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Similarities of Human Hydatid Cyst Fluid components and the Host Serum

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Introduction:

Biochemical similarities between hydatid fluid and the host serum have been reported by several investigators (1,4,6,10,14.17). In chemical analysis of bovine and human serum together with respective hydatid cyst fluid Nazzaco (14) in 1923 found comparable amounts of ureanitrogen , glucose, sodium chloride, creatinine, non protein nitrogen, and protein in reduced amounts. A year later Flossner(8) reported " By chemical analysis of one human hydatid cyst fluid, there was no detectable protein present".

But in 1957 Carbon and Lorenzetti (4) from analysis of 93 different cyst fluids (man, sheep, cattle) reported 17.3-227 mg.Dl. protein. In 1953 pozzi and pirosky (16) precipitated protein of hydatid cyst fluid and identified 16 aminoacids chromatographically.

Codounis and polidores (5) in 1936 reported 8-120 mg.

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Dl. protein in human hydatid cyst fluid. Furthermore in 1959 Magath (13) fractionated two human hydatid cyst fluids and reported 7.5 mg.Dl. protein of which 44% was albumin, 39% was alpha and beta globulin and 17% was gamma.

The host proteins can penetrate the membranes of the hydatid cyst (3,18), besides hydatid cyst fluid and other cystic antigens have components similar to antigens of host tissues (12, 13, 10, 18).

Material and Methods:

In our present study nine hydatid cyst fluids fron man (Table 1,2) caused by Echinococcus granulosus located in lungs and respective sera were analysed biochemically , and the proteins were fractionated by electrophoresis and immunoelectrophoresis (2,11, 20, 21).

Protein concentration of hydatid cyst fluid is characteristically low (4, 5, 8); and therfore it must be concentrated as much as one hundred fold before it can be analysed with precision using electrophoresis or immunoelectrophoresis.

Samples were concentrated by ultrafiltration with Millipor pelicon membrane under nitrogen pressure 50 P.S.I. and the concentrates were subjected to electro and immu - noelectrophoresis by the Millipor procedure on cellulose acetate and agarose gel in appropriate veronal buffer.

Urea content of hydatid cyst fluid was determined by the Autoanalyser (diacetyl method), on unconcentrated fluid, glucose by the Autoanalyser (alcalin ferricyanide method), protein by the biuret method and chlorides by the method of Schales and Schales (Table 2).

Experimental Results and Discussion:

In the study of nine cases of intact hydatid cyst fluid

Patients	Age	Sex	Occupation	Residence	Nutrition	Origin of the Samples
1	16	M	Student	Teheran	Medium	Lung
2	15	M	Student	Teheran	?	Lung
3	23	M	Farmer	Keredj	Medium	Lung
4	7	F	House wife	Khumein	Bad	Lung
5	30	F	House wife	Mianeh	Bad	Lung
6	13	M	Student	Teheran	Medium	Lung
7	35	M	Farmer	Borujerd	Bad	Lung
8	17	M	Farmer	Mianeh	Bad	Lung
9	35	F	House wife	Keredj	Medium	Lung

TABLE 1. Epidemilogical Aspects of the Patients

Sample	Urea	Glucose	Chlorides	Proteins	Blood Group
1	48	80	600	30	O Rh+
2	40	100	550	60	B Rh+
3	36	80	500	30	O Rh-
4	38	50	680	1700	B Rh+
5	36	50	850	200	AB Rh+
6	36	50	550	30	O Rh+
7	40	35	700	110	B Rh+
8	36	60	1200	120	B Rh+
9	36	50	550	100	A Rh+

TABLE 2. Biochemical analysis of Hyd. Cyst. Fl. and Blood group

and the respective sera of the host the following results have been obtained: Table 1, 2.

1. All hydatid cyst fluids were fertile and scolices were obtained from them.

2. Protein levels in the unconcentrated fluids varied fron 20-1700 mg.Dl. Seventeen hundred mg. Dl., protein content seems to be high and has rarely been encountered (4, 8). By means of electro - and immunoelectrophoresis there appeared striking similarities between the mobilities of protein components in hydatid cyst fluid and the serum of the host (6, 20, 21). Identical mobilities of protein fractions in hydatid cyst fluid and serum leads us to believe that the hydatid cyst fluid proteins should be albumin and globulins Fig 1,2,3,4,5,6,7,.

Although some investigators have claimed that hydatid cyst fluid is free from protein (6), we believe that, protein was missed probably because these fluids were not sufficiently concentrated.

