

**Kurdistan Region - Iraq  
Ministry of Higher Education  
and Scientific Research  
University of Zakho**



***Journal of***

**University of Zakho**

***A - Science***

**Volume 1  
Number 1**

**December  
2013**

***Journal of University of Zakho***

***A - Science***

**Volume 1  
Number 1**

**December  
2013**

## Contents

<b>- Molecular Identification of <i>Echinococcus Granulosus</i> (G1) Strain in Human and Animals</b>	
Abdullah A. Hama, Wijdan M.S. Mero, and Jaladet M.S. Jubrael.....	1
<b>- Effect of Parainfluenza Virus Infection on Human Immuno-Inflammatory Genes Expression and Gene Ontology Analysis</b>	
ABDULRHEM T. AL-GHAZAL, SAID I. ISMAIL, YOUSUF I. UMARY, AND RULA F. AL-KHUZIE.....	8
<b>- Study on Biochemical Parameters on Hydatid Cyst Layers (Laminated and Germinal) and Surrounding Host Tissues Isolated From Different Intermediate Hosts</b>	
AHMAD S. MERZA AND WIJDAN, M.S. MERO.....	22
<b>- Screening of Tpo Gene C.1708c&gt;T and C.1978c&gt;G Mutations in Iraqi Patients with Hypothyroidism and Thyroid Cancer.</b>	
Al-Faisal, A.H.M. , Abdul-Hassan, I.A., Al-Ramah, I. J. , And Barusrux, S.....	31
<b>- Epidemiological Study of Hydatid Cyst of <i>Ecchinococcus Granulosus</i> Isolated from Sheep and Goats in Duhok Province, Kurdistan Region of Iraq.</b>	
ARSHAD MOHAMMAD ABDULLAH SARGALI AND WIJDAN MOHAMMAD SALIH MERO.....	38
<b>- Seroprevalence of Anti - Toxoplasma Antibodies among Women of Child Bearing Age in Duhok Province</b>	
AWAT ABDULL AZIZ MOSTAFA AL- ATROSHI AND WIJDAN M.S. MERO.....	44
<b>- Determination of Lipids and Glucose Content in Hydatid Cysts of <i>Echinococcus Granulosus</i> Isolated from Different Intermediate Hosts (Sheep, Goats, Cattle and Human) Tissues</b>	
Azad A. Meerkhan And Wijdan M.S. Mero.....	50
<b>- Detection of <i>Vt1</i> and <i>Vt2</i> Genes in <i>E. Coli</i> O157:H7 Isolated From Soft Cheese In Basrah, Iraq Using Duplex Pcr</b>	
BASIL A. ABBAS, MOHAMMED H. KHUDOR AND OSAMA I. ABID SMEASEM.....	58
<b>- Effect of Omega-3 and Multivitamins on Aluminum-Induced Changes in Serum and Tissue Enzyme Activities in Rats</b>	
OMAR A. M. AL. HABBIB AND BASIM S. A. AL. SULAIVANY.....	65
<b>- Molecular Characterization of <i>Echinococcus Granulosus</i> Isolated from Human Hydatid Cyst Using Mitochondrial <i>Cox1</i> Gene Sequencing in Dohuk Province- Kurdistan Region, Iraq</b>	
BAYRAM, D. AHMED, WIJDAN, M.S. MERO, A.M., SALIH, NING, XIAO, ADRIANO, CASULLI, AND JASIM, M. ABDO.....	72

