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## **Effect of lice *Linognathus Vituli* on the effectiveness of liver enzymes for sheep in Salah al-Din province**

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**Abstract**---The current study was conducted to find out the extent of the spread of lice *Linognathus Vituli* on sheep in Salah El-Din Governorate for the period from 1/10/2021 to 1/4/ 2022, and its aim is to assess the impact of sheep lice infestation on liver enzymes. The present results showed on the effect of sheep lice infestation on some physiological parameters, and the result of the study showed an increase in the levels of both aspartate aminotransferase (AST) and alanine aminotransferase (ALT), and a decrease in the level of alkaline phosphatase (ALP) was noted at a significant level  $P \leq 0.05$  compared to control group.

**Keywords**--- AST, ALT, ALP.

**Introduction**

Lice is a highly specialized obligate ectoparasites, as each species parasitizes a particular host. The louse that spreads in both humans and animals belongs to two orders: the order Anoplura, to which the louse belongs, represented by *Pediculus humanus* and *Pediculus humanus*. *Phthirus pubis*, *Linognathus ovillus* sheep body louse, *Goat Linognathus tenopsis* *Linognathus*, in addition to several species that infect birds( Forbes, 2021; deLeon *et al.*,2020). Lice can cause a wide range of animal health problems such as mechanical tissue damage, irritation, inflammation, hypersensitivity, boils and weakness, and when present in large numbers cause anemia and reduced productivity in the animal (Seyoum *et al.*, 2015) and cause economical losses reflected on animal health such as anemia, lack of milk production and poor quality of wool, as well as causing

severe discomfort to the animal, itching and unwillingness to eat (Collis et al., 2020).

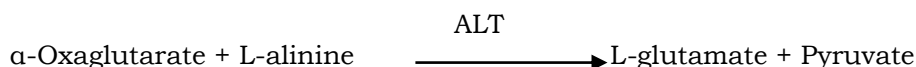
## Material and Methods

### Specimens of blood

Blood samples were drawn from the jugular vein of 120 sheep samples using a sterile 10 cm<sup>3</sup> syringe. As 10 cm<sup>3</sup> of blood was taken and then placed in test tubes free of anticoagulant substance, Gel Tube, and then separated by centrifugation for 5 minutes at a speed of 3000 revolutions / minute, and then the serum was obtained as it was placed in small test tubes Appendroff tube and kept in the freezer At a degree of 20 - C 0 until use for the purpose of conducting enzymatic and biochemical tests.

### Determination of ALT activity in serum

The alanine aminotransferase enzyme was measured in the blood serum using a ready-made analysis kit by colorimetric method according to the equation below.:



The ALT enzyme converts the amino acid alanine into pyruvate, and then the pyruvate reacts with the reagent (2,4-dinitrophenylhydrazine) to form 2,4-dinitrophenylhydrazones), whose color intensity is measured at a wavelength of 505 nm in an alkaline medium after filtering on polarized water (Retiman & Frankle, 1957).

### Accounts

The activity of ALT enzyme in serum is calculated based on the linear equation of the standard curve shown in Figure 1.

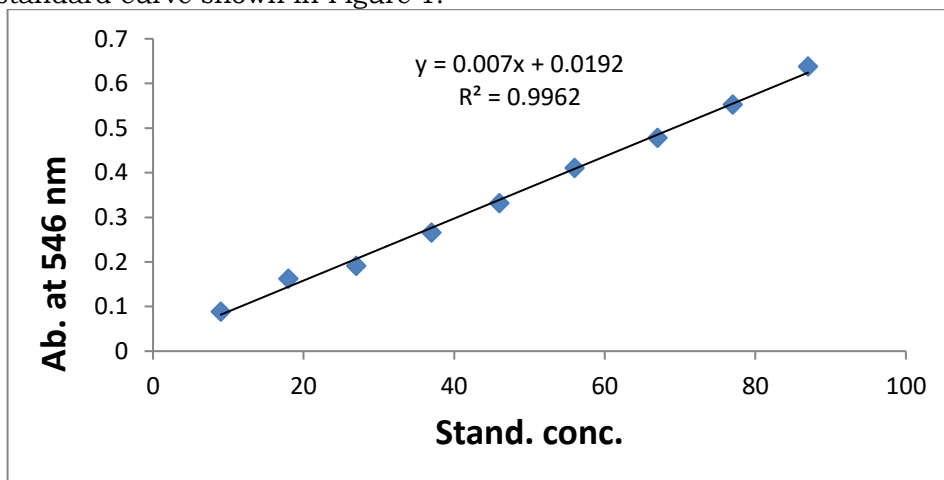
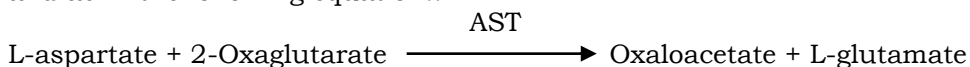


Figure 1. Standard curve for ALT.

