

BIOCHEMICAL PROFILE OF HYDATID CYST FLUIDS OF *ECHINOCOCCUS GRANULOSUS* OF SHEEP IN DUHOK AREA

S.M.AL-BAYATI*,O.H.AZIZ*,A.M.ABDULL. A. S.A.ABED*****

* - College of Veterinary Medicine, University of Dohuk, IRAQ

** - College of Agriculture, University of Dohuk, IRAQ

*** - Department of Animal production, Ministry of Science and Technology

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Summary

Twenty two (11 from lung and 11 from liver of lung-liver cross infection) hydatid cysts fluid collected from sheep slaughter in Duhok abattoir and there biochemical analysis done for several parameters (total protein , Glucose, Cholesterol , triglyceride, creatinine , Urea , Uric acid , Calcium and Magnesium ions) by colorimetric assay kits for the first time in this area . The biochemical parameters varies in there measures as for protein increased significantly ($P<0.01$) in lung cysts fluid ,while in liver some increased significantly like cholesterol ($P<0.01$),triglyceride ($P<0.05$) , creatinine ($P<0.01$) , calcium ($P <0.01$) and magnesium ($P<0.05$). In compare with previous studies the results reflected some differences for many values ,and also among lungs or livers , which may pointed some strain variability in parasite metabolism, growth rate or even strain variation.

دراسة بعض القيم الكيموحيوية لسائل الكيس العدري لطفي المشوكات الحبيبية المعزول من الأغنام في منطقة دهوك

سعد محي البياتي* , عمر حسن عزيز* , عدنان محمد عبدالله** صفاء عباس عبد***

* - فرع الصحة العامة البيطرية، كلية الطب البيطري، جامعة دهوك، دهوك.

** - قسم الإنتاج الحيواني، كلية الزراعة، جامعة دهوك، دهوك.

*** - قسم الإنتاج الحيواني، وزارة العلوم والتكنولوجيا، بغداد.

الخلاصة

أظهرت دراسة بعض القيم الكيموحيوية للسائل العدري لطفي المشوكات الحبيبية (11 كيسا عدريا رئويا ومثلها كبديا) والمعزول من الأغنام المذبوحة في مجزرة دهوك ولأول مرة وقد اظهرت النتائج تباينا واضحا وشملت التحليلات الكيموحيوية البروتين الكلي و سكر الكلوكوز - سكر العنب - والكلستيرول - وثلاثي الكلسيريد و الكرياتينين واليوريا وحامض اليوريك - وحامض البولين - وايوني الكالسيوم والمغنيسيوم ، وباستخدام الطرائق الطيفية اعتمادا على العدد القياسية الجاهزة، أظهرت التحاليل الكيموحيوية فروقا إحصائية متباينة إذ كانت للبروتين عالية المعنوية ($P<0.01$) في الرئة عنها بالكبد والكلستيرول ($P<0.01$) عالي المعنوية في الكبد وكذلك لثلاثي الكلسيريد ($P<0.05$) والكرياتينين ($P<0.01$) والكالسيوم ($P<0.01$) والمغنيسيوم ($P<0.05$) وهذه النتائج اختلفت عن نظيراتها السابقة وكذلك عن القيم القياسية لتراكيزها بالمصل .

Introduction

Hydatid cysts, as a second larval stage of *Echinococcus granulosus*, can be found in lungs, liver, and other viscera of sheep and other animals (1, 2 and 3). The adult stage is a tapeworm that parasitizes in the intestine of the family canidae (4 and 5). Unilocular hydatid disease (hydatidosis, echinococcosis) is recognized as a helminthic zoonotic disease that poses a significant economic and public health problem in many parts of the world being one of the world's major zoonoses (6). A biochemical study of the hydatid cyst fluid is important to differentiate the strains of *E. granulosus* in different countries (3, 5, 7, 8, 9 and 10) or parasite physiology (8, 11, 12, 13 and 14). These biochemical studies were designed to investigate the variation of some parameters for sheep hydatid fluid and to do a comparison between lung and hepatic cysts which was a first trial in Kurdistan-Iraq region.

Material and Methods

Hydatid cyst fluids: Twenty two samples of hydatid fluids were collected from lung and liver. Hydatid cysts of infected organs of sheep (the animal with lung-liver hydatidosis were chosen only). The direct aspiration of fluid from parasite cysts with sterile syringes was done after washing the surface of cyst with normal saline and the fluid suddenly transferred into sterile vacutainer tube (without anticoagulant), and transported with cold container to biochemistry lab. for biochemical analysis.

Biochemical analysis: The biochemical tests include: Total protein, urea, uric acid, glucose, cholesterol, triglyceride, creatinine, calcium ions, and magnesium ions, were measured using colorimetric assay kits (Biolabo[®]).

Statistical analysis

All data were analyzed by one-way analysis of variance, the specific differences between groups were determined using Paired T-Test (15). The accepted level of significance was $P < 0.05$ at least.

Results

The results showed (table 1) that total protein of lung cysts had a higher value significantly ($P < 0.01$) than that of liver but not for others. While in the liver were found cholesterol, ($p < 0.01$), triglyceride ($P < 0.05$), creatinine ($P < 0.01$), calcium ions ($P < 0.01$) and magnesium ions ($P < 0.05$) are statistically different than of lung but not for rest parameters.