- <b>Mercury Accumulation in Liver, Kidney, Pectoral Muscle and Breast Feathers of Zarivar Wetland Common Coot(<i>Fulicaatra</i>)</b> Borhan Mansouri, Farshid Majnoni, and Hazhir Karimi.....	81
- <b>Response of Nutrient Balance Index in <i>Triticum Aestivum</i> L to Mycorrhizal Inoculation and Phosphorus Fertilizer</b> Dalshad Azeez Darwesh And Sakar Abdulqadir Sahid.....	87
- <b>The Role of Endothelium and Endothelium-Derived Relaxation Factors in Nitric Oxide-Induced Aortic Relaxation</b> ABBAS B. QADIR SALIHI AND OMAR A.M. AL-HABIB.....	95
- <b>Characterization of Two Domestic Goat Breeds in Duhok Province / Iraq Using Microsatellites</b> Ahmed Basheer Mohammed.....	101
- <b>Pathogenic Variability in Isolates of <i>Fusarium Oxysporum</i> F. Sp. <i>Ciceris</i></b> Ali Kareem Al-Taae And Saleh Ahmed Eesa Al-Jobory.....	108
- <b>Detection of Enterohemorrhagic <i>Escherichia Coli</i> O157 in Sheep and Goats Using Fluorogenic and Chromogenic Culture Media</b> ALI YAHYA SAEED, KHALID SOBHI IBRAHIM.....	115
- <b>Cytogenetic Effects of Honey Contaminated with Fumagillin (Dicyclohexylamine) on Male Mice <i>Mus musculus</i> Balb/C <i>In Vivo</i></b> Soleen Sardar Zuhdi And Asaad Abdulwahed B. Al-Asady.....	120
- <b>Comparison between the Most Frequent Fungal Species Colonizing Grapevine Berries at Different Maturation Stages</b> ASIA ABDULHAMID SAADULLAH AND SAMIR KHALAF ABDULLAH.....	132
- <b>Relaxant Effects of Essential Oils of <i>Eucalyptus Camaldulensis</i> on Aortic Rings in Male Albino Rats</b> Omar A. M. Al-Habib, Dlzar A. Kheder, Giovani Vidari And Gianluca Gilardoni.....	139
- <b><i>In Vitro</i> Rooting of Hybrid Rose (<i>Rosa Carolina</i> L.)Shoots and Subsequent Establishment</b> GHARBIA H. DANIAL AND MOBASHER S. OMER.....	147
- <b>Rapid Differentiation of <i>Pleurotus Ostreatus</i> from <i>Pleurotus Sapidus</i> Using Pcr Technique</b> HADEEL WALEED ABDULMALK.....	153

- Bacteriological and Molecular Characterization of Extended Spectrum B-Lactamases in Clinical Isolates of *Klebsiella Pneumoniae* Isolated from Kurdistan Region, Iraq.**  
HAVAL M. KHALID, SAMIRA Y. YOUSIF, AND JALADET M. SALEH JUBRAEL.....158
- Correlation between Plasma Endothelin-1, Blood Glucose and Serum Calcium in Male Rats Instilled with Bleomycin**  
ISMAIL M. MAULOOD; HAMA N. H. JAF AND ALMAS M. R. MAHMUD.....164
- Effects of Short-Term Cell Phone Exposure on Eeg, Ecg and Blood Pressure in Males and Females of Human**  
Habiba S. Khalid, Bizhar R. Rasul And Ismail M. Maulood.....170
- Lipid Profiles and Liver Functions Tests in Kidney Stone Formers**  
ISMAIL SALIH AL-KAKEY, KANIAW RAFHAT KHAFAR.....177
- Pcr-Based Detection of Chicken and Cattle Meat Targeting *Cytochrome B* Gene As Affected by Heating and Mixing of Meat**  
ISMAIL ABDUL-REDHA ABDUL-HASSAN JALAL ALI TAUMA.....183
- Prevalence of Intestinal Parasites among Children in Various Localities of Duhok Province**  
Wijdan.M.S. Mero And Jehan. N. Hussein.....189
- Diversity of Microfungi in Litter of Pine Forests in Duhok**  
LAVA HIKMAT NASHAT AND SAMIR KHALAF ABDULLAH.....200
- First Record of *Dina Lineata* (Hirudinea: Erpobdellidae) in Greater Zab River Kurdistan Region-Iraq**  
LUAY A. ALI AND HAYFA J. JAWAIR.....207
- Synthesis and Characterization of Some New Bis-Chalcones and Their Transformation to Bis-Thiocarbamoyl-2- Pyrazoline Derivatives**  
Farouq Emam Hawaiz, Faiq Hamasaed Hussein And Hashim Jalal Azeez.....210
- Spectral and Theoretical Studies of The Stability Constant of Charge Transfer Complexes of a Number of Schiff Bases with  $\text{Eu}(\text{Fod})_3$  in Different Solvents**  
Layla M. N. Saleem, Emad A. Saleh Al-Hyali And F. H. Marie Al-Taei.....220
- Phenolic Compound, Triterpene and Steroids from the Leaves and Bark of *Dysoxylum Macrocarpum***  
Ibrahim A. Najmuldeen, Kamal Aziz Ketuly, And A. Hamid A. Hadi.....227

