



Study Of Some Biochemical Parameters in Dose During Pregnancy in Goats

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Article History	Abstract
Received: 11 Feb 2022 Revised: 26 May 2022 Accepted: 10 August 2022	This study was made to study the level of biochemical parameters presence in pregnant and non-pregnant goats from middle east. The level of S. glucose, S. urea, S. creatinine, S. cholesterol, and S. triglycerides were determined and analysed using analysis of variance software at P-Value of $P < 0.05$, which showed insignificance difference between the pregnant and non-pregnant goats. Other biochemical parameters determined and analysed in this work include S. total protein, S. albumen and S. globulin. The level of these parameters between pregnant and non-pregnant is in significance and therefore, looks similar. S. calcium, S. potassium and S. sodium minerals were also determined and analysed using the same method as mentioned above. The obtained results demonstrated that there is no significance difference between the pregnant and non-pregnant goats in terms of the level of some biochemical parameters
CC License CC-BY-NC-SA 4.0	Keywords: Biochemical, Goats, Minerals, Non-pregnant, Pregnant, Parameters

1. Introduction

Livestock are generally reared all over the world and considered as the major source's meat, dairy product for human consumption and skin for clothing and other uses, hence these animals are economically important. In Africa and Middle East, Sheep and Goats rearing play significant socio-economic role for small and large scale farmers (Madan et al., 2019a). Goats are generally considered as one of the important livestock that can be reared with little cost under very harsh climatic condition. They are considered to be one of the most favourable animals compared to other ruminants under subsistence farming due to their ability to withstand and adjust to harsh environmental conditions (Devendra, 2001). Goats can virtually feed on any grass be it fresh or dry and survive. Besides, Goats are resistant to diseases and have short gestation period compared to other livestock, hence can reproduce twice a year under normal condition. Moreover, goats can easily be maintained with very little resource and offer high profit output to the farmers (Mbassa and Poulsen, 1991).

Generally, rearing of livestock is being constrict by some problems concerning metabolic disorders, which are believed to be caused by improper feeding or feeding the animals with unsuitable food. Moreover, such metabolic disorders show no appearance of clinical symptoms resulting to poor

development during breeding (Radostits and Done, 2007). The determination of normal values of blood biochemical properties are very vital to clinical transformation of laboratory-based data. These properties could vary according to some factors such as sex, age, environment, pregnancy and physical exercise (Nazifi et al., 2003; Yokus and Cakir, 2006). The biochemical parameters of animals could be used to evaluate the level of health and sickness of animals (AL-Absawi and AL-safi, 2021; Utlü et al., 2004).

In Goats, metabolism is generally used during pregnancy to provide energy for the growth and development of fetus and milk formation during gestation (Mohammadi et al., 2016; Piccione et al., 2009). Numerous researches have reported the influence of various stages of reproductive cycles of goats on biochemical parameters and its relationship to pregnancy.

The reproductive condition differs with various stressors involving the transition phase of animals. The fetus development requirements and lactogenesis related to mammary gland activity is postpartum period causes the enhanced nutrient requirement during the transitional phases. High biochemical and physiological adaptations are needed during the transition period (Tharwat et al., 2013).

During pregnancy, the physiological status of animals could change their metabolism. Increase in metabolism such as minerals and electrolytes metabolism is one of the most vital changes that occur during pregnancy (Iriadam, 2007). This is due to the fact that electrolytes and minerals such as sodium, calcium and potassium are highly important for the bones development and erythropoiesis, it also help in providing the nourishment to the developing fetus (YAHİ et al., 2017). The energy needed for the reproduction processes is provided by the maternal tissues during gestation period thereby, changing or influencing the biochemical value of the serum. In addition to pregnancy, the biochemical parameters of the goats can be affected by their age, baby growth, season and malnutrition (Yokus and Cakir, 2006).

This research was conducted to investigate the biochemical parameters in pregnant goats so that to understand the normal level of the commonly utilized biochemical parameters during their pregnancy. The research will help the livestock (Goats) farmers to fully understand the metabolic needs of the animals during pregnancy for proper management and reduce the economic cost.

