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Effect of Supplementing Alcoholic and Aqueous Extract of Khalal and Seedless Date and Date Seed Khalal AL-Zahdi Date (*Phoenix dactylifera* L.) to Drinking Water on Some Physiological and Microbial Traits of Females of Quail Reared under High Temperature

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Abstract

This research aims to supplementing effect alcoholic and aqueous extract of khalal and seedless date and date seed khalal AL-Zahdi date (*Phoenix dactylifera* L.) to drinking water on some productive traits of quail females under high temperature, the study included using about 225 of quail females at the production stage at age 50 day, and it was randomly distributed at 45 female per treatment at rate 15 female per replicate. The birds were randomly distributed as following: The first treatment (T1) is control treatment without any addition to drinking water and the second treatment (T2) and the third treatment (T3) adding 300 mg / liter of water from the aqueous and alcoholic extract of AL-Zahdi Khalal respectively and fourth (T4) and fifth (T5)

adding 300 mg / liter of water from aqueous and alcoholic extracts from AL-Zahdi Khalal seed respectively. The results of the study indicated that there was a significant increase ($P \leq 0.01$) in the percentage of lymphocytes, and a significant decrease ($P \leq 0.01$) in the percentage of heterophill cells and the percentage of heterophill cells to lymphocytes (H / L) for all Addition treatments compared to control treatment, as well as a significant decrease ($P \leq 0.01$) in the number of E.Coli bacteria and a significant increase ($P \leq 0.01$) in the number of Lactobacilli bacteria. In the jejunum and ileum regions. We conclude from the study that the use of these extracts contributed to improving the physiological, histological and microbial characteristics.

Keywords: Aqueous Extract, Alcoholic Extract, Al-Zahdi Khalal, Al-Zahdi seeds Khalal, Quail Bird

Introduction

Heat stress is one of the main challenges facing the poultry industry in many regions of the world (Lin *et al.*, 2006) [49]. Compared to other domesticated animals, poultry birds are more susceptible to exposure to changes in environmental conditions due to their high efficiency in the rate of growth and metabolism. High body temperature, Heat stress induces changes in feed intake, increased water consumption, decreased growth rate, and body immunity (Abuja, 2010) [2]. Heat stress increases the formation of free radicals in bird cells, causing oxidative stress, where oxidative stress increases oxidation and decreases antioxidant molecules, so the body cannot replace or renew them in a short period (Yang *et al.* 2010; Slimen *et al.* 2014) [78, 70]. Many of the current studies have focused on medicinal and food plants and their role as antioxidants to prevent heat and oxidative stress due to the importance of their components as they are used as growth stimuli (Sarinivasan, 2005) [66] and as antibacterial (Tagoe *et al.*, 2011) [73] and as antioxidants (Osman *et al.*, 2005) [56]. Therefore, the specialists were interested in finding less expensive and fewer alternatives in terms of side effects, in addition to their medical, therapeutic and nutritional benefits for humans, animals and birds (Al-Khailani, 2009) [16]. Among these alternatives is the use of the fruit and the pits of Khalal Zahdi date where extracts and adding them to drinking water for poultry, where it is characterized during ascetics by containing vitamins such as C, E and A and the yellow phenolic pigments responsible for the yellow color, which is classified as one of the most important non-enzymatic antioxidants, Which rises in the ripening stage compared to the rest of the fruit ripening stages (Al- Laith, 2007; Ghnimi *et al.*, 2017) [17, 41]. As for the Date pits (*Phoenix dactylifera* L. CV. Al-Zahdi), it is characterized by its containment of many phenolic compounds and nutrients similar to the Date pits throughout the maturity stages of the Al-Zahdi dates fruit and has many medicinal uses as it is effective in treating infections (Awadalla *et al.*, 2002) [27]. It is considered a good source and stimulates the immune system in the body in addition to being an antioxidant (Al-Turk, 2008 [24]; Al-Jiriisi, 2016). Studies have shown that the pits dates have a positive effect on the average of weight gain

of fattening animals, due to the presence of chemicals similar to growth hormones in their work and this contributes to increasing the growth average of animals and birds (Awadalla, 2002; Al-Qarawi and others, 2004; Al-Sawaf, 2011) [27, 20, 21]. Therefore, this study aims to conduct the process of water and alcohol extraction of the fruit and the pits of Khalal Zahdi date and give them to quail females in the production stage to know the effects that these extracts contribute to mitigating the effect of high temperature due to the lack of similar studies on its effect to alleviate heat stress and to note the extent of its effect on some physical and the microbial traits of female quail birds raised at high temperatures.