- Synthesis and Biological Activity of Copper (Ii), Nickel (Ii) and Cobalt (Ii) with Tetradentate Schiff Bases Complexes Derived from 2-Hydroxy-1- Naphthaldehyde and Aromatic Diamines**  
Maher K.A., Huda A.Basheer., Aveen A.Ibrahiem.....246
- Spectrophotometric Determination of Catecholamines via Charge Transfer Complexation with Bromanil, Applications to Catecholamine Drug Formulations**  
MAHMOOD ALI HASAN.....253
- Flow Injection Spectrophotometric Determination of Histamine in Fish Meals**  
Mohammad Salim Abdullah, Nabil Adel Fakhri.....261
- Synthesis of Some Polydiactylene Esters**  
MOHAMMAD SALMAN AL-AJELY, AND AMMAR ABDULGHANI QASIM.....273
- Separation and Spectroscopic Characterization of N-Paraffin Waxes and Isoparaffins from Three Local Crudes in Kurdistan Region of Iraq**  
Mohammed K. Younis , Firas S. Al-Ghulami And Fanar M. Saleem.....286
- Synthesis and Characterization of  $Co^{+2}$ ,  $Ni^{+2}$ ,  $Cu^{+2}$ ,  $Zn^{+2}$  and  $Hg^{+2}$  Complexes with 1, 1, 2, 2-Tetrakis (Sodium Thiolactate) Ethylene**  
N.H.Buttrus.....292
- Synthesis of Functionalized 4-Aryl-2,3 Bis (Trifluoromethanesulfonyloxy) Benzophenones, Based on Site-Selective Suzuki-Miyaura Cross-Coupling Reactions of 2,3,4-Tris (Trifluoromethanesulfonyloxy) Benzophenone.**  
Nadi Eleya.....300
- Effects of Occupational Noise Exposure on Arterial Blood Pressure of Workers in Selected Industrial Places in Duhok City.**  
KAMIL MANSOOR YOUSIF, AND BERIVAN HADI MAHDI.....308
- Investigation of Noise Pollution of Electrical Diesel Generators in Duhok City/ Kurdistan of Iraq**  
MANAF A. MAHAMMED, FARIS A. KOCHERY, MOHAMMED S. ABDULKHALIQ.....319
- On  $S_p$ -Connected Spaces**  
ALIAS BARAKAT KHALAF AND HARDI ALI SHAREEF.....325
- On N-Dimensional Achr-Algebras**  
Amir Abdulillah Mohammed And Abdulhakeem Luqman Hasan.....333