### Determination of AST activity in serum

The aspartate amino group transporter enzyme was measured in the blood serum using ready-made analysis kit by colorimetric method according to (Tietz, 2006) and as in the following equation.:



The AST enzyme converts the aspartate into oxalates, then the oxalates react with the reagent (2,4-dinitro phenyl hydrazine) to form (2,4-dinitro phenyl hydrazones), whose color intensity is measured at the wavelength 505 nm in a basic medium after zeroing. on distilled water..

### The accounts

The activity of AST in serum is calculated based on the linear equation of the standard curve shown in Figure 2.

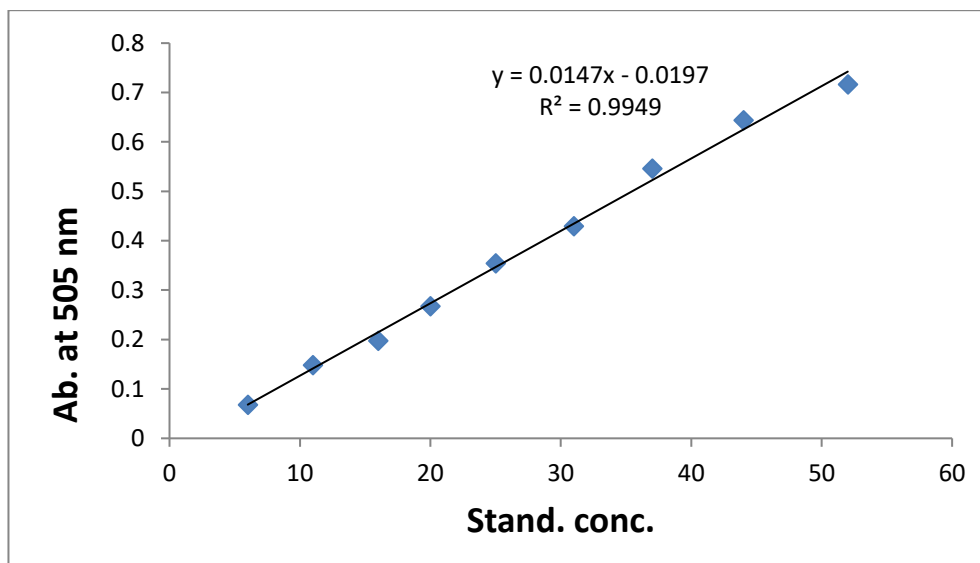
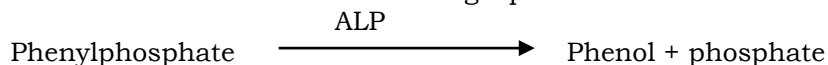


Figure 2. standard curve for AST enzyme

### Determination of ALP activity in serum

The concentration of basal phosphatase in the blood was measured using the colorimetric method described in the ready-made analysis kit. The principle of this method is summarized in the following equation:



Aminoantipyrine, Potassium ferricyanide and liberated phenol were measured in the presence of two substances to turn into a red complex, as its absorbance was measured at 510 nm. As for the presence of sodium arsenate, it worked to stop the enzymatic reaction, according to the source. (Belfield & Goldberg, 1971).

## Accounts

The optical absorption of the model x the light absorption of the efficient model.  
 Enzyme activity =  $n \times (\text{kind\&kingU}/100\text{ml})$  Measurement optical absorption.

## Results and Discussion

The level of activity of liver enzymes in blood serum, Table (1) shows the mean  $\pm$  standard deviation of liver function levels represented by enzymes (AST, ALT, ALP) in the blood serum of sheep infected with lice.