Materials and Methods

The alcoholic extract was prepared according to the method used by (Harborne *et al.* 1975; Al-Juraisy *et al.*, 2013) [45, 12]. 50 g the fruit and the pits of Khalal powder were placed in a 1000 ml glass beaker, 250 ml of ethyl alcohol (ethanol) was added to it at a concentration of 70%, then the beaker was placed on the Magnetic stirrer device to mix well for 24 hours at room temperature and the mixture was filtered by layers of gauze. Then the prepared extract was placed in a flask of a rotary evaporator at a temperature of 40 ° C. For the purpose of getting rid of ethyl alcohol and moisture and to obtain a dry powder in relation to the extract of date pits or in the form of a sticky substance for an extract during ascetics. As for the aqueous extract of the fruit and the pits of Al Khalal, it was prepared by adding 50 g of the fruit and the pits of Al Khalal powder in a 1000 ml glass beaker and 250 ml of boiling water were added to it. The aqueous extract was prepared in the same methods as the alcoholic extract was prepared and the samples were dried at a temperature of 60 C °. The 225 Japanese quail birds aged 50 days from one hatching were used at a rate of 185 g for a period of 12 weeks. They were randomly distributed to five treatments. Each treatment included 45 birds at three replicates per treatment and at 15 birds per replicate. The birds were raised in wooden floor cages designed with dimensions of 1 m 2 equipped with a plastic feeder clip to ensure that the feed was not dispersed, as well as the use of inverted plastic fountains with a capacity of 5 L, the use of 16 hours of lighting, followed by 8 hours of darkness. The lamps were placed at a height of 2 m from the cages to ensure that the birds get good lighting intensity, and the birds were exposed to a temperature of (28-36-30 ± 2 C °) and a humidity of (40-60-50 ± 2%) for the times (700-1200) - 1900) and the experiment treatments were distributed as follows:

The first treatment (T1), the control treatment, without any addition to drinking water, the second treatment (T2) and the third (T3), adding 300 mg / L of water from the aqueous and alcoholic extract for the Al-Zahdi khalal date without pits, respectively. And the fourth treatment (T4) and the fifth (T5) add 300 mg / liter of water from aqueous and alcoholic extract for the Al-Zahdi khalal pits, respectively. The extracts were added daily to drinking water, a standard diet was used, the components of which were calculated according to the recommendations of the National Research Council of America (N.R.C), 1994) [55], and the protein content reached 20.0%, while the energy reached 2903 kilocalories / kg of feed energy represented. The data were analyzed using a completely randomized designs (CRD) to

study the effect of the studied treatments on the various traits, and the significant differences between the averages were compared using the Duncan (1955) [36] polynomial test. The program used SAS (2012) [67] in the statistical analysis. The following traits were studied: weekly body temperature measurement, estimation of the number of lymphocytes (L) and heterophyll cells (H) and the ratio of heterophil cells to lymphocytes (H / L) according to the method (Campbell, 1988) [31]. Some biochemical traits of serum, represented by measuring the concentration of total protein in serum as mentioned (Tietz, 1987) [74], the concentration of glucose in the blood serum according to the method (Tietz, 1995) [75], the cholesterol concentration in the blood serum according to the method (Young, 1995) [79] and the enzymes AST and ALT in serum Blood according to the method (Ritman and Frankel, 1957) [62], And the measurement of some oxidative enzymes in the blood serum represented by the concentration of glutathione (GSH) according to what was mentioned (Eyer, 1986) [39] and the enzyme catalase (CAT)) according to the method (Hadwan and Kadhum, 2018) [44], and the enzyme superoxide desmotase (SOD) according to the method (Marklund and Marklund, 1974) [52] and the enzyme Glutathione peroxidase (GPX) reported (Rotruck, 1973) [63] at ages 6 and 12 weeks of experiment. Calculating the number of *E. coli* and *Lactobacilli* bacteria and calculating villus height, width and depth of crypts in the jejunum and ileum regions at the age of 12 weeks according to the method (Bancoft and Marilyn, 2008; Al-Shukry, 2011) [28, 22].

