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 Broiler Reared Under High Temperature

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Abstract

This research aims to 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 of the physiological, histological and microbial traits of broilers reared under high temperature. As the study included the use of 300 chicks of one day age and with an average weight of 41 g, the unsexed rose strain, and it was distributed to five treatments, where one treatment contained 60 chicks, with three replicates for each treatment (20 chicks/replicates ) for a period of 6 weeks, the birds were exposed to temperatures at an average of (28- 36 -30 ± 2 ° C) and the degree of humidity at an average of (40- 60-50 ± 2%) for the times (700-1200-1900). The chicks were distributed randomly into five treatments 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 / liter of water from the aqueous and alcoholic extract for Al-Zahdi khalal, respectively and the fourth treatment (T4) and the fifth (T5) adding 300 mg / liter of water from aqueous and alcoholic extract for the Al-Zahdi khalal seed, respectively. The results of the study indicated that there was a significant improvement in the weekly body temperature, a significant increase in the number of lymphocytes and a significant decrease in the number of heterophill cells and the percentage of heterophill cells to lymphocytes (H/L) for all addition factors compared to With control treatment, As well as a significant increase in the concentration of total protein in blood serum and all oxidative enzymes in blood serum, noting that a significant decrease occurred in the concentration of both glucose and cholesterol at the age of 21 days and the AST enzyme and ALT enzyme at the age of 42 days. The preference was in favor of T3 and T5, as was the significant increase in all the studied histological traits. Also, there was a significant decrease in the number of E. Coli bacteria in the ileum area only, and a significant increase 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 the improvement of the studied physiological, histological and microbial characteristics of broilers reared at high temperatures, noting that T3 and T5 recorded the best results for all the studied traits.

Keywords: Aqueous extract, Alcoholic extract, Al-Zahdi Khalal, Al-Zahdi seeds, Heat stress, broiler.

1. Introduction

The high temperature affects the poultry industry in large areas of the world and it may be one of the most important problems facing the poultry industry in Iraq due to the abnormal rise in summer temperatures for more than six months of the year, which results in birds being exposed to heat stress that leads to a great economic loss due to high depreciation and low production When the environment temperature raises, changes occur in some components of the blood, which include a decrease in the total protein concentration, an increase in the concentration of glucose sugar in the blood plasma, and a decrease in the calcium concentration in the blood serum [1]. Heat stress causes a deterioration in the productive and physiological traits of birds [2,3]. Various means and methods have been used to alleviate this phenomenon, such as adding
salts [4], adding vitamins such as vitamin C [5] and adding glucose [6] and the use of manufactured chemical drugs as one of the means of reducing heat stress, such as analgesic and sedative drugs such as morphin and hypothermia such as aspirin and paracetamol, may have negative effects on consumer health as a result of their accumulation in the body of birds and their transmission to humans in addition to their high price [7]. Therefore, specialists have been interested in finding less expensive and lesser alternatives in terms of side effects, in addition to their medicinal, therapeutic and nutritional benefits for humans and animals [8]. Among these plants is the use of the fruit and the pits of Al-Zahdi khalal. As the Al-Zahdi Khalal is the third stage of the ripening stage of the fruit Al-Zahdi dates, which are characterized by yellow color because they contain flavonoids, which are classified as one of the most important natural non-enzymatic antioxidants [9]. As for the pits of Al-Zahdi Khalal, it is characterized by containing many important nutrients. The pits of Al-Zahdi Khalal are characterized by their high content of antioxidants because they contain large quantities of phenolic compounds, especially Gallic Acid and M-Coumaric. Note that these compounds improve the functional performance of the body through their work on the integrity of the body's immune system [10,11]. In light of the above, this study was designed to investigate the role played by the use of aqueous and alcoholic extracts of the fruit and the pits of Al-Zahdi Khalal, which despite the encouraging results recorded for similar studies on extracts of dates and pits date on other laboratory animals. And the lack of similar studies on the effect of the fruit and the pits of Al-Zahdi Khalal to reduce the effect of heat stress for poultry birds. The possibility of its efficiency in getting rid of stress caused by high temperature, improving some side effects resulting from it, and preventing its effects remains a topic that calls for study, experimentation and understanding the extent of the contribution of these extracts as antioxidants and compounds that improve physiological performance. Therefore, this study aims to make extracts and add them to drinking water and to know their effect on some physiological, histological and microbial traits of broiler chickens raised at high temperatures.