2. Materials and methods

Two groups of adult goat females were used in this research to study the biochemical traits during pregnancy in Goats, each group contain six dose, one group contain pregnant dose, and the other group contain empty ewes (non-pregnant) as control group. The mean gestation period of the Goats is estimated to be 148.33 ± 1.58 days. The goats were purchased from the local market. Blood samples had been collected at late stage of pregnancy (few days before birth) this group is termed as pregnant group while the samples collected randomly from last group, which are termed as control group. The samples were collected from jugular vein of dose and then transported into the gel tube. The obtained blood samples were subjected to centrifugation process immediately in order to separate the serum at 3000 rpm for the period of 10 minutes and subsequently stored in refrigerator at the temperature of -20°C before other analysis.

2.1 Laboratory analysis

After the blood sample collection from the goats, eleven parameters were analysed. The parameters analysed are serum glucose based on (Sandip et al., 2009) adopted method. Total protein and serum globulin were also analysed according to (Dumas et al., 1981) method. Serum albumin was determined according to (Rosenfeld and Surgenor, 1952) technique. Serum triglycerides and serum cholesterol were determined according to (Artiss and Zak, 1997; Randrup, 1960) techniques, respectively. Serum creatinine and serum urea were determined by (Heinegård and Tiderström, 1973) and (Fawcett and Scott, 1960), respectively. The three minerals, serum Sodium (Na), serum Calcium (Ca) and serum Potassium (K) were finally analysed according to (Bold et al., 1965) technique. The obtained data for the analysis were subjected to statistical analysis using T test independent analysis with significant level of $P < 0.05$.

2.2 Statistical analysis

The statistical analysis of the obtained data was conducted by SPSS software on the basis of (T) test independent analysis using a significant level of ($P < 0.05$) (Goulden, 1965).

3. Results and Discussion

The obtained results for the biochemical parameters analysis of the blood are depicted in Table 1. There are observed differences in the biochemical parameters (Serum Glucose, Serum Urea, Serum Creatinine, Serum Cholesterol and Serum Triglyceride) as can be seen in Table 1, which means that there is significant difference ($P < 0.5$) in the obtained results both in the control and the pregnant goats. The obtained results showed high level of some of these biochemical components in both the non-pregnant (control) and the pregnant goats. However, the obtained Serum Glucose in the non-pregnant goats (control) is 67.66 ± 4.32 which is higher than the pregnant goats with 65.66 ± 1.96 mg/dl of S Glucose. The level of S Urea in pregnant goats was found to be 34.50 ± 3.01 mg/dl, which is a bit higher than the control goat with 33.16 ± 2.78 mg/dl. The S creatinine level in both pregnant and control goats is almost similar, recording 0.75 ± 0.13 mg/dl and 0.75 ± 0.16 mg/dl for pregnant and control, respectively.

Table 1. The obtained results for biochemical parameters of pregnant & non-pregnant goats measured in mg/dl

Samples	S. Glucose (mg/dl)	S. Urea (mg/dl)	S. Creatinine (mg/dl)	S. Cholesterol (mg/dl)	S. Triglycerides (mg/dl)
Control	67.66 ± 4.32	33.16 ± 2.78	0.75 ± 0.16	74.83 ± 8.30	23.50 ± 2.73
Pregnant	65.66 ± 1.96	34.50 ± 3.01	0.75 ± 0.13	73.83 ± 2.13	21.16 ± 1.32