Results and Discussion

The results in Table 1 showed the effect of adding the aqueous and alcoholic extract for the Alkhalal date without pits and the dates pits in drinking water on the number of lymphocytes and heterophyll cells and the percentage of heterophilic cells to lymph (H / L) of 50 day ages quail females raised at High temperatures for 12 weeks excelled on all treatments. It was significantly added ($P \leq 0.01$) compared with T1. Each of T3, T4 and T5 recorded the best results on T2 at the age of 6 weeks for the number of lymphocytes in the blood. As for the 12th-week results, T2, T3 and T5 were significantly excelled to ($P \leq 0.01$) compared with T1, T3 and T5 were significantly excelled to T2 and T4. While the results of the heterophil cells number at the age of 6 weeks from the beginning of the experiment indicated a significant decrease ($P \leq 0.01$) for all addition treatments compared with T1, and both T3 and T5 achieved the best results compared with T2 and T4, while the results of the 12th week from the beginning of the experiment witnessed a significant decrease. A significant decrease ($P \leq 0.01$) for T3, T4 and T5 compared to T1. The preference was in favor of T3 and T5 as it decreased significantly compared with T2. As for the results of the ratio of heterophil cells to lymph (H / L), it indicated a significant decrease ($P \leq 0.01$) for all addition treatments compared with T1 at week 6 of the beginning of the experiment. The preference was in favor of T3 and T5, where it decreased significantly compared with T2 and T4, as well as T4 significantly decreased compared with T2, while the results of the 12th week of the experiment indicated a significant decrease ($P \leq 0.01$) for all addition treatments compared with T1, and both T3 and T5 recorded the best results. It decreased significantly compared with T2 and T4.

Table 1: Effect of supplementing alcoholic and aqueous extract of khalal and seedless date and date seed khalal AL-Zahdi date (*Phoenix dactylifera* L.) to drinking water in lymphocyte and heterophile count and H / L ratio of 50-day ages of quail females under high temperature(Mean ± Standard error)

Studied traits	Weeks	Treatments					Significant level
		T1	T2	T3	T4	T5	
Lymphocytes	6	58.17±1.20c	62.33±1.99b	69.50±0.29a	66.67±1.48a	70.00±0.29a	**
	12	66.17±1.09c	68.50±0.58b	71.33±0.17a	67.67±0.60bc	71.50±0.76a	**
Heterophil cells	6	24.17±0.44a	21.00±1.00b	17.33±0.33c	19.17±0.60bc	17.17±0.44c	**
	12	21.67±0.67a	20.33±0.33ab	17.83±0.33c	19.17±0.33bc	18.00±0.58c	**
H/L	6	41.55±0.12a	32.93±1.18b	24.95±0.57d	28.82±1.52c	24.52±0.53d	**
	12	32.74±0.79a	29.70±0.72b	25.00±0.43c	28.34±0.69b	25.18±0.81c	**

The different letters within the same row indicate the presence of significant differences between the treatments, ** significant at p <0.01.

T1 control treatment without addition, treatment T2, T3 adding 300 mg \ L of water from the aqueous and alcoholic extract of Al-Zahdi Khalal, T4 'T5' Adding 300 mg \ L of water from the aqueous and alcoholic extract of AL-Zahdi khalal seeds respectively.

The decrease in the ratio of H / L in the addition treatments compared with T1 may be due to the increase in the blood lymphocytes corresponding to the presence of a decrease in the number of heterophyll cells. It works to reduce oxidation of fatty substances and compounds and then preserving the plasma membranes surrounding the lymphocytes from damage and protecting the antioxidant defence system inside the body by containing hydroxyl groups that work to give the hydrogen atom to the hydroxyl and peroxy radicals, leading to its stability and stopping its harmful action (Cao *et al.*, 1997) [32], As well as preserving these membranes and their optional permeability by preventing the oxidation of phospholipids present in these membranes by free radicals (Kelly *et al.*, 2002) [48], as well as their anti-microbial, inflammatory and oxidative role that increases the immune susceptibility of birds (Kamel *et al.* 2016) [47]. and their role as antioxidants in light of their action on eliminating harmful free radicals that are produced as a result of the activity and functioning of cells (Ardekani *et al.*, 2010) [26]. Or, the significant excelled of the addition treatments, especially the two treatments T3 and T5, may be due to their high content of vitamin E, which increases splenocyte proliferation and then this increase leads to an increase in the number of lymphocytes (Sakai and Moriguchi, 1997) [65], As the spleen matures the lymphocytes, vitamin E works to keep the cells in full effect, in turn, in preventing oxidative damage to the DNA of lymphocytes (Duthie *et al.*, 1996) [37]. In addition to its role in raising the body's immunity through its role in enhancing the biosynthesis of immunoglobulins in the blood (Boa-Amponsem *et al.*, 2006) [30].