2. Materials and Methods

The alcoholic extract was prepared according to the method used by [12,13]. 50 g of Al-Zahdi Khalal and seeds 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 humidity and in order to obtain a dry powder for the Al-Zahdi khalal seeds extract or in the form of a sticky substance for Al-Zahdi Khalal extract. The amount of alcoholic extract for Al-Zahdi Khalal resulting was at an average of 8 g, while the amount of alcoholic extract for Al-Zahdi khalal seeds resulting was at an average of 2.7 g. As for the aqueous extract, it was prepared in the same methods where the alcoholic extract, but by using boiled distilled water instead of ethyl alcohol, and the samples were dried at a temperature of 60 ° C. The quantity of aqueous extract for Al-Zahdi Khalal resulting was at an average of 6 g, while the amount of aqueous extract for Al-Zahdi khalal seeds resulting was at an average 2 g. In this experiment, 300 chicks of meat were used, one day age, with an average weight of 41 g, the unsexed rose strain, and randomly distributed into five treatments, 60 chicks per treatment, with three replicates for each treatment (20 chicks / per replicate), the continuous lighting system was adopted for a period of (24 hours/day). The chicks were raised on the ground-raising system on the litter, the chicks were fed on a starter diet from one day age until the age of 21 of the birds containing the percentage of protein and energy by 23.04% and 3027.10 kg / kg feed respectively. After that, it was replaced by a growth suspension until the end of the experiment at 42 days age, which contains protein and energy ratio of 20.06% and 3194.92 kilocalories/kg, according to the chemical analysis of the diet according to NRC [14]. The birds were exposed to temperatures of (28-36°) 30 ± 2 ° C and the degree of humidity (40-60-50 ± 2%) for the times (700 - 1200 - 1900). The experiment was designed to include five treatments: -

The first treatment (T1) control treatment, without any addition to drinking water. The second treatment (T2) adding of the aqueous extract for the Al-Zahdi Khalal without seeds at a ratio of 300 mg / L of drinking water. The third treatment (T3) adding the alcoholic extract for the Al-Zahdi Khalal without seeds at a ratio of 300 mg / L of drinking water. The Fourth treatment (T4) adding of the aqueous extract for the Al-Zahdi Khalal without seeds at a ratio of 300 mg / L of drinking water. The Fifth treatment (T5) adding the alcoholic extract for the Al-Zahdi Khalal seeds at a ratio of 300 mg / L of drinking water.

The data were analyzed using a completely randomized design (CRD) to study the effect of the studied treatments on the different traits, and the significant differences between the averages were compared using the Duncan [15] polynomial test. The program used SAS [16] in the statistical analysis. The following traits were studied: measuring the weekly body temperature and estimating the number of lymphocytes (L) and heterophil cells (H) and the ratio of heterophil cells to lymphocytes (H / L) according to the method [17]. And some biochemical traits of blood serum represented by measuring the concentration of total protein in serum according to what was mentioned [18], the concentration of glucose in the blood serum according to the method [19], the concentration of cholesterol in the blood serum according to the method [20] and the enzymes AST and ALT in serum Blood according to the method [21]. And the measurement of some oxidative enzymes in the blood serum represented by the concentration of glutathione (GSH) as mentioned [22] and the enzyme...
Catalase CAT) according to the method [23], and the enzyme Superoxide dismutase (SOD) according to the method [24] and the enzyme glutathione Peroxidase (GPX) reported [25] at age 21 and 42 days. 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 42 days of age according to the method [26,27].

3. Results and Discussion

Table 1 shows the weekly rectal temperature of birds for five periods. The results of the period (8-14) days showed a significant decrease (P≤0.01) for all addition treatments compared with T1 in most of the experiment weeks starting from the second week (8-14 days) except for the fourth week (22-28 days) in which the results showed no significant differences between the experiment treatments. T5 and T3 recorded the best results, where they significantly decreased compared to T2 and T4 in most of the experiment weeks.

