DETERMINATION OF SOME BIOCHEMICAL PARAMETERS IN HYDATID CYST FLUIDS
Kist hidatik sıvısında bazı biyokimyasal parametrelerin incelenmesi

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Abstract

Purpose: *This study was performed to determine the chemical and biochemical parameters in hydatid cyst fluids of sheep and cattle infected with echinococci.*

Materials and Methods: *Auto-analyser technique was used to determine the chemical and biochemical parameters in hydatid cyst fluids of infected sheep and cattle.*

Results: *Mean glucose contents in hydatid cyst fluids of sheep's lungs were higher than that in livers (44.3 versus 35.8 mg/dl). Mean micrototal proteins were 26.1 and 21.4 mg/dl and mean triglycerides were 2.8 and 2.9 mg/dl in hydatid cyst fluids of sheep's lung and livers, respectively. Mean glucose and micrototal protein levels in cattle was lower than sheep; 11.1 and 12.9 mg/dl in lungs and 8.1 and 10.4 mg/dl in livers, respectively. Mean triglyceride levels in hydatid cyst fluids of cattle lungs and livers were 2.9 and 2.5 mg/dl; there was not a statistically significant difference from corresponding values of sheep ($p>0.05$). With regard to electrolytes, mean sodium, potassium and chloride levels in sheep hydatid cyst fluids were lower than those in cattle. In contrast, mean calcium levels were higher in hydatid cyst fluids of sheep than those of cattle ($P<0.05$).*

Conclusion: *Determination of the chemical and biochemical parameters in hydatid cyst fluids of infected sheep and cattle may help to identify the source of human infection.*

Key Words: *Cyst fluids*

Özet

Amaç*: Enfekte koyun ve sığırların hidatik kist sıvısında bazı kimyasal ve biyokimyasal parametreleri ölçmek.*

Gereç ve Yöntem: *Enfekte koyun ve sığırların akciğer ve karaciğerinden 50 şer adet ve sığır dalağından alınan 30 hidatik kist sıvısı, otoanalizör tekniği kullanılarak kimyasal ve biyokimyasal parametreler yönünden incelendi.*

Bulgular*: Hidatik kist sıvısındaki koyun akciğer ortalama glikoz miktarları koyun karaciğerinden daha yüksekti (sırasıyla 44.3 ve 35.8 mg/dl). Belirtilen organlarda ortalama mikrototal protein seviyeleri 26,1 ve 21,4 mg/dl idi. Trigliserit değerleri ise sırasıyla 26,1, 21,4 mg/dl olarak bulundu. Sığırlar dikkate alındığında: ortalama glukoz ve mikrototal protein seviyeleri koyunlarda saptanan kinden çok daha düşüktü ($P<0,05$). Değerler sırasıyla (11,1; 8,1; 12,9; 10,4) mg/d idi. Sığır karaciğer ve akciğer hidatik kist sıvılarındaki ortalama trigliserit seviyeleri 2,5 ve 2,9 mg/dl idi ve bu değerler koyunlardakinden önemli oranda farklı değildi ($P>0,05$). Elektrolitlere gelince, koyun akciğer ve karaciğer hidatik kist sıvılarında sodyum, potasyum ve klor ortalama değerleri sığır akciğer ve karaciğerindeki değerlerden daha düşük bulundu. Tersine diğer kimyasal parametre olan kalsiyum seviyesi koyun akciğer ve karaciğer hidatik kist sıvısında sığırınkine göre daha yüksek bulundu ($p<0.05$).*

Sonuç : *Enfekte olan koyun ve sığırların hidatik kist sıvısında bazı kimyasal ve biyokimyasal parametrelerin ölçümü, insanlarda kist hidatik kaynağını tespit etmekte yardımcı olabilir.*

Anahtar Kelimler: *Kist sıvısı*

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Unilocular hydatid cyst (cystic echinoccoccosis) is an important cestode infection and endemic in Turkey (1-4). WHO reports stated that approximately 100,000 people in the world are infected with this disease every year (5). It is the metacestode form of *Echinococcus granulosus*,

which is a potentially dangerous in man and herbivorous animals (cattle, sheep, goat and others) and affects many organs mainly the livers and the lungs (2-4). This disease also causes economic loss. The cyst fluids contain biochemicals such as carbohydrates, proteins, lipids, vitamins, electrolytes and trace elements that may have role in the metabolism and growth of unilocular hydatid cyst (6-11).

The aim of this study was to determine the level of glucose, protein, triglycerides and chemicals (sodium, potassium and chloride) in hydatid cyst fluid of infected sheep and cattle.

MATERIALS AND METHODS

Organs infected with unilocular hydatid cysts (lungs, livers and spleen) were collected from Malatya slaughterhouse (MALET). Cyst fluids were aspirated using sterile disposable syringes from a total of 200 cysts obtained from livers and lungs of sheep and cattle (50 cysts per each organ) as well as 30 cattle spleen cysts.

Glucose, micrototal protein, triglycerides and calcium levels were measured using an auto-analyser (Beckman Synchron CX4 Clinical System). The electrolytes (sodium, potassium and chloride) were also measured using an auto-analyser (Ciba-Corning 664 Fast 4 System).

The student's t, ANOVA (F), Post Hoc (Tukey) tests were used for the statistical analysis.