The Serum Glucose played a major role in the body of animals, serving as a fuel to produce energy, thereby helping to maintain the physiological activities of the whole body. It is usually transported through the blood streams circulating the carbohydrates in ruminant animals. Serum Glucose level was found to differ between the body of male and female goats. According to (Khan and Ludri, 2002), glucose level between 65.50 ± 16.77 mg/dl to 87.95 mg/dl was recorded for male goats, while from 67.94 ± 15.02 mg/dl to 83.82 ± 9.51 mg/dl was recorded for the female goats at a P value of $P \leq 0.001$, which shows that S glucose level in male goats is higher than that is obtainable in female goats. The obtained results for the level of S glucose in this research are 65.66 ± 1.96 mg/dl and 67.66 ± 4.32 mg/dl for pregnant and non-pregnant goats, respectively as shown in Table 1. The values were recorded at a P value of $P < 0.05$. The result showed little difference between the pregnant and non-pregnant goats, with glucose level obtained in non-pregnant goats higher than that of pregnant goats with about 2 mg/dl. Moreover, the results are within the results obtainable in female goats as reported by (Khan and Ludri, 2002). As mentioned earlier, environment and food may affect the glucose level in the goat's body. Since the study animals used in this research work are from the same environment and therefore consume the same type of food, hence there is no much difference in the serum glucose level.

Serum Urea is one of the vital components found in animal's blood and it plays some important metabolic functions of the body. The levels of Urea obtained in the blood of the pregnant and non-pregnant goats are 34.50 ± 3.01 mg/dl and 33.16 ± 2.78 mg/dl, respectively. There is more Urea content in the blood of pregnant goats than that of non-pregnant goats used in this research. This might be due to increase in metabolic and physiological activities in the body of the pregnant goats, which so vital in the development of fetus. The level of S urea in goats was reported to vary between the single and twin fetus during the early stages of pregnancy and late pregnancy as reported by (Madan et al., 2019b). The level of urea found in the single fetus pregnant goat was found to be 25.94 ± 2.74 mg/dl early pregnancy and rose to 39.05 ± 2.4 mg/dl in the later stages. While in the twin fetus goats 34.79 ± 3.22 mg/dl of urea was recorded at early stage of the pregnancy and 42.3 ± 2.91 mg/dl of urea was recorded in later stage (Madan et al., 2019a). The results are in conformity with what was obtained in this work.

Serum Creatinine is another important component found in the blood of the ruminant animals. This biochemical component also helps in physiological and metabolic activities in the body of animals. During this research work, 0.75 ± 0.13 mg/dl of S creatinine was recorded in pregnant goats while 0.75 ± 0.16 mg/dl of the same s creatinine was recorded from non-pregnant goats. The obtained results, which was recorded at p-value of $P < 0.05$ showed insignificant difference between the two group of goats. Both the pregnant and non-pregnant goats showed similar composition of s creatinine, which falls within the normal accepted limit of 0.51 mg/dl – 1.02 mg/dl. The results further confirmed that the effect of s creatinine level in goats during pregnancy and non- pregnancy period is insignificant. S Cholesterol obtained from the pregnant goats recorded 73.83 ± 2.13 mg/dl, which is a little lower than the amount (74.83 ± 8.3 mg/dl) obtained from the control goats (non-pregnant). The results were evaluated at P value of $P < 0.05$. The showed little difference between the pregnant and non-pregnant goats (control) and therefore, insignificant. Goats are known to contain low level of cholesterol in their body, thereby making its meat as one of the healthier meats.

The level of serum triglycerides found in pregnant goats is 21.16 ± 1.32 mg/dl while that of non-pregnant goats was found to be 23.50 ± 2.73 mg/dl measured at P value of $P < 0.05$. The values are insignificant considering their closeness in values. The pregnancy in goats has little or no effect on serum triglycerides levels. All these biochemical components are very important to the growth and development of the animals. However, there is limit of these biochemical compositions in the body of the animal to function effectively.

Other biochemical parameters analysed in this research work include the total protein, serum albumin and serum globulin. These biochemical components are equally important in metabolic and physiological activities. The serum total protein obtained for the pregnant and non-pregnant goats are 6.40 ± 0.33 g/L and 6.43 ± 0.33 g/L, respectively as presented in Table 2. The results were recorded at P-Value of $P < 0.05$, which is insignificance. The results are somehow similar with little difference of 0.003g/L, which signifies that the level of serum total protein has little or no effect in goats during pregnancy.