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 on the weekly body temperature °C of broiler chickens reared under high temperature (mean ± standard error).

| Age Weeks | Treatments | T1 | T2 | T3 | T4 | T5 | Significant level |
|-----------|------------|----|----|----|----|----|------------------|
| 2         |            | 42.57±0.07<sup>a</sup> | 42.10±0.06<sup>b</sup> | 41.63±0.09<sup>b</sup> | 41.93±0.28<sup>ab</sup> | 41.57±0.07<sup>b</sup> | **   |
| 3         |            | 42.43±0.07<sup>b</sup> | 42.10±0.06<sup>b</sup> | 41.90±0.06<sup>cd</sup> | 42.00±0.06<sup>bc</sup> | 41.73±0.03<sup>d</sup> | **   |
| 4         |            | 42.70±0.06 | 42.47±0.03 | 42.37±0.03 | 42.50±0.07 | 42.27±0.03 | NS   |
| 5         |            | 42.60±0.06<sup>b</sup> | 42.47±0.03<sup>bc</sup> | 42.27±0.03<sup>b</sup> | 42.47±0.06<sup>bc</sup> | 41.93±0.09<sup>b</sup> | **   |
| 6         |            | 42.73±0.09<sup>b</sup> | 42.50±0.12<sup>b</sup> | 42.23±0.09<sup>b</sup> | 42.57±0.07<sup>a</sup> | 42.20±0.06<sup>d</sup> | **   |

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.

mg/L of water from the aqueous and alcoholic extract for Al-Zahdi Khalal seeds respectively body temperature is one of the most important indicators that determine the health status of birds and the extent to which they are affected by the temperature of the environment, and its preservation is an important priority because its rise poses a threat to The physical balance of birds and the reason for the decrease in body temperature may be due to the high concentration of flavonoids in the addition treatments, especially in T3 and T5 [28]. Flavonoids such as Luteolin, Apigenin, and Quercetin act where anti-inflammatory, analgesic and antipyretic agents by working on the functions of special enzyme systems that participate in the generation of inflammatory processes by working to inhibit the formation of the enzymes Cyclo Oxygenase and Lipoxase that mediate inflammatory processes. In addition, flavonoids reduce the production of prostaglandins by inhibiting the enzyme Cyclo-Oxygenase, where this enzyme is responsible for the transformation of the arctic fatty acid into prostaglandins that cause pain and high temperature [29]. These results were in agreement with [7], who indicated a decrease in the temperature of the broiler chickens in the following times (600,1800,2400) when adding the aqueous extract of boiled pits date at a concentration of 0.4% in drinking water at week 5, and also observed a decrease in week 6. Body temperature when eating broilers from Aqueous extract of Al-Zahdi khalal seeds boiled at a concentration of 0.3% with drinking water.

Table 2 showed that the effect of adding the aqueous and alcoholic extract for the Al-Zahdi khalal and Al-Zahdi khalal seeds in the drinking water of broiler chickens raised at high temperatures resulted in a significantly excelled of T3, T4 and T5 (P≤0.01) compared with T1 with T3 and T5 excelled on T2 and T4 for the number of cells. Lymphocytes at the age of 21 and 42 days. As for the results of the number of H-cells, a significant decrease (P≤0.01) was observed for all addition treatments compared with T1 at the age of 21 days. While the results of the age of 42 days indicated that there was a significant decrease (P≤0.01) for each of T3, T4 and T5 compared with T1, and T3 and T5 were significantly decreased compared with T2 and T4.Where, the results of the number of heterophylla cells into lymphocytes H / L indicated a significant decrease (P≤0.01) for all addition treatments compared with T1, with a significant decrease in favor of T3 and T5 compared with T2 and T4 at the age of 21 days. As for the results of the age of 42 days, it indicated a significant decrease (P≤0.01) for all addition treatments compared with T1, and the preference was in favor of T3 and T5 as it decreased significantly compared with T2 and T4, and also decreased T4 compared to T2.
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 in lymphocyte and heterophile count and H / L ratio of broilers reared under high temperature (mean ± standard error).

| Studied traits         | Weeks | Treatments       | Significant level |
|------------------------|-------|------------------|-------------------|
|                        |       | T1               | T2                | T3               | T4               | T5               |
| Lymphocytes            | 3     | 58.3±0.44abc     | 60.3±1.30abc     | 69.50±0.58abcd   | 63.00±1.61bc     | 69.33±1.172bc    |
|                        | 6     | 59.67±0.60abc    | 60.17±1.45abc    | 69.17±1.09abcd   | 64.17±1.83abcd   | 69.83±0.67abc    |
|                        |       | 28.67±0.17bc     | 30.50±1.15bc     | 21.67±0.33bc     | 23.83±0.73bc     | 21.67±0.33bc     |
|                        | 3     | 28.50±0.29bc     | 26.83±1.09bc     | 21.33±0.44bc     | 25.50±0.29bc     | 20.50±0.29bc     |
|                        | 6     | 48.73±0.42a      | 39.07±2.77b      | 31.24±0.55c      | 37.84±0.81b      | 31.18±0.41c      |
|                        | 3     | 47.76±1.13a      | 44.59±1.27b      | 30.84±0.19d      | 39.81±1.25c      | 29.36±0.22d      |
| H/L                    |       | 31.24±0.55c      | 37.84±0.81b      | 31.18±0.41c      | 31.18±0.41c      | 29.36±0.22d      |