Albumin occurs in greatest concentration in hydatid cyst fluid, but in lesser amounts than in the serum (6, 14 , 18,19).for example in some cases of hydatid cyst fluid there is five.times as much albumin in the serum as in the hydatid cyst fluid concentrated 100 folds, which means that albumin concentration in the serum is 500 times as high as in unconcentrated hydatid cyst fluid. Inspection of Fig 1- 7 reveals that it is the same for the globulins.

3- Urea values of unaltered fluid determined by auto - analyser (diacetyl method) varied from 20-43 mg.Dl.

4- Clucose values of unaltered fluid determined by autoanalyser (alcalinferricyanide method) varied from 20-162 mg.Dl.

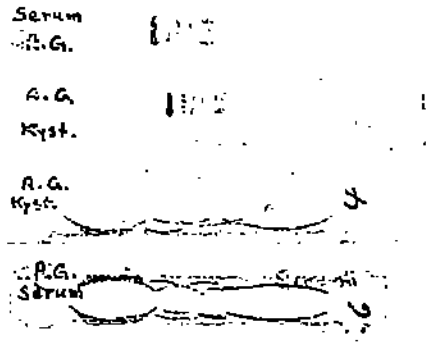

Fig.2: Electro and immunoelectrophoretic pattern of hydatid fluid and the Host Serum.

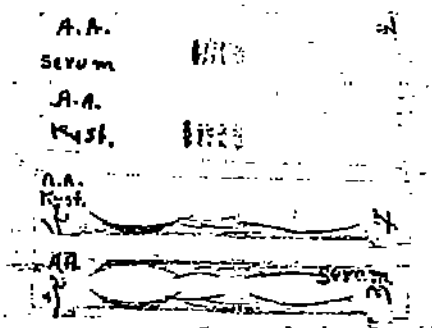

Fig. I.Electro and Immunoelectrophoretic Pattern of Hyddatid fluidand the Host Serum.

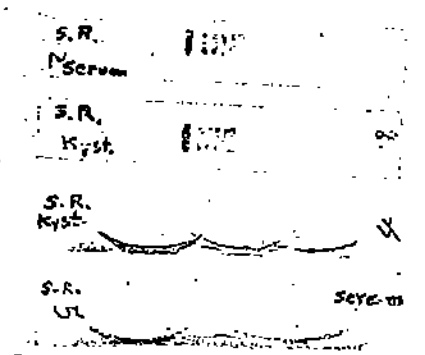

Fig. 3: Electro and immunoeletrophoretic Pattern of Hydatid Fluid and the Host Serum.

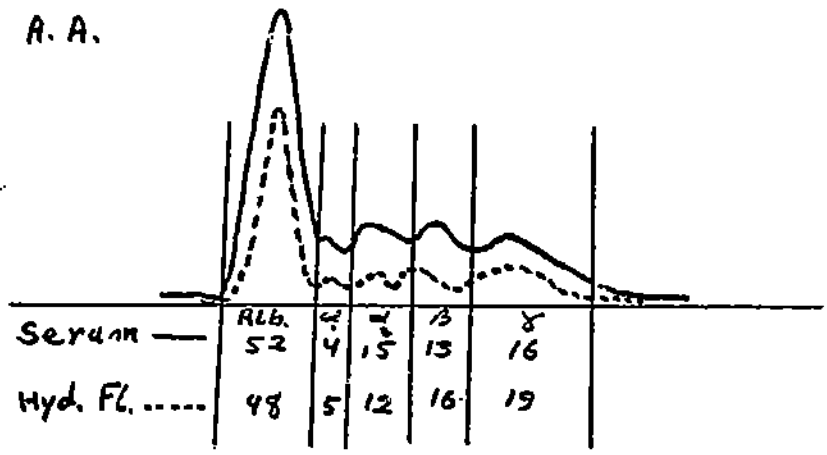

Fig. 4 Electrophoretic Pattern of Hydatid Fl. and the Host Serum.

