date fruit as taught by the Prophet is now being supported by strong scientific evidence. Ajwa is effective against diabetes, PCOS, various types of cancers, liver, and heart diseases, against different toxicities, fertility, and infertility in both men and women and altering hormonal activities in the brain. This article gives a general description of Ajwa Dates, focusing on their nutrient composition and functions on the human body. Ajwa is considered a dominant fruit with previously unknown functionalities, making it a potential agent in preventing disease. Methodology: Data was collected and plagiarised from 77 articles for this review, and data on the composition and importance of the data is included.

INTRODUCTION

Dates are grown in 35 countries across the world, and 2.9 million-acre lands are used for its cultivation. Egypt is the major producer, and Iran comes second in date production [1]. Among these are Ajwa Dates [2], a staple food in South Africa and the Middle East, contributing to a significant source of diet and income in these areas [3]. The date palm has now become an emerging field in medicine because of its widespread nutritive benefits. It is now believed that Ajwa dates can be used in making healthy and nutritious food products4, and the bioactive component that this fruit contains, making it a functional food, will further push the food syndicates to join the race of health and wellbeing [4].

Date palms undergo 5 stages until they are fully grown: the Hanabauk, Kimri, Khalal, Rutab, and Tamr stage. The Khalal, Rutab, and Tamr are the stages when the dates become edible and are consumed by the public [5]. Both the flesh and the pits have phenomenal benefits as both the parts are rich in dietary minerals and bioactive components [6]. Ajwa has phenomenal nutritive benefits. They are shown to induce mobility of the bowel and relieve constipation [7]. Ajwa dates acts as an anticancer, anti-inflammatory, antioxidants, antifungal, anticholesterolemic, and antimicrobial agent [8].

Antioxidant Potential: Antioxidants reduce oxidative stress when they react with free radicals [9]. According to various studies, dates are considered to have the highest content of polyphenols [10]. Many approaches can be applied for defining the AOP (antioxidant potential) of solo components and their mixes. 2,2 -azino-bis-3-ethylbenzotiazolin-6-sulfonic acid (ABTS·+) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) (spectrophotometric approaches), which are chromogenic radicals, are mostly used, and antioxidants in food react with these radicals (Figure 2).

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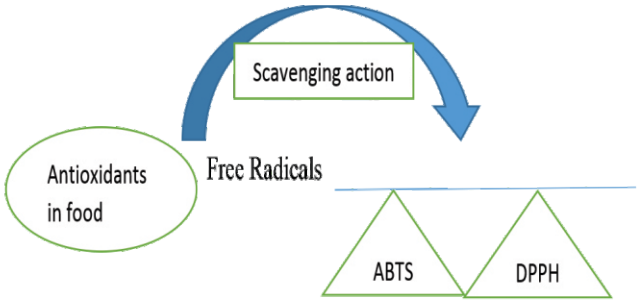

Figure 2: Antioxidant activity of Ajwa on ABTS and DPPH

Pits of Ajwa showed the highest scavenging action of DPPH (96.3% in 80% ethanol) compared to Zaidy Dates. Using solvents for extraction of this action, ethanol (90%) was found to be the most effective [11].

Effect of Ajwa on Lipid Profiles and Reduced risk of CVD's: Lipids are a wide collection of organic compounds which comprise fats, oils, hormones [12] Extracts of Ajwa pit lower serum triglycerides pointedly in mice more significant in female mice than in male mice, probably due to increased estrogen, which reduces blood lipids and cholesterol [11] shown in (Figure 3).

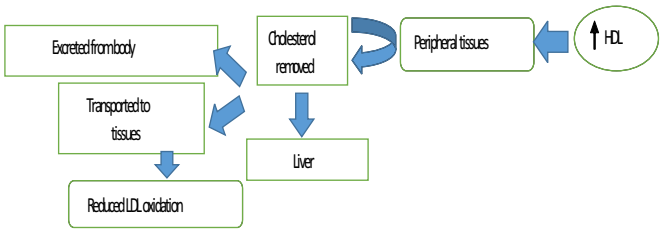

Figure 3: Role of Ajwa in RCT (Reverse Cholesterol Transport)

Ajwa pits reduce LDL oxidation reducing the risk of heart disease in hyperlipidemic mice (both males and females). The same 30% extract is also shown to avoid oxidation of LDL, which in turn would reduce the risk of CVD in mice [13]. Ajwa fruit having LDL lowering ability and increasing HDL and Ajwa date seed powder being superior to other date seed powders is also in line with other studies [14]. Lowered cholesterol and LDL, with increased HDL, also known as good fat, all lead to reduced risks of cardiovascular diseases. The statement is confirmed by other studies [40]. It is also proposed that the function of Ajwa fruit lowering increased levels of lipids may probably be because it is rich in polyphenols and flavonoids [15]. The presence of potassium and magnesium in Ajwa may be a possible reason for controlling LDL, BP, and myocardial contractility [16].

Fertility: IncreasedtestessizeEnhancedgonadotrophiactivityestroneThe presence of potassium and magnesium in Ajwa may be a possible reason for controlling LDL, BP, and myocardial contractility. Modest consumption of dates has been shown to have a beneficial effect on blood pressure. AHA has also recommended dates and the DASH diet for cardioprotective effects [17]. The gonadotrophin, in turn, increases the testes size and seminal vesicles, causing an enhancement in estradiol and testosterone, thus increasing the number of sperms [18] (Figure 4).