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

T1 treatment control 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 ratio of heterophill cells / lymphocytes (H / L) is an important indicator of the true health status of birds, as an increase in this ratio is a clear indication of stress in birds, [30]. The H / L values increase with increasing temperature, which can be considered a measure of the environmental stress of the bird, and heterophil cells are classified as a free radical scavenger, especially oxide-O2, whose production increases due to the oxidative process resulting from heat stress, where heat stress stimulates cells heterophil, and their number increases with the large amounts of free radicals produced in and out of cells [31]. Exposure to heat stress leads to an increase in the secretion of cortical hormones to the adrenal gland, which leads to the emergence of a state of lack of lymphopenia [32]. The decrease in the H / L ratio of the addition treatments compared with T1 may be due to the increase in lymphocytes corresponding to the presence of a decrease in the number of heterophill cells. This may be due to the fact that the extracts contain flavonoids, which are classified as antioxidant compounds that increase the activity of antioxidants, which work to reduce the oxidation of fats and stop the action of ions involved in the oxidation process and thus preserve the plasma membranes surrounding lymphocytes from damage and protect the defence system. The antioxidant inside the body by containing hydroxyl groups that work to give the hydrogen atom to the hydroxyl and peroxyl radicals, leading to its stability and stopping its harmful action [33] As well as maintaining these membranes and their optional permeability by preventing the oxidation of phospholipids present in those membranes by free radicals [34]. It was found that the addition of the aqueous and alcoholic extract for the Al-Zahdi klhalal and AL-Zahdi khalal seeds, It contributed to raising the percentage of lymphocytes as well as reducing the percentage of heterophill cells, and then reducing the ratio of heterophill cells to lymphocytes.

Table 3 shows the results of some blood serum traits represented by the level of total protein, glucose, cholesterol, and the enzymes AST and ALT, which were measured at the age of 21 and 42 days of age of birds. The results of the total protein level in the blood serum indicated that all the addition treatments were significantly excelled (P≤0.01) on T1 when 21 days of age with T5 excelled T2, T3 and T4 as well as T3 excelled T2 and T4, As for the results of the age of 42 days, it indicated that T3, T4, and T5 were significantly excelled (P≤0.01) over T1, with T5 noticing the excelled T2, T3 and T4, as well as the excelled T3 on T2, while the results of the level of glucose in blood serum at the age of 21 showed a significant decrease (P≤0.01) in favor of T3 and T5 compared with T1, T2 and T4, while the results of the glucose level at the age of 42 days showed a significant decrease (P≤0.01) for all addition treatments compared with T1 and the preference was in favor of T3 and T5 as it decreased significantly compared with T4. As for the results of the serum cholesterol level at the age of 21 days, it 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 to T2 and T4, while the results of the serum cholesterol level were shown at age 42 days. There were no significant differences between all experiment treatments. While the results of the level of AST enzyme in serum at the age of 21 days showed a significant decrease (P≤0.01) for all addition treatments compared with T1 and the preference was in favor of T3 and T5 as it decreased significantly compared with T2 and T4, while the results of the age of 42 days, a significant decrease was observed. (P≤0.01) in favor of T3 and T5 compared to the rest of the treatments. The results of the ALT enzyme level in the blood serum at the age of 21 days indicated that there were no significant differences between the experiment treatments, but at the age of 42 days, the results indicated a significant decrease in T3 and T5 (P≤0.01) compared with T1, T2 and T4. The decrease in the protein content in the control treatment may be due to the birds’ exposure to stress due to the increase in the environment temperature, and this leads to an increase in the secretion of the stress hormone Corticosterone and this leads to the formation of glucose from a non-carbohydrate source, which includes proteins by the process of Gluconeogenesis [35] And that its high
percentage when adding the extracts, especially the aqueous and alcoholic extract for the Al-Zahdi khalal and AL-Zahdi khalal seeds in the two treatments T3 and T5 may be due to the fact that these extracts reduce the rate of secretion of the hormone Corticosterone. As this hormone is considered protein destructive through the birds’ need for energy in the process of lowering the temperature, especially by increasing the process of panting and increasing the vital respiratory capacity, where the increase in the processes of gasping will lead to an increase in the demand for energy, which is the source of glucose sugar, and it is known that when the temperature rises the environment temperature, the bird will reduce its feed consumption and increase its drinking of water, and then the percentage of energy inside the body will decrease to carry out the vital processes, and the destruction of protein inside the body will contribute to raising the amount of glucose. As the percentage of glucose in T1 increases compared to the rest of the treatments, and the work of the extracts includes increasing the appetite of birds exposing to heat stress because they contain some substances that increase the appetite, such as pectin, which increases the appetite of birds and then increases the consumption of feed, which leads to the birds obtaining the basic needs. Especially the energy and protein available in the feed without the need for a process of forming glucose from non-carbohydrate sources. As exposure to high heat leads to an increase in stress hormones such as adrenaline and norepinephrine, and this leads to the degradation of glycogen and an increase in blood sugar [36], he indicated [37].