Table 2. Some biochemical parameters of pregnant & non-pregnant goats measured in g/L

Sample	S. Total Protein (g/L)	S. Albumin (g/L)	S. Globulin (g/L)
Control	6.43 ± 0.33 a	3.38 ± 0.23 a	3.05 ± 0.23 a
Pregnant	6.40 ± 0.21 a	3.40 ± 0.20 a	3.00 ± 0.38 a

Serum albumin is another important biochemical parameter found in the bodies of animals. It is used like other biochemical components for metabolic and other physiological activities. The obtained results for s albumin from pregnant and non-pregnant goats is presented in Table 2. Pregnant goats recorded 3.40 ± 0.21 g/L, while non-pregnant goats recorded 3.38 ± 0.23 g/L. There is little difference of 0.02g/L between the two groups. The results were measured at P-Value of $P < 0.05$, which showed that the results are insignificance. Hence, there is no much difference in s albumin level between pregnant and non-pregnant goats.

Serum globulin level as one of the biochemical parameters found in animals was also determined in this work. The obtained results are displayed in Table 2. The results were analysed using analysis of variant at P-Value of $P < 0.05$. The pregnant goats recorded 3.00 ± 0.38 g/L while the non-pregnant goats recorded 3.05 ± 0.23 g/L a little higher than that of pregnant goats. The difference in the level of globulin between the two groups of goats is only about 0.05 g/L, which is insignificant as it implied from the P-value used. The obtained results are in accordance with many similar reported research works.

Minerals are also important body component that are vital for metabolic and physiological activities. Animals body contains various minerals in this work, serum calcium, serum potassium and serum sodium were determined and analysed.

Table 3. Mineral analysis of pregnant & non-pregnant goats measured in Mmol/L

Minerals				
Samples	S. Calcium (Mmol/L)	S. (Mmol/L)	Potassium	S. Sodium (Mmol/L)
Control	2.39 ± 0.14 a	2.68 ± 0.24 a		156.16±1.72 a
Pregnant	2.52 ± 0.05 a	2.86 ± 0.22 a		155.16±1.47 a

The obtained results are presented in Table 3. Even though there is more serum calcium and serum potassium in the blood of the pregnant goats compared to that obtained in non-pregnant goats, however, here is higher level of serum sodium in non-pregnant goats. The obtained results are regarded as insignificance, as the results for all the three minerals were analysed at P-value of $P < 0.05$, which is insignificance. Minerals are necessary in certain amount in the body of animals in order to participate in various body functions. The obtained minerals level from the goat's blood used in this research is in accordance with the mineral levels previously reported in goat's blood serum.

4. Conclusion

In this research work, a comparative study was made between pregnant and non-pregnant goats to study and compare their biochemical parameters. The biochemical parameters and minerals are believed to help the animals perform various energy related activities such as metabolic, physiological, and pathological processes. The obtained results in this research showed insignificance differences in the level of these parameters between the pregnant and non-pregnant goats. The biochemical parameters are usually affected by various factors such as sex, food, and environment. Based on the obtained results in this work, there are no significant differences between the pregnant and non-pregnant goats in terms of biochemical parameters and minerals level in their blood serum.