Table 1  
Liver enzymes

Liver enzymes	Mean $\pm$ S.D		
	Control (C) n=24	Infected(p) n=100	P $\leq$
AST (IU/L)	5.04 $\pm$ 53.66	7.81 $\pm$ 96.50	**
ALT(IU/L)	1.39 $\pm$ 11.93	4.15 $\pm$ 27.45	**
ALP (IU/L)	6.48 $\pm$ 116.58	6.42 $\pm$ 54.20	**

Significant P $\leq$  0. 05 ,P $\leq$ 0.01\*\*

The number of samples n represents:

It represents the arithmetic mean  $\pm$  standard error: Mean  $\pm$  S.D

### Measurement of AST enzyme concentration in blood serum

The results showed that the mean  $\pm$  standard deviation of the activity level of AST enzyme was (7.81  $\pm$  96.50) IU/L in the serum of sheep infected with lice, while it reached (5.04  $\pm$  53.66) IU/L in the serum of healthy, uninfected people. The activity of AST enzyme was significantly increased (P<0.05) in the blood serum of sheep infected with lice compared to control sheep, as shown in Table. The present results are in agreement with (Ali & Jiha, 2022) in studying the disturbance of liver function indicators and serum electrolytes associated with E. granulosus infection in sheep, as well as with the results of (Gwaze et al., 2012) in his diagnostic and biochemical study of infected sheep, as well as in the study of (Al - Hadithy, 2013) who indicated an increase in the level of AST enzyme.

AST enzyme is present in high concentration in the tissues of the heart, liver, skeletal muscles and kidneys, while its concentration is low in the blood serum, so any damage to these tissues will lead to an increase in its concentration in the serum (Fulton et al., 1995). Abnormal structural and functional changes may occur to hepatocytes, and such changes may lead to increased necrosis of hepatocytes, which releases enzymes into the bloodstream (Bolkent et al., 2008) and may also be due to building glycogen in hepatocytes, which may lead to cirrhosis of the liver, which occurs as a result of the accumulation of fat within the hepatocytes (Angulo & Lindor, 2007). The level of AST enzyme also increases as a result of liver damage, as indicated by (Zeheer, 1997). Liver enzymes are important indicators of liver function, as their increase may be due to a

disturbance in hepatic dysfunction, as the relationship is direct between elevated enzyme levels and liver abnormalities, as an elevation of ALT enzyme level with AST level is considered. It is an important indicator of liver damage (Eteng et al., 2008). Or the reason for its rise may be attributed to the body's need for large amounts of amino acids, so the enzyme rises to fill the deficiency in the body (Guidet et al., 1989).

#### **Measurement of ALT enzyme concentration in blood serum**

The results showed that the mean  $\pm$  standard deviation of the activity level of ALT was  $(4.15 \pm 27.45)$  IU/L in the blood serum of sheep infected with lice, while it was  $(1.39 \pm 11.93)$  IU/L in the serum of uninfected sheep. The activity of ALT enzyme was significantly increased ( $P < 0.05$ ) in the serum of infected sheep compared to the blood of uninfected sheep, as shown in Table. The current results agree with (Ali & Jihad, 2022) in studying the disturbance of liver function indicators and serum electrolytes associated with *E. granulosus* infection in sheep, as well as in the study of (Chernushkin et al., 2020) which showed an increase in the level of ALT enzyme. The enzyme AST. ALT plays a key role in the process of transporting and metabolizing amino acids that provide compounds that are oxidized to produce energy during the tricarboxylic cycle. Such as proteins, nucleic acids, carbohydrates and lipids, and the synthesis of these molecules in the later stages managed by enzymes (Cao et al., 2004). Also the rise in enzymatic levels. ALT AST is a result of damage to liver cells, as it is one of the indicators of inflammation, as this rise in the effectiveness of these two enzymes occurs when damage occurs in liver cells as a result of diseases such as cancer, cirrhosis, viral or parasitic infection, and the rise is higher when, injury exclusively (Hrkovic-Porobija & Hadzimusic, 2017).))

#### **Measurement of ALP enzyme concentration in blood serum**

The results showed that the mean  $\pm$  standard deviation of ALP enzyme activity level was  $(6.48 \pm 116.54)$  IU/L in the blood serum of uninfected sheep, while it was  $(6.42 \pm 54.20)$  IU/L in the blood serum of sheep infected with lice. The activity of ALT enzyme was significantly decreased ( $P < 0.05$ ) in the serum of infected sheep compared to the blood of uninfected sheep, as shown in Table. The current results agree with (Ali & Jihad, 2022) in studying the disturbance of liver function indicators and serum electrolytes associated with *E. granulosus* infection in sheep with the current study, and also agree with the results of (Gwaze et al., 2012)) in his diagnostic and biochemical study of infected sheep. The decrease in the level of ALP may be due to a decrease in the use of protein in the liver, which affects the decrease in the production of enzymes, causing a decrease in their concentrations in the blood, or the activity of ALP enzyme decreases in the serum in cases of hepatitis, which reflects the deficit in the ability of liver cells to manufacture the enzyme (Carl et al., 2013). Contrary to the case of its high, it may be due to the occurrence of necrosis of liver cells..

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