The addition of AL-Zahdi khalal seeds powder has contributed greatly to the decrease in the level of glucose because it contains high levels of phenols, antioxidants, magnesium and phosphorous, which stimulate the undifferentiated cells in the Lankershans islets in the pancreas and turn them into modern differentiated beta cells that act on the secretion of insulin and thus lower the level of glucose. In the blood, because the date pits are characterized by containing percentages of biotin, which contributes significantly to reducing the concentration of glucose in the blood through its role in increasing the concentrations of the enzyme Glucokinase in liver cells and Lankershans islets in the pancreas as this enzyme works to regulate the process of glucose degradation [38]. The reason for a significant decrease in the concentration of cholesterol in the blood serum when using the aqueous and alcoholic extract for the Al-Zahdi khalal and the AL-Zahdi khalal seeds, especially for the two treatments (T3) and (T5), may be due to the fact that these extracts contain vitamin C. [39] indicated the role of vitamin C in reducing The level of cholesterol in the blood by converting cholesterol into bile acids and thus works to reduce its percentage in the blood because of the role of vitamin C in reducing the effects of stress by forming the Ascorbate Redical complex, which works to remove the effect of free radicals and thus reduces the secretion of stress hormones, especially the hormone corticosterone that causes degradation Adipose tissue and hyperlipidemia. The decrease in the hormone corticosterone is accompanied by an increase in the activity of thyroid hormones, which have an important role in cholesterol metabolism, where they work to increase the formation of cholesterol and increase the ability of the liver to excrete it in the bile. The addition of the extracts has contributed significantly to the decrease of the enzymes AST and ALT in the blood serum, especially 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 Satisfying free radicals and making them stable and ineffective at the beginning of the chain of oxidative processes of fatty acids in cell membranes [40].

### 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 traits of blood serum at the ages of 3 and 6 weeks for broilers reared under high temperature (mean ± standard error).