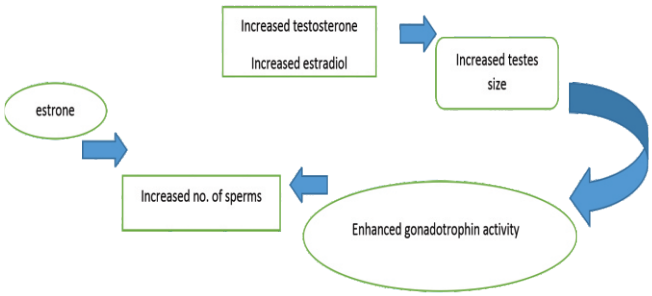

Figure 4: Ajwa in Fertility

Date palm pollen (DPP) can improve the actions of testosterone (serum), FSH and LH in rats because of gonadotrophin like components in DPP. A study investigating the DPP effect on damaged testicles caused by toxic levels of cadmium in male mice showed that DPP enhanced the amount of estradiol balanced the levels of testosterone and sperm action. [19]. The improvements in sperm parameters, such as sperm motility, its count and morphology by ajwa because of its composition containing estradiol and flavonoids and its having gonadotrophin effect is also in line with other studies [20]. More studies need to be done in this field to look closely at how ajwa could work as an effective fertility agent. Studies also need to be done on humans too to prove its effects.

Anticancer and Anti-inflammatoryFunctions: Antioxidants scavenging free radicals are directly and indirectly related to decreased inflammation and reducing tumors by obstructing proinflammatory mediators [21]. Numerous studies have revealed that the inhibition of proinflammatory cytokines in several autoimmune disorders is effective due to the immunoinhibitory characteristics of a few cytokines, for example, IL-1, IL-6, IL-12, TNF-a, and IFN-y [22]. Methanolic Extract of Ajwa Date (MEAD) repressed MCF7 cells in vitro by cell cycle arrest and apoptosis, upregulated the gene expression of apoptosis and persuaded S phase arrest. MEAD also repressed breast cancer cell proliferation in a mouse model [23]. The results of Ajwa concerning the reduction of breast cancers are also supported by other studies [50].Ajwa date extract has been shown to reverse the damage caused by diethylnitrosamine induced hepatocellular carcinoma (HCC) in Wister mice. Levels of antioxidant enzymes, oxidative markers, cytokines, and gene expressions were restored back to normal [24]. Ajwa dates have been used to study the repressed action of Ajwa dates on prostate cancer cells for the first time. The treatment of PC3 cell line used for research in prostate cancer with EAFAD (ethyl acetate fractions of Ajwait Dates)

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has also shown significant repressed activity on PC3 cells [25]. Moreover, the presence of phenolics as effective bioactive compounds against HCC cells is also in line with another study [26]. The reduction in liver damage apart from liver cancers by maintaining ALT, AST, and ALP levels are also in line with another study [27].NK cells that are responsible for controlling numerous types of cancers, and infections caused by microbes by restricting the spread of damage [28] The fruit also balances the proliferation, differentiation migration, and maturation of RBC and platelets, according to a study published in the journal Cell Chemical Biology [29]. Ajwa Dates in Libya comprise a phytochemical called ß-glucan, which has anti-cancer activity against tumors [30].

Anti-microbial: The fruit of ajwa and safawi showed antibacterial action against S. aureus, B. cereus, Serratia marcescens, and E. coli, according to a study. Mabroom and Mariami dates could not show any action towards S.marcescens [31]. Ajwa fruit shows antibacterial action against selected gram-negative bacteria. Different extraction procedures lead to different phytochemical concentrations leading to the desired action against the bacteria. Both the bacteriostatic and bactericidal (killing bacteria) action was found. The methanol extract was found to be more potent for antibacterial actions [32].

Nephroprotective: The significant normalization of high creatinine, urea and uric acid and MDA levels (malondialdehyde; a urinary marker for oxidative stress) balancing out the actions of the enzymes responsible as antioxidants and reinstating the changed morphology in dichloroacetic acids induced nephrotoxicity in mice [33]. The preservation of renal tissue against damage is also supported by other studies [34,35]. Erythropoietin arbitrated protection of the kidney against the damage in the cells of the tubules amending the cytoskeleton damage, decreasing apoptosis and influencing regeneration of cells [36].

Antidiabetic: Diabetes is one of the major global nutritional issues. The figure has risen from 108 million to 422 million from 1980-2014 respectively, with rapid rises in developing and underdeveloped countries [37]. Drinks made from the roasted pit powder of Ajwa fruit reduce cholesterol, LDL, and triglycerides with a significant decrease in glucose and adequate insulin levels in mice. The pit is found most effective in combating obesity, hyperglycemia, and hypercholesterolemia [38]. Further studies are important regarding the amount and the no. of time of Ajwa fruit consumption to be proven effective in combating diabetes [39].

Dosage: Recommended doses of Ajwa have still not been researched for humans for the prevention of cardiovascular diseases, diabetes, cancer, nephron, and neural diseases. It has been shown that the extract of dates in a 10ml dose along with insulin increases the secretion of endogenous insulin in diabetic rats [40]. When ajwa was administered at a dose of 1.4g/kg to 24 Wister rats, it reduced doxorubicin related cardiotoxicity and enhanced the antioxidant potential of the cardiac tissue [41].

CONCLUSION

Reviewing literature regarding ajwa date fruit has led to the conclusion that it has a high potential and preventive cure against critical illnesses. However, there are many areas left for research regarding the exact mechanisms on how the flesh and the pits work, the use of ajwa as a drug in the pharmaceutical industry, the study on its powder and paste, and the extraction of each bioactive component along with the studies of their chemical structures to be used as drugs in the pharmaceutical industry and the use of ajwa in the food processing and producing industries.

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