Table 2 shows the results of the effect of the addition

treatments represented by the aqueous and alcoholic extract for the Alkhalal date without pits and the dates pits in drinking water on some biochemical traits in the blood serum represented by the level of protein, glucose, cholesterol, AST and ALT in the blood serum at weeks 6 and 12 of the experiment for 50-day ages quail females raised at high temperatures for 12 weeks, The results of the total protein level in the serum for weeks 6 and 12 of the experiment showed that all addition treatments were significantly excelled (P≤0.01) compared with T1, and the preference was in favor of T3 and T5, which in turn excelled both T2 and T4. While the results of serum glucose level in week 6 of the experiment indicated a significant decrease (P≤0.01) in favor of addition treatments compared with T1, and the preference was in favor of T3 as it decreased significantly compared with T2, T4 and T5, with a significant decrease in favor of T5 compared to T2, Where, the results of serum glucose at the 12th week of the experiment showed a significant decrease (P≤0.01) in favor of all addition treatments compared with T1.

The preference was in favor of T3 and T5, where it decreased significantly on both T2 and T4. The results of the serum cholesterol level at week 6 of the experiment showed a significant decrease (P≤0.01) in favor of T3, T4 and T5 compared with T1, while noting that T3 and T5 significantly decreased compared to T2 and T4. As for the results of the 12th week of the experiment, it indicated a significant decrease in all addition treatments (P≤0.01) compared with T1. The preference was in favor of T4 and T5, as it decreased significantly compared with T2 and T3, while T3 decreased significantly compared to T2. As for the results of the enzymes of AST and ALT at weeks 6 and 12 of the experiment, the results indicated a significant decrease (P≤0.01) for all addition treatments compared with T1, and the preference was in favor of T3 and T5, where it decreased significantly compared with T2 and T4.

Table 2: Effect of supplementing alcoholic and aqueous extract of khalal and seedless date and date seed khalal AL-Zahdi date (*Phoenix dactylifera* L.) to drinking water on some traits of blood serum of 50-day ages of quail females under high temperature(Mean ± Standard error)

Studied traits	Weeks	Treatments					Significant level
		T1	T2	T3	T4	T5	
Total protein(g/dl)	6	4.30±.007c	4.87±0.33b	5.52±0.06a	4.73±0.10b	5.48±0.10a	**
	12	3.64±0.15c	4.49±0.04b	5.33±0.53a	4.28±0.03b	5.29±0.09a	**
Glucose(mg/dl)	6	238.00±4.73a	223.33±0.33b	194.50±6.21b	218.17±1.33bc	208.83±3.24c	**
	12	282.17±2.52a	255.83±2.62b	213.00±2.08c	254.33±3.32b	215.33±1.96c	**
Chlesterol (mg/dl)	6	183.33±3.61a	178.33±1.01ab	160.33±1.83c	175.33±0.60b	154.83±0.67c	**
	12	192.67±1.59a	175.00±2.47b	160.83±2.02c	142.00±1.48d	142.83±2.52d	**
AST(U/L)	6	124.10±2.27a	113.07±2.63b	97.57±0.46d	106.40±0.41c	96.5±0.90d	**
	12	129.9±0.17a	115.40±0.55b	97.96±0.14c	115.90±0.63b	97.8±0.13c	**
ALT(U/L)	6	8.51±0.29a	5.51±0.39b	3.49±0.23d	5.34±0.17b	3.51±0.26c	**
	12	9.81±0.19a	7.92±0.03b	3.90±0.08c	7.37±0.32b	4.24±0.14c	**

The different letters within the same row indicate the presence of significant differences between the treatments, ** significant at p <0.01.

T1 control treatment without addition, treatment T2, T3 adding 300 mg \ L of water from the aqueous and alcoholic extract of Al-Zahdi Khalal, T4 'T5' Adding 300 mg \ L of water from the aqueous and alcoholic extract of AL-Zahdi khalal seeds respectively.