| Studied traits | Weeks | T1                | T2                | Treatments | T3                | T4                | T5                | Significant level |
|----------------|-------|-------------------|-------------------|------------|-------------------|-------------------|-------------------|------------------|
|                |       |                   |                   |            |                   |                   |                   |                  |
| Total          | 3     | 4.12±0.04<sup>a</sup> | 4.34±0.04<sup>b</sup> | 5.22±0.08<sup>c</sup> | 4.33±0.04<sup>a</sup> | 5.47±0.03<sup>a</sup> | 5.09±0.06<sup>a</sup> | **              |
| protein(g/dl)  | 6     | 3.70±0.01<sup>a</sup> | 3.74±0.08<sup>a</sup> | 4.62±0.13<sup>b</sup> | 4.13±0.34<sup>b</sup> | 6.07±0.21<sup>a</sup> | 5.09±0.06<sup>a</sup> | **              |
| Glucose(mg/dl) | 3     | 175.67±0.17<sup>b</sup> | 175.83±0.44<sup>b</sup> | 171.33±0.33<sup>b</sup> | 175.50±0.58<sup>b</sup> | 171.17±0.44<sup>b</sup> | 175.83±0.44<sup>b</sup> | **              |
| Cholesterol   | 6     | 224.00±9.85<sup>b</sup> | 175.00±5.68<sup>b</sup> | 156.83±3.22<sup>b</sup> | 187.67±4.57<sup>b</sup> | 159.17±6.65<sup>b</sup> | 175.83±0.44<sup>b</sup> | **              |
| AST(U/L)      | 3     | 163.17±0.33<sup>b</sup> | 161.00±0.29<sup>b</sup> | 157.67±0.17<sup>c</sup> | 160.33±0.83<sup>b</sup> | 157.33±0.17<sup>c</sup> | 175.83±0.44<sup>b</sup> | **              |
| AST(U/L)      | 6     | 143.33±0.33<sup>b</sup> | 142.67±1.64<sup>b</sup> | 142±2.31<sup>b</sup> | 141.50±0.87<sup>b</sup> | 140.67±1.48<sup>b</sup> | 175.83±0.44<sup>b</sup> | NS              |
| ALT(U/L)      | 3     | 134.22±5.05<sup>b</sup> | 123.42±1.25<sup>c</sup> | 88.90±0.25<sup>b</sup> | 123.76±0.25<sup>c</sup> | 86.18±0.05<sup>b</sup> | 175.83±0.44<sup>b</sup> | **              |
| ALT(U/L)      | 6     | 130.03±6.99<sup>b</sup> | 129.21±1.43<sup>b</sup> | 109.05±4.57<sup>b</sup> | 124.84±2.45<sup>b</sup> | 102.19±2.37<sup>b</sup> | 175.83±0.44<sup>b</sup> | **              |

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.

Table 4 shows the effect of adding the aqueous and alcoholic extract for the Al-Zahdi Khalal and AL-Zahdi khalal seeds to broilers reared at high temperatures on the level of some oxidation indicators in the blood serum represented by Glutathione (GSH), Catalase (CAT), Super Oxide Dismutase (SOD), and Glutathione. Glutathione peroxidase (GPX) at 21 and 42 days. It is noticed that T3 and T5 were significantly excelled (P≤0.01) on the rest of the experiment treatments at the level of glutathione (GSH) in blood serum at the age of 21 days, while the results of the age of 42 days indicated that T5 was significantly excelled (P≤0.01) on T1, T2 and T3, as well as the excelled of T4 over T1 and T2. The results of CAT catalase in serum at the age of 21 days showed that T5 was significantly excelled (P0.05) on both T1 and T4, with an observation of the excelled T3 on T1. While the results of the age of 42 days indicated that T3 and T5 were significantly excelled (P≤0.01) compared with T1, T2 and T4. The results of superoxide desmotase (SOD) in serum at the age of 21 days showed that T3 and T5 were significantly excelled to (P≤0.01) compared with T1 As for T2 and T4, their results did not differ from T1. As for the age of 42 days, it is noted that T3 and T5 significantly excelled T1 and T2 (P≤0.01), as well as T4 excelled on T1. While the results of the enzyme glutathione peroxidase (GPX) in the blood serum at the age of 21 days indicated that T5 was significantly excelled (P≤0.01) on the rest of the experiment treatments with the excelled of T3 on T1, but at the age of 42 days, a significant increase (P≤0.01) was observed. For T3 and T5 compared to T1, 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 some indicators of oxidation of serum at the ages of 3 and 6 weeks for broilers reared under high temperature (mean ± standard error).

| Studied traits | Weeks | T1 | T2 | T3 | T4 | T5 | Significant level |
|----------------|-------|----|----|----|----|----|------------------|
| Glutathione (μmol/L) | 3     | 46.58±1.33abc | 49.85±0.91a | 65.46±3.16c | 51.08±1.74bc | 71.49±1.69a | ** |
|                | 6     | 36.29±3.62abc | 38.89±2.60bc | 43.66±4.16bc | 51.71±0.71ab | 59.22±1.78a | ** |
| Catalase (KATAL/ML) | 3     | 0.06±0.02abc | 0.10±0.01abc | 0.11±0.01abc | 0.07±0.01bc | 0.12±0.01a | ** |
|                | 6     | 0.07±0.01b | 0.09±0.01b | 0.14±0.01a | 0.09±0.01b | 0.13±0.01a | ** |
| Superoxide (U/L) | 3     | 455.60±4.95b | 633.50±9.31b | 1038.4±5.27a | 634.0±5.17b | 1196±14.90a | ** |
|                | 6     | 581.5±6.18b | 742±12.08bc | 1368.7±4.41a | 1085.2±19.85ab | 1411.1±9.77a | ** |
| Dismutase (U/L) | 3     | 458.79±4.17bc | 506.43±16.91bc | 701.22±6.36bc | 250.68±12.54bc | 920.31±12.15a | ** |
|                | 6     | 547.45±4.83b | 693.34±2.10b | 926.78±4.42a | 610.00±12.53b | 960.21±3.89a | ** |