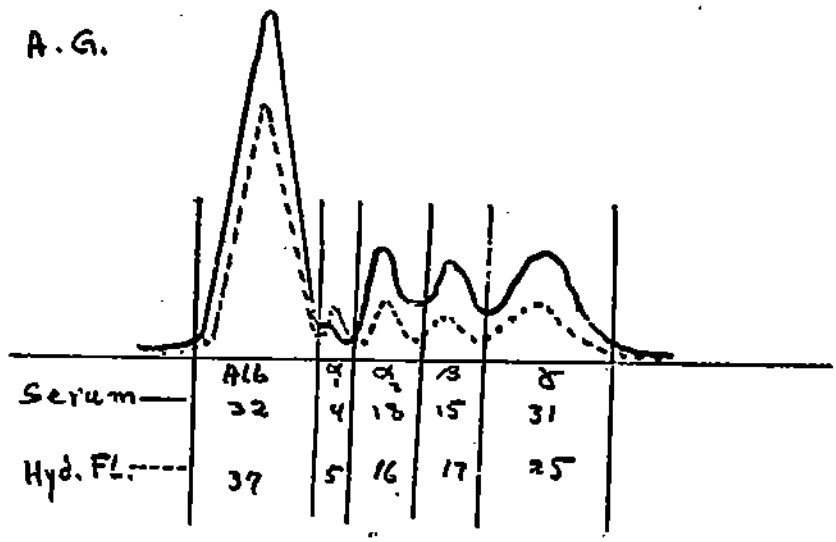

Fig 5: Electrophoretic Pattern of Hydatid Fl. and the host serum

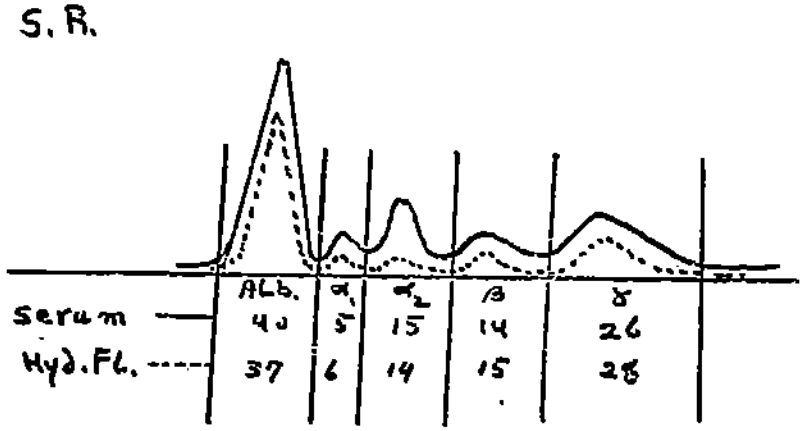

Fig 6: Electrophoretic Pattern of Hydatid Fl. and the Host Serum.

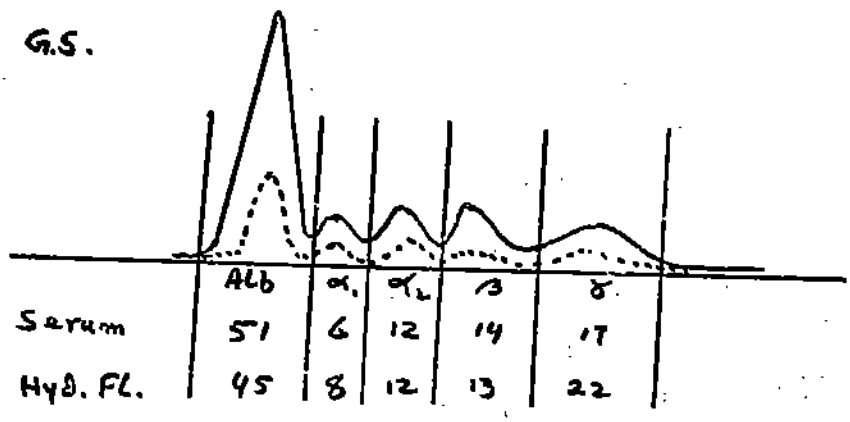

Fig. 7: Electrophoretic Pattern of Hydatid Fl. and the Host Serum.

5- Chloried values were from 500-850 mg.D l.by schales and Schales method.

6- The search for blood group antibodies was negative (3).

Although lung cysts, surrounded by an extralayer (adventice), still, the host proteins can penetrate the cyst fluid. For this reason the protein concentration of lung fluid is lower than the cyst fluids of other organs.

These findings indicate that hydatid cyst fluid contains small amounts of blood proteins of the host. Hence in preparation of antigens for skin tests or other immunological studies, it is important that the antigen should be prepared from the same species for which the test is to be used. The optimal protein concentration of antigen suitable for skin test should be around 90 mg. Dl. (15).

Summary:

Nine lung hydatid cyst fluid of Echinococcus granulosus species from man were analysed by electrophoresis, immunoelectrophoresis and biochemical tests. In addition respective sera of the host were analysed for comparison.

Analysis revealed striking similarities in cellulose acetate and agarose gel electrophoretic and immunoelectrophoretic Patterns of proteins from hydatid cyst fluid and the serum of the respective hosts.

It is presumed that serum proteins (albumins and globulins) occur in hydatid cyst fluid, but in small amount than in the host serum, and we believe that the host proteins can penetrate the membranes of the hydatid cyst.

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