Reference

1. AL-Absawi, M.K.H., AL-safi, M.A., 2021. A Study of Some Physiological Aspects Parameters in Late Gestation, and Early Lactation in Awassi Ewes. *Ann. R.S.C.B.*, 25, 4831–4839.
- a. Artiss, J.D., Zak, B., 1997. Measurement of cholesterol concentration, in: Rifai, N., Warnicka, G., Dominiczak, M.H. (Eds.), *Handbook of Lipoprotein Testing*. AACC Press, Washington, pp. 99–114.
2. Bold, A.M., Hurst, R.J., McSwiney, R.R., 1965. Automated estimation of sodium potassium and calcium using the Eppendorf flame photometer. *J. din. Path.* 18.
3. Devendra, C., 2001. Small holder dairy production systems in developing countries: Characteristics, potential and opportunities for improvement. A review. *Asian Aust. J. Anim. Sci.* 14, 104–113.
4. Dumas, B., Carter, R., Peers, T., Schaffier, R., 1981. A candidate reference method for determination total protein serum. *Clin. Chem.* 27, 64.
5. Fawcett, J., Scott, J., 1960. Determination of urea. *J. Clin. Path.* 13, 156.
6. Goulden, C.H., 1965. *Methods of Statistical Analysis*. Wiley, New York, pp. 50–55.
7. Heinegård, D., Tiderström, G., 1973. Determination of serum creatinine by a direct colorimetric method. *Clin. Chim. acta* 43, 305–310.
8. Iriadam, M., 2007. Variation in certain haematological and biochemical parameters during the peri-partum period in Kilis does. *Small Rumin. Res.* 73, 54–57.
9. Khan, J.R., Ludri, R.S., 2002. Changes in maternal blood glucose and plasma non-esterified fatty acid during pregnancy and around parturition in twin and single fetus bearing Crossbred goats. *Asian Australas. J. Anim. Sci.* 15, 504–508.
10. Madan, J., Kumar, S., Sindhu, S., Gupta, M., Pandey, A.K., Yadav, A.S., Rose, M.K., 2019a. A Study of thyroid hormone levels in Beetal Goats during different development stages. *Inter. J. Bioresour. Stress Manag.* 10, 137–140.
11. Madan, J., Kumar, S., Sindhu, S., Gupta, M., Pandey, A.K., Yadav, A.S., Rose, M.K., 2019b. A

- Study of thyroid hormone levels in Beetal Goats during different development stages. *Inter. J. Bioresour. Stress Manag.* 10, 137-140.
12. Mbassa, G.K., Poulsen, J.S.D., 1991. Influence of pregnancy, lactation and environment on Hematological profile in Danish Landrace Goats of different parity-II. Plasma urea, creatinine, bilirubin, cholesterol, glucose, and total serum proteins. *Comp. Biochem. Physiol.* 100, 403-412.
 13. Mohammadi, V., Anassori, E., Jafari, S., 2016. Measure of energy related biochemical metabolites changes during peri-partum period in Makouei breed sheep. *Vet. Res. Forum* 7, 35-39.
 14. Nazifi, S., Saeb, M., Rowghani, E., Kaveh, K., 2003. The influences of thermal stress on serum biochemical parameters of Iranian fathaile sheep and their correlation with triiodothyronine, thyroxin and cortisol concentrations. *Comp Clin. Path.* 12, 135-139.
 15. Piccione, G., Caola, G., Giannetto, C., Grasso, F., Calanni Runzo, S., Zumbo, A., P., P., 2009. Selected Biochemical Serum Parameters in Ewes during Pregnancy, Post- Parturition, Lactation and Dry Period. *Anim. Sci. Pap. Rep.* 27, 321-330.
 16. Radostits, O.M., Done, S.H., 2007. *Veterinary medicine: a textbook of the diseases of cattle, horses, sheep, pigs and goats.* Elsevier Ltd, USA.
 17. Randrup, A., 1960. A specific and reasonably accurate method for routine determination of plasma triglyceride. *Scand J Clin Lab Invest* 12, 1-9.
 18. Rosenfeld, M., Surgenor, D., 1952. The hematin-binding reaction as a basis for serum albumin determination. *J Biol Chem.* 199, 911-921.
 19. Sandip, B.B., Bule, M.V., Singhal, R.S., Ananthanarayan, L., 2009. Glucose oxidase-an overview. *Biotechnol. Adv.* 27, 489-501.
 20. Tharwat, M., Ali, A., Sobayil, F., 2013. Haematological and biochemical profiles in goats during the transition period. *Comp. Clin. Pathol.* 224, 1-7.
 21. Utlu, N., Kaya, N., Yucel, O., 2004. Biochemical blood parameters of different breeds of cattle. *Turk.J.Vet.Anim. Sci.*, 28, 139-142.
 22. YAH, D., OJO, N.A., MSHELIA, G.D., 2017. Effects of Dexamethasone on Liver Enzymes and Some Serum Electrolytes in Pregnant Yankasa Sheep and Sahel Goat. *Niger. Vet. J.* 38, 226-234.
 23. Yokus, B., Cakir, D.U., 2006. Seasonal and physiological variations in serum chemistry and mineral concentrations in cattle. *Biol Trace Elem Res* 109, 255-266.