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 leads to a decrease in the 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 decrease in the ability to manufacture vitamins within the body such as vitamin C, this leads to a decrease in the levels of non-enzymatic antioxidants in the body, so the body turns to the consumption of enzymatic antioxidants, which leads to their depletion in the body tissues due to heat stress, The high level of oxidative enzymes in the blood serum when using the extracts may be due to the high content of these extracts of flavonoids and Coumarins, which are classified as antioxidants due to their containment of multiple hydroxyl groups that work on give hydrogen atoms to free radicals and making them more stable and not attacking cell membranes That they contain lipid compounds [41-43]. 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 this vitamin plays an important role as a natural antioxidant and plays an important role in association 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 composition of the enzyme mentioned above [44].Then, it maintains the levels of antioxidants at their standard levels compared to the control treatment. Vitamin E is also classified as a non-enzymatic antioxidant that 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 oxidative process, and then the vitamin provides the first line of defense for protection from hydrogen peroxide resulting from heat stress [45]. It contributes to reducing the consumption of antioxidant enzymes and increasing their concentrations in the blood serum, and this was observed in all trial treatments with a preference in favour of the two treatments T3 and T5.
Table 5 shows the results of the effect of adding the aqueous and alcoholic extract for the Al-Zahdi Khalal and AL-Zahdi khalal seeds to broilers reared at high temperatures and their effect on the number of E. coli and Lactobacilli bacteria in the jejunum and ileum areas of the small intestine at the age of 42 days. The results showed no significant differences. Among the experimental parameters of E. coli numbers in the jejunum area, as for the ileum area, a significant decrease (P≤0.01) was observed for all addition treatments compared with T1. The preference was in favor of T3 and T5, as it decreased significantly compared with T2 and T4. As for the results of the number of Lactobacilli bacteria in the jejunum and ileum regions, all addition treatments were significantly excelled (P≤0.01) on T1 and the preference was in favor of T3 and T5, which in turn excelled 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 numbers of coliform bacteria and lactobacilli in the jejunum and ileum regions (log / g cycle) for broilers reared under high temperatures at the age of 6 week (mean ± standard error)

| Type of bacteria | The location of the examination | T1       | T2       | T3       | T4       | T5       | Significant level |
|------------------|--------------------------------|---------|---------|---------|---------|---------|------------------|
| E.Coli           | jejunum                        | 3.42±0.01 | 3.40±0.01 | 3.51±0.12 | 3.38±0.01 | 3.40±0.02 | NS               |
|                  | ileum                          | 3.56±0.02 | 3.30±0.30 | 2.34±0.08a | 3.29±0.05b | 2.22±0.01c | **               |
| Lactobacilli     | jejunum                        | 5.34±0.05c | 6.53±0.02b | 8.19±0.35a | 6.50±0.07b | 8.24±0.29a | **               |
|                  | ileum                          | 5.32±0.04c | 6.68±0.09b | 8.68±0.29a | 7.16±0.27b | 8.91±0.09a | **               |

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

The use of the extracts, especially the two treatments T3 and T5, in which the birds consumed the aqueous and alcoholic extract for Al-Zahdi Khalal and AL-Zahdi khalal seeds, contributed to a significant decrease in the numbers of coliform bacteria and a significant increase in the numbers of beneficial lactobacilli bacteria, and this may be due to their high content of flavonoids [46]. indicated that flavonoids, especially Quercetin and Apigenin, work to inhibit the synthesis of bacterial nucleic acids by forming hydrogen bonds that impede the work of DNA and RNA to form the protein of the bacteria, or to link with the bacteria and interact with its protein wall by hydrogen bonds. It is associated with the bacteria, losing the property of adhesion, and it was noticed that the two compounds increased in the alcoholic extract for the frits and AL-Zahdi khalal seeds. Also, the properties possessed by the extracts led to a decrease in the proliferation of E. Coli bacteria and increased the number of beneficial lactobacilli (Lactobacilli) during the period of the experiment. On the phenolic compounds that have antimicrobial and anti-fungal properties that are naturally present in plants in order to give plants natural immunity against fungal and viral infection By accumulating in the cells adjacent to the affected cells, as phenols act to inhibit the growth of bacteria and fungi through their role in the synthesis of ethylene from the amino acid methionine, and this substance works to encourage the activity of cell-dissolving enzymes, which leads to the killing of bacteria [47].