RESULTS

Table (I) shows that the mean glucose contents of hydatid cyst fluid of sheep's lungs were higher than those in livers (47.27 and 35.81 mg/dI respectively) ($p<0.001$). The mean levels of micrototal protein levels were also higher in sheep's lungs than those in livers (26.10 and 21.44 mg/dI respectively) ($p<0.01$). On the other hand, mean levels of triglicerides were low (2.79 and 2.87 mg/dI respectively) but this difference did not reach statistical significance.

In regard to electrolytes, the mean sodium and chloride levels were much higher than those of calcium. Mean potassium level was the lowest (Table I).

Table (II) indicates that mean glucose and micrototal protein levels in cattle lung and liver hydatid cyst fluids were lower than those of corresponding sheep levels.

In regard to cattle spleens, our data indicates much higher levels of glucose, triglyceride and micrototal protein than those of lungs and livers (Table II) ($p<0.05$). These values could not be measured in sheep spleens since no hydatid cyst was detected in spleens of sheep.

Table (II) also indicates higher sodium contents in bovine lung, liver and spleen hydatid cyst fluid than the corresponding levels in sheep. In contrast to sodium, calcium levels in sheep hydatid cyst fluids were higher than those obtained from the cattles (Tables II & I). Similar to the sheep group, the sodium and chloride levels were much higher than those of calcium and potassium levels in the cattle group (Table II).

Table I. *The biochemical findings in the hydatid cyst fluid of sheep lungs and livers (mean±SD).*

Biochemical Parameters	*Lungs (n=50)*	*Livers (n=50)*	*T-test**	*p value*
Glucose (mg/dI)	*47.27 ± 9.84*	*35.81 ± 10.75*	*4.95*	*<0.001*
Triglyceride (mg/dI)	*2,79 ± 0.99*	*2.87 ± 1.02*	*0.74*	*>0.05*
Micrototalprotein (mg/dI)	*26.10 ± 8.77*	*21.44 ± 7.18*	*2.68*	*<0.01*
Calcium (mg/dI)	*22.30 ± 4.45*	*25.40 ± 6.81*	*2.51*	*<0.05*
Sodium (mmol/L)	*106.75 ± 11.34*	*125.71 ± 13.61*	*5.45*	*<0.001*
Potassium (mmol/L)	*5.69 ± 1.26*	*6.58 ± 1.92*	*2.56*	*<0.05*
Chloride (mmol/L)	*113.80 ± 10.18*	*110.80 ± 9.14*	*1.55*	*>0.05*

**Degree of Freedom (df) = 49*

Table II. *The biochemical findings in the hydatid cyst fluid of cattle lungs, livers and spleens (mean±SD)*

Biochemical Parameters	(n=50) Lungs	(n=50) Livers	(n=30) Spleens	ANOVA*	P value	Tukey HSD**	P value
Glucose (mg/dI)	11.10±2.74	8.12.±1.29	25.78±3.76	382.89	<0.05	I-II, I-III, II-III	<0.05
Triglyceride (mg/dI)	2.95±0.73	2.56±0.38	3.42±1.38	10.47	<0.05	I-III, II-II	<0.05
Micrototalprotein (mg/dI)	12.90±3.14	10.46±3.82	38.51±6.83	443.14	<0.05	I-III, II-III	<0.05
Calcium (mg/dI)	7.82±1.04	3.10±0.85	9.47±2.11	327..88	<0.05	I-II, I-III, II-III	<0.05
Sodium (mmol/L)	142.36±18.48	137.91±15.23	132.60±14.89	3,98	<0.05	I-III	<0.05
Potassium (mmol/L)	6.40±1.22	9.66±3.17	6.62±1.35	33.75	<0.05	I-II, II-III	<0.05
Chloride (mmol/L)	110.86±9.37	113.44±18.35	121.73±5.35	6.41	<0.05	I-III, II-III	<0.05

** Degree of Freedom (df), Between Groups = 2, Within Groups = 127; Total = 129*
*Tukey HSD**: significant among above-mentioned groups., non-significant in unmentioned groups*

DISCUSSION

There are marked quantitative and qualitative differences in metabolism of hydatid cysts of various animals (mice, sheep, goats, cattle and camels) and of human beings around the world (12-13). This is most probably due to complex geographical strain and substrain variance plus fundamental biochemical and physiological differences, which may occur among various animal species in different parts of the world (12-15). However, there is a certain close affinity and similarity between sheep and human forms of *Echinococcus granulosus* in infectivity and biochemical metabolism (12). In Kenya, it was reported that the goat, cattle and camel forms of *Echinococcus granulosus* were quite distinct biochemically from both the sheep and human types, which might indicate that these organisms were either non or poorly infective to man (12).

There have been many studies dealing with chemical analysis of hydatid cyst fluid (12-17) in man and animals. A study by Farayha and Smyth (8) showed that there was a wide variation in concentrations of ions and other chemical in the hydatid cyst fluid of the sheep and mouse and they reported that the chemical composition of hydatid cyst fluid was also affected by protoscolices contents (13). In Kenya, it was found that the hydatid cyst fluids of goat type had significantly more lipids than of sheep type but less than those of cattle, camel or human types.

It was also found that triglycerides and protein levels of hydatid cyst fluids of human and sheep were higher than those of cattle (12). Similarly, in our study, hydatid cyst fluids of sheep had higher glucose and protein levels than of cattle, but there were no significant differences in triglyceride contents.

This study, and others, clearly indicate that biochemical, physiological metabolic differences, protoscolices contents, geographical strain or substrain may all affect the chemical composition of hydatid cyst fluid which might in turn aid in the identification of the source of human infection (12-16).

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