The high level of protein in the blood serum in the addition treatments, especially the two treatments T3 and T5, may be due to their high content of flavonoids, which may work to reduce the severity of exposure of birds to high temperatures to reduce body temperature and fever (Ben Sassi, 2018) [29]. The flavonoids reduce prostaglandin production by inhibiting the enzyme cyclo-oxygenase, which is responsible for the conversion of arachidonic fatty acid to the temperature-causing prostaglandins (Tunon *et al.* 2009) [76]. Exposure to high temperature leads to stress of birds, which leads to an increase in the level of the hormone corticosterone in the blood serum in order to form glucose from a non-carbohydrate source by destroying proteins in the process of Gluconeogenesis (Freeman, 1987) [40]. To ensure that an adequate blood glucose level is maintained for energy (Quinteiro-Filho *et al.*, 2012) [60]. As for the results of the serum glucose level, the reason for a significant decrease in the addition treatments, especially the two treatments T3 and T5, is due to the fact that they contain phenols, antioxidants, magnesium, phosphorous, biotin, Sundu *et al.* (2006) [72], El-Sohaimy and Hafez (2010) [38], which contribute to reducing the level of glucose in the blood. By its role in increasing the level of the enzyme Glucokinase in liver cells and the islets of Lankarhans in the pancreas, especially biotin, as this enzyme works to regulate the degradation of glucose (Al-Kahteeb, 2008) [15]. In addition, phenolic compounds stimulate undifferentiated cells in the islets of Lankarhans in the pancreas and transform them into modern differentiated beta cells that increase insulin secretion and thus lower the level of glucose in the blood (Habib and Ibrahim, 2011 [43]; Abdelaziz *et al.*, 2015). The reason for a significant decrease in the level of cholesterol in the blood serum at the age of 21 days when using the aqueous and alcoholic extract for the Alkhalal date without pits and the dates pits, especially for the two treatments (T3) and (T5), may be due to the containment of these extracts containing active compounds such as

flavonoids and alkaloids that are Antioxidants prevent the oxidation of lipid membranes (Waly *et al.*, 2015; Ahmed *et al.*, 2015) [80, 4]. As these compounds work to restrict the action of metal ions that stimulate the oxidation process by having multiple hydroxyl groups that work to give hydrogen atoms to free radicals, leading to their stability and stopping their action in fat oxidation (Veskoukis *et al.* 2010) [77]. In addition to its role in increasing the production of the enzyme Paraoxonase1, which plays an important role by binding with HDL and preventing its oxidation (Serhatlioglu and others, 2003; Al-Khafaji, 2018) [68, 14]. As for the enzymes transporting the amine (ALT, AST), which occupy an essential role in the vital processes where they transport The amine group ranges from amino acids to ketone acids and vice versa in most organisms (Ibrahim and Saleh, 2005) [46] and the addition of the extracts has contributed significantly to the decrease of enzymes in the blood serum, especially in the two treatments T3 and T5 due to the high amount of flavonoids in them, which work to protect cell membranes from oxidation by their inhibitory effect on the action of free radicals because they contain hydroxyl groups that work to give the hydrogen atom and then saturate the roots. Free radicals make them stable and ineffective at the beginning of the chain of oxidation processes of fatty acids in cell membranes (Mishra *et al.*, 2013) [53]. Or the role of Sitosterol-, which is a protective substance that works on not forming free radicals and then increases the efficiency of the liver's work, which Al-Qarawi *et al.* (2004) [20] has proven. It is found in dates and dates.

Table 3 shows the results of the effect of adding the aqueous and alcoholic extract for the Alkhalal date without pits and the dates pits in the drinking water of 50-day ages quail females raised at high temperatures for 12 weeks on the level of some oxidation indicators in the blood serum represented by Glutathione (GSH) and Catalase (CAT), Super oxide Dismutase (SOD) and Glutathione Peroxidase (GPX) for weeks 6 and 12 of the experiments, The results indicated that all addition treatments were significantly excelled ($P \leq 0.01$) compared with T1. The preference was in favor of T3 and T5, which in turn excelled both T2 and T4 in all the studied traits.

Table 3: Effect of supplementing alcoholic and aqueous extract of khalal and seedless date and date seed khalal AL-Zahdi date (Phoenix dactylifera L.) to drinking water on some indicators of oxidation of serum of 50-day ages of quail females under high temperature (Mean ± Standard error)

Studied traits	Weeks	Treatments					Significant level
		T1	T2	T3	T4	T5	
Glutathione (µmol/L)	6	53.67±2.72c	61.33±2.83b	77.60±2.16a	60.84±1.76b	84.73±1.65a	**
	12	35.07±0.05c	38.08±0.33c	44.26±2.05b	39.17±0.10c	54.80±2.00a	**
Catalase (KATAL/ML)	6	0.07±0.02b	0.13±0.01a	0.19±0.02a	0.13±0.02a	0.18±0.01a	**
	12	0.12±0.01b	0.13±0.01b	0.17±0.01a	0.13±0.01b	0.18±0.02a	**
Superoxide Dismutase(U/L)	6	614.83±4.63c	666.44±10.90bc	1219.82±4.98a	823.3±11.19b	1220.66±5.05a	**
	12	598.2±4.37c	1000±6.04b	1827.8±18.89a	1027.8±8.89b	1890.7±15.2a	**
Glutathione peroxidase(U/L)	6	493.48±32.2d	615.75±23.80c	881.30±15.76a	707.56±4.54b	905.40±9.98a	**
	12	477.67±1.95b	501.33±1.17ab	571.00±16.20a	496.78±5.7ab	596.00±3.85a	**

The different letters within the same row indicate the presence of significant differences between the treatments, ** significant at $p < 0.01$.