Also, the results showed to be higher significantly ($P < 0.05$) for total protein, cholesterol, and triglyceride but lowered significantly ($P < 0.05$) for glucose, urea, Ca^{+2} ions, and Mg^{+2} ions.

Lately, comparing among the above parameters (by depending the Mean \pm SD of lung-hepatic fluid of the parasite cysts) with standard value (table 2) Serum of sheep clarified that urea, creatinine and Ca^{+2} ions lowered significantly ($P < 0.05$) in parasite cysts.

Table 1: The biochemical values of *Echinococcus granulosus* cyst fluid

| Biochemical Parameters | Parasitic cysts origins lung | Parasitic cysts origins liver |
|------------------------|------------------------------|-------------------------------|
| Total Protein (g/l) | 31.336 ± 6.099** | 15.218 ± 14.067 |
| Glucose (mmol/L) | 1.672 ± 0.614 | 1.032 ± 0.502 |
| Cholesterol (mmol/L) | 0.107 ± 0.049 | 8.331 ± 6.028** |
| Triglyceride (mmol/L) | 0.128 ± 0.054 | 0.332 ± 0.11* |
| Creatinine (mmol/L) | 17.956 ± 15.53 | 48.267 ± 22.872** |
| Urea (mmol/L) | 0.675 ± 0.327 | 0.61 ± 0.58 |
| Uric acid (mmol/L) | 0.015 ± 0.012 | 0.023 ± 0.017 |
| Calcium (mmol/L) | 0.173 ± 0.077 | 0.524 ± 0.496** |
| Magnesium (mmol/L) | 0.345 ± 0.214 | 1.019 ± 0.816* |

No. of cyst 11 in both lung and liver

Data is the Mean ± SD

* Significant with lung at P < 0.05

** Significant with lung at P < 0.01

Table 2: Some standard biochemical parameters values of sheep.

| Types of substances | Values range | Reference |
|-----------------------|---------------|------------------|
| Total Protein (g/l) | 59-78 | Merck,1998 (16) |
| Glucose (mmol/L) | 2.4-4.5 | Merck. 1998 (16) |
| Cholesterol (mmol/L) | 1.1-2.3 | Merck. 1998 (16) |
| Triglyceride (mmol/L) | not available | ----- |
| Creatinine (mmol/L) | 7.6-17.4 | Merck,1998 (16) |
| Urea (mmol/L) | 2.86-7.14 | Ref. 22,27 |
| Uric acid (mmol/L) | Not available | ----- |
| Calcium (mmol/L) | 2.3-2.9 | Merck. 1998 (16) |
| Magnesium (mmol/L) | 0.8-1.1 | Merck. 1998 (16) |

Discussion

Biochemical substances of hydatid cysts play a definite role in the metabolism, physiology, and immunology of cysts echinococcosis (7and11). Variation in these parameters reflect strains variation in different hosts (1and6), and also reflected the relation between intermediate host and parasite (5,6,7 ,12,17,18 and19).

The current study showed that parasite in its intermediate hosts has various degree of metabolism in various colonized organs (here the lung and liver) and that could explain for each parameters as follows : The increase in protein level of lung cysts may be essential to overcome the action of lung and heart pumping rate but not for liver, where increasing reflect the importance of protein in the catabolism and anabolism (growing) activities (13,14,20 and21),as well as the mixed production of it by host and parasite (8,20and22), and also the high level of protein in lung cysts which agree with previous studies (20 and21) ; Glucose occurrence indicate the presence of glycolysis and glyconeogenesis cycles which related to energy production with parasite cyst (6,7,8 and21) and agree with previous studies (2,6 and7). Increased level of Cholesterol in liver compration with lung may be related with its function as a structural component (20,21,23,24 and25) and also related to the colonized site of the parasite as it increased in liver more than of lung and that observed with many previous study (2,6,7, 9,18and26) ; Triglyceride appearance is expected as it the most abundant sterol molecule within parasite (16,20 and21) and also as an energy source with long term metabolite fuel storage with physical protection role (14 and 18) ; Creatinine level reflect the Ammonia metabolism and energy production (16,20,21and27); Urea and uric acid refer to the presence of Urea cycle (20) which is essential to eliminate the toxic level of Ammonia through amino acid and nucleotide metabolism (20) , Ca^{+2} ions is important in ATP production and ATPase activities and lately Mg^{+2} ions act as a co factore for many enzymes – catalyzed reaction (10,20 and 21) and that compatible with previous studies (6 and7). Also, biochemical parameters reflect the quantitative differences in the metabolism of hydatid parasite in respected to the sites of parasitism (7).Also the decreasing or increasing of biochemical values provide the preventive role of the parasite cyst capsule to exchange these substances which may explain in some how the parasite overcome the immunity of the intermediated hosts and that in contrast to previous studies (8,9,12 and 18) which stated that substances exchange takes place through this capsule, other wise, the high rate of SD values in many of studded parameters may reflect or suggested a various degree of parasitic growth rate or activity and that need to be investigated in future.

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