Table 6 shows the results of the effect of the aqueous and alcoholic extract for the Al-Zahdi Khalal and AL-Zahdi khalal seeds in drinking water to broilers reared at high temperatures and their effect on the trait of villi length, width and depth of crypts in the jejunum and ileum at the age of 42 days. As it is noticed that all the addition treatments were significantly excelled (P≤0.01) compared with T1 and the preference was in favor of T5, as it excelled T2, T3 and T4, as well as T3 excelled T2 and T4 in the traits of villi height and cache depth in the jejunum region. Significantly added (P≤0.01) compared with T1, noting the excelled of T3 and T5 on T2 and T4. While the ileum results indicated a significant (P≤0.01) excelled for all addition treatments (T2, T3, T4, and (T5)). Compared with T1, the preference was in favor of T3 and T5, as it was excelled to T2 and T4 in villi length and depth of crypts, while T3 and T5 recorded significant excelled (P≤0.01) compared with T1, T2 and T4 in the villi width.
Table 6. 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 broilers reared under high temperature at 6 week days of age (mean ± standard error)

| Weaving area | The location of the examination | Treatments | Significant level |
|--------------|---------------------------------|------------|-------------------|
|              |                                 | T1         | T2               | T3               | T4               | T5               |                     |
| Jejunum      | villi length                     | 432.87±2.13$^a$ | 462.57±6.00$^b$ | 509.88±7.27$^c$ | 474.06±11.44$^d$ | 542.79±11.81$^e$ | **                 |
|              | villi width                      | 63.41±0.43$^d$ | 69.47±0.56$^d$  | 79.51±0.80$^b$  | 68.94±0.53$^c$  | 83.94±1.78$^a$  | **                 |
|              | Depth of crypts                  | 47.44±0.75$^c$ | 52.85±0.84$^b$  | 68.23±0.23$^a$  | 52.56±1.36$^b$  | 66.75±0.46$^b$  | **                 |
| Ileum        | villi length                     | 321.51±1.15$^c$ | 347.07±2.36$^b$ | 408.89±9.55$^a$ | 347.95±3.66$^b$ | 394.12±13.04$^a$ | **                 |
|              | villi width                      | 59.08±0.07$^a$ | 63.40±0.18$^b$  | 79.56±1.48$^b$  | 65.10±0.44$^c$  | 80.26±1.36$^c$  | **                 |
|              | Depth of crypts                  | 40.79±0.68$^b$ | 43.66±0.62$^b$  | 57.64±1.22$^a$  | 45.61±1.71$^b$  | 59.79±2.99$^a$  | **                 |

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 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 significant excelled of the treatments that dealt with the extracts is observed in the numbers 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 pathogenic intestinal bacteria [48] This helps improve digestion and absorption in the jejunum and ileum. [49] indicated that the use of an aqueous and alcoholic extract for the AL Khalal date without pits and dates pits at a concentration of 4 ml / kg live weight for rats had an effect similar to that of the Lansoprazole treatment given to treat stomach and gastrointestinal ulcers. As these extracts work to increase the secretion of mucus, which is an important protective factor for the mucous membrane of the stomach and intestines, as well as its role as antioxidants, and then this leads to an improvement in the mucous membrane lining the stomach and the gastrointestinal tract. It is possible that these extracts affect the increase of the mucous layer lining the intestine and this leads to improvement of the perpetuation cells and helps to increase the length of the villi positively and increase the absorption process as a result of direct stimulation of the proliferation and division of the intestinal cells of the gastrointestinal tract and this improves the villi height and depth of crypts and activates important secretory functions of the gastrointestinal tract by increasing the digestibility and absorption of food mass as a result of improving these traits.

Conclusions

The addition of the aqueous and alcoholic extract for Al-Zahdi Khalal and AL-Zahdi khalal seeds at a ratio of 300 mg / liter of drinking water greatly contributed to a significant increase in all the studied traits. The preference was in favor of the third and fifth treatments for broiler chickens reared at high temperatures, who consumed drinking water containing 300 mg of the alcoholic extract of Al-Zahdi Khalal and Al-Zahdi Khalal seeds, respectively.

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