T1 control treatment without addition, treatment T2, T3 adding 300 mg \ L of water from the aqueous and alcoholic extract of Al-Zahdi Khalal, T4 'T5' Adding 300 mg \ L of water from the aqueous and alcoholic extract of AL-Zahdi khalal seeds respectively. Exposure of birds to high temperatures leads to stress, and

this contributes to low levels of non-enzymatic antioxidants in the blood serum and all body tissues that the bird gets from the feed, and because of the low feed consumption and the low ability to manufacture vitamins inside the body such as vitamin C, this leads to lower levels Non-enzymatic antioxidants in the body, so the body resorts to the

consumption of enzymatic antioxidants, which leads to their depletion in the body tissues, The high level of oxidative enzymes in the blood serum when using the extracts may be due to the high content of those extracts of flavonoids, which are classified as antioxidants that work to protect the cells that manufacture antioxidant enzymes, which leads to an increase in their concentration in the blood serum due to the flavonoid compounds containing groups The polyhydroxylation that gives hydrogen atoms to free radicals makes them more stable and does not attack cell membranes that contain lipid compounds (Gu *et al.*, 2003; Al-Farsi *et al.*, 2005; Mansouri *et al.*, 2005; Shanab *et al.*, 2014; Ahmed *et al.*, 2018) [42, 8, 50, 69, 5]. The flavonoids in the pits also reduce the oxidation of low-density lipoproteins, LDL and cholesterol, by binding to them and forming non-oxidative compounds (Mohamed and Al-Okbi, 2004 [54]; Al-Ghanim *et al.*, 2010 [10]; Akuna *et al.*, 2012; Al-Meqbaali *et al.*, 2017 [19]). The flavonoids increase the level of glutathione due to their role in the synthesis of Y-Glutamyl cysteine, which increases the rate of formation of glutathione and thus increases the concentration of the enzyme glutathione peroxidase (Zitka *et al.*, 2012) [81]. Also, the increase in the level of oxidation indicators in the blood serum may be due to the containment of these extracts of vitamin E, as vitamin E plays an important role as a natural antioxidant and plays an important role in combination with the enzyme glutathione peroxidase in preventing the oxidation of unsaturated fatty acids in the cells of the body in combination with the element selenium. It is included in the

aforementioned enzyme synthesis (Abdul-Wahed and Al-Zuhairi, 2009) [1], and then maintains the antioxidants at their standard levels compared to the control treatment. Vitamin E is also classified as a non-enzymatic antioxidant, which works to reduce enzymes that work to oxidize fatty compounds such as Xanthine Oxidase and NADH dehydrogenase. Vitamin E also reduces the formation of hydrogen peroxide and thus contributes to preventing damage to cell membranes by removing free radicals resulting from the oxidation process, and then the vitamin provides the first line of defense for protection from hydrogen peroxide resulting from heat stress (Panda *et al.*, 2008) [57] This is what contributes to reducing the consumption of antioxidant enzymes and increasing their levels in the blood serum. This was observed in all trial treatments with a preference in favor of the two treatments T3 and T5.

Table 4 the results of the effect of adding the aqueous and alcoholic extract for the Alkhalal date without pits and the dates pits to the numbers of E. coli and Lactobacilli bacteria in the jejunum and ileum at the 12th week of the experiment for 50-day aged quail females raised at high temperatures for 12 weeks. (P≤0.01) in favor of both T3 and T5 compared to the rest of the experiment treatments for coliform bacteria in the jejunum and ileum, As for the results of Lactobacilli bacteria in the jejunum and ileum regions, it indicated a significant increase (P≤0.01) for all addition treatments compared with T1 and the preference was in favor of T3 and T5, which in turn excelled T2 and T4.

Table 4: Effect of supplementing alcoholic and aqueous extract of khalal and seedless date and date seed khalal AL-Zahdi date (Phoenix dactylifera L.) to drinking water on the numbers of coliform bacteria and lactobacilli in the jejunum and ileum regions (log / g cycle)50-day ages of quail females under high temperature(Mean ± Standard error)

Type of bacteria	The location of the examination	Treatments					Significant level
		T1	T2	T3	T4	T5	
E.Coli	jejunum	3.02±0.05a	2.90±0.06a	2.13±0.01b	2.91±0.05a	2.11±0.03b	**
	ileum	3.08±0.04a	2.87±0.08b	2.10±0.03c	2.77±0.07b	2.13±0.00c	**
Lactobacilli	jejunum	4.39±0.01d	5.36±0.04c	7.26±0.06a	5.81±0.11b	7.30±0.02a	**
	ileum	4.53±0.02c	5.51±0.06b	7.48±0.05a	5.86±0.23b	7.54±0.01a	**

The different letters within the same row indicate the presence of significant differences between the treatments, ** significant at p <0.01.

T1 control treatment without addition, treatment T2, T3 adding 300 mg \ L of water from the aqueous and alcoholic extract of Al-Zahdi Khalal, T4 'T5' Adding 300 mg \ L of water from the aqueous and alcoholic extract of AL-Zahdi khalal seeds respectively.

Heat stress disrupts the microbial balance in the gut of birds, which leads to an increase in the numbers of harmful microorganisms at the expense of the numbers of beneficial microorganisms. This leads to negative effects on the vitality and performance of birds, and measuring the numbers of Lactobacilli bacteria and E. Intestinal pathology bacteria while Lactobacilli bacteria are an important indicator of beneficial bacteria that have an important role in the competitive elimination process for many types of pathological intestinal bacteria (Al-Tamimi, 2004) [23], The reason for the significant decrease in harmful coliform bacteria in the ileum area and the significant increase in the number of beneficial lactobacilli bacteria when using the extracts, especially the two treatments T3 and T5, in which the birds consumed the alcoholic extract for the Alkhalal date without pits and the dates pits may be attributed to their high content of flavonoids. Pandey *et al.* (2010) [58] indicated that the flavonoids, especially Quercetin and Apigenin, work

to inhibit the synthesis of harmful bacteria's nucleic acids by forming hydrogen bonds that impede the work of DNA and RNA to form the protein of the bacteria or work on binding and interaction with the bacteria by means of hydrogen bonds and thus the bacteria lose the property of adhesion. The two compounds had an increased amount in the alcoholic extract of fruit and pits of Al-Zahdi Khalal dates and this effect reduced the numbers of coliform bacteria and increased the competitive exclusion of these bacteria. This contributed to an increase in the number of Lactobacilli bacteria. Or, the reason for the low numbers of coliform bacteria may be due to the nuclei containing Mannan-Oligosaccharide, Daneshyar *et al.* (2014) [34], which possesses binding regions with cilia with pathogenic bacteria such as E. coli bacteria, thus preventing them from binding at the receiving sites in the intestinal lining and excluding them from the body (Spring, 2011). 1996) [71]. This may contribute to an increase in the number of Lactobacilli bacteria.

Table 5 shows the results of the effect of adding aqueous and alcoholic extract the Alkhalal date without pits and the dates pits to drinking water in Villi Length, Villi Width and Crypt Dept in the jejunum and ileum at week 12 of the

experiment for 50-day ages quail females raised in at High temperature, It is noted that a significant excelled ($P \leq 0.01$) for all addition treatments compared with T1 in the trait of villi height, cry depth in the jejunum and ileum, and width

of villi in the jejunum region, with an observation, excelled of T3 and T5 over both T2 and T4. As for the traits of villi width in the ileum region, T3 and T5 were significantly excelled to ($P \leq 0.01$) compared with T1, T2 and T4.

Table 5: Effect of supplementing alcoholic and aqueous extract of khalal and seedless date and date seed khalal AL-Zahdi date (*Phoenix dactylifera* L.) to drinking water on the height, length and width of the villi and the depth of the crypts of 50-day ages of quail females under high temperature (Mean \pm Standard error)

Weaving area	The location of the examination	Treatments					Significant level
		T1	T2	T3	T4	T5	
Jejunum	villi length	238.06 \pm 1.95c	276.14 \pm 3.48b	307.29 \pm 8.34a	272.26 \pm 2.35b	312.64 \pm 0.98a	**
	villi width	52.66 \pm 0.66c	60.73 \pm 0.93b	71.86 \pm 1.49a	59.63 \pm 1.54b	73.48 \pm 0.91a	**
	Depth of crypts	42.50 \pm 0.26c	46.86 \pm 0.36b	53.24 \pm 1.30a	45.88 \pm 0.48b	54.57 \pm 1.19a	**
Ileum	villi length	217.66 \pm 3.95c	268.69 \pm 4.25b	295.80 \pm 1.85a	259.36 \pm 3.77b	300.85 \pm 4.72a	**
	villi width	56.12 \pm 0.04c	66.51 \pm 1.33b	77.62 \pm 2.97a	64.97 \pm 1.31b	76.36 \pm 1.32a	**
	Depth of crypts	43.47 \pm 0.55b	46.71 \pm 1.07b	58.07 \pm 1.20a	46.05 \pm 0.47b	59.35 \pm 3.13a	**

The different letters within the same row indicate the presence of significant differences between the T1 treatments, ** significant at $p < 0.01$ control treatment without addition, treatment T2, T3 adding 300 mg \ L of water from the aqueous and alcoholic extract of Al-Zahdi Khalal, T4 'T5' Adding 300 mg \ L of water from the aqueous and alcoholic extract of AL-Zahdi khalal seeds respectively.

The digestive system provides the biological environment for the digestion and absorption of the eaten food and protection from diseases and toxins, and the broiler grows very quickly due to the high capacity of the small intestine to absorb the digested food and convert it into muscles, Heat stress causes cellular changes to the mucous membrane lining the small intestine, and these changes depend on the genetic status of the bird and the period of the birds 'exposure to heat stress. Studies have shown that heat stress reduces the height of the villi, a decrease in the depth of the crypts and the weight of the jejunum, and all these factors affect the ability of birds on the digestion and absorption of nutrients necessary for sustenance and production (Perazeres *et al.*, 2016) [59]. Heat stress also reduces the performance of the mucous membrane of the small intestine due to the permeability of the intestine affected by oxidation resulting from heat stress and this is what works to form Reactive Oxygen Species and Reactive Nitrogen Species, which work to form hydrogen peroxide as a result of attack Intestinal cell membranes and target lipoproteins, and the final product of harmful hydrogen peroxide is a nonenal 4-Hydroxy compound, which increases the oxidative damage to the intestinal cell membrane and also causes inflammation of the digestive system and this leads to the influx of harmful bacteria from the intestinal lumen into the blood and its transfer to all tissues of the body (Marchini *et al.*, 2011) [51]. All of these factors lead to a decrease in the compensation of intestinal cells and then affect the villi height, width and depth of crypts that contribute to increasing the process of absorption of digested food, but when birds were treated with extracts, a significant increase was observed in all the studied traits and for all addition treatments, with the excelled of the two treatments T3 and T5. The reason for this may be due to their high content of flavonoids, which are classified as natural antioxidants, which may work to preserve the outer mucosa lining the intestine from oxidation by acting as complexes with unsaturated fatty acids present in cell membranes and then reduce the effects of free radicals and prevent degradation Cell membranes (Rice-Evans *et al.*, 1996) [61]. Or, flavonoids may increase the activity of the gastrointestinal tract in general and the small intestine area of the jejunum and ileum regions in particular by observing an increase in the length and width of the villi, as well as an increase in the depth of the crypts in them. Crypts are the villi generating cells and they divide

in order to compensate for the damaged villi cells, and the speed of cell division and proliferation is an indication of a rapid tissue transformation that works to regenerate the villi as a natural response to get rid of the damaged villi and replace them with new cells when the bird is exposed to various stresses (Anonymous, 1999) [25]. The speed of this response in the process of regenerating damaged villi is only an important indicator of the effectiveness of the digestive system of birds, and this is due to the role played by the extracts, especially the two treatments (T3) and (T5) due to the high components of their active compounds. In light of the observation of Table 5, a significantly excelled of the treatments that dealt with the extracts is observed in the preparation of Lactobacilli bacteria, which is an important indicator of beneficial bacteria that have an important role in the competitive elimination process of many types of pathological intestinal bacteria (Al-Tamimi, 2004) [23], and this may help in improving The state of digestion and absorption in the jejunum and ileum area due to the role that these extracts play in protecting and activating the cell wall in these two areas from harmful elements and bacteria. Conclusions. The addition of aqueous and alcoholic extracts for the Alkhalal date without pits and the dates pits at a ratio of 300 mg / L of drinking water greatly contributed to a significant increase in the studied physiological, microbial, and histological traits, and the preference was in favor of the two treatments T3 and T5 for quail birds exposing to heat stress and consuming drinking water. A container of 300 mg of alcoholic extract fruit and pit for the Alkhalal date, respectively.

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