---

<b>- <math>(i, j) - S_c - \text{Continuous}</math> and <math>(i, j) - \theta S_c - \text{Continuous Functions}</math></b>	
ALIAS B. KHALAF, HARDI N. AZIZ AND HARDI A. SHAREF.....	338
<b>- On Pre-<math>\Gamma</math>-I-Open Sets in Ideal Topological Spaces</b>	
HARIWAN ZIKRI IBRAHIM.....	349
<b>- Evidence of Global Warming from Zakho Precipitation Data</b>	
Aasim Abdulkareem. Azooz And Sonya Zuhair Issac Bahraw.....	354
<b>- Using Nikiforov-Uvarov Method to Find the Single-Particle Nuclear States for Harmonic-Oscillator Potential</b>	
Aziz H. Rahim, Hossien Hossieni, And Nzar R. Abdullah.....	364
<b>- Calculation of the Ionization Cross Sections for Ion – Atom Collision by Using the Cdw-Eis Model.</b>	
Aileen Yowareh Eyou And Badal Haydar Elias.....	372
<b>- Optimization of the Geometrical Parameters for the Output Mirror in a He-Ne Laser</b>	
Delshad O. Abdul-Rahim And Saman Q. Mawlud.....	383
<b>- Studying the Effect of Volume Fraction Variation and Environmental in Creep Behavior of Polyester Resin Composed with Fiber E-Glass(Mat) and Carbon Black Powder Particles</b>	
Gelass M. Jamal, Harith I. Jafaar And Nabil N. Rammo.....	387
<b>- STUDYING THE EFFECT OF VOLUME FRACTION VARIATION AND ENVIRONMENTAL IN CREEP BEHAVIOR OF POLYESTER RESIN COMPOSED WITH FIBER E-GLASS(MAT) AND CARBON BLACK POWDER PARTICLES</b>	
Gelass Mukaram Jamal, Harith Ibraheem Jafaar and Nabil Naem Rammo .....	388
<b>- OPTIMUM TILT ANGLE FOR SOUTH FACING FLAT SOLAR COLLECTORS IN DUHOK CITY</b>	
Salahaldin Na'man, Haval Y. Yacoob, Omar Salih Omar.....	405





## MOLECULAR IDENTIFICATION OF *ECHINOCOCCUS GRANULOSUS*(G1) STRAIN IN HUMAN AND ANIMALS

ABDULLAH A. HAMA\*, WIJDAN M.S. MERO\*\*, AND JALADET M.S. JUBRAEL \*\*\*

\*Dept. of Nursing, Slemani Polytechnic University, Halabja Technical Institute Slemani Kurdistan -Iraq.

\*\*Dept. of Biology, Faculty of Science, University of Zakho, Kurdistan Region-Iraq.

\*\*\*Scientific Research Centre, Faculty of Science, University of Duhok, Kurdistan Region-Iraq.

(Accepted for publication: June 9, 2013)

### ABSTRACT

Hydatid disease is one of the most common zoonosis with the global distribution caused by the larval stage (metacestode) of small dog tapeworm *Echinococcus granulosus* that have dual impact on the economic and public health concerns. Ten strain of *E. granulosus* were identified based on the genetic characterization (G1-G10), the most common strain is sheep strain (G1) which is generally responsible of human Echinococcosis, some other genotypes as G2, G3, G4, G5 and G6 were isolated from human. The molecular identification and strain determination is the initial step for good management and minimizing the infection of CE. This study aimed to identify sheep strain from intermediate hosts including human by polymerase chain reaction (PCR) using specific primer for sheep strain (G1) and detect the genetic variation by sequencing. The specific primer of *E. granulosus* for sheep strain provide a powerful tool for molecular and epidemiological studies on *E. granulosus* with possibilities for extension to other genotypes using different molecular targets, the strain identification of *E. granulosus* is an important point that provide control and management of this disease. The present study showed that the sheep strain is predominant in Kurdistan, all samples were referred to sheep strain and sequence analysis showed slight micro variations within G1.

**KEYWORD:** Sheep strain, Genotype, G1, Strain identification, *E. granulosus*.

### INTRODUCTION

**E**chinococcosis is a cyclo-zoonotic disease of man and domestic animals, caused by the larval stage of small dog tapeworm *E. granulosus* (Gillespie and Pearson, 2001, and Jawetz and Adelbergs, 2007). The metacestode can grow in various parts of the body, but it is found mostly in the liver and lungs (Markell *et al.*, 1999). Human is the dead end of the disease, since the disease cannot be transmitted between humans or from human to dogs (WHO and OIE, 2002).

Human hydatidosis occurs commonly as two forms which differ in pathology, morphology and epidemiology, cystic hydatid disease (CHD) caused by the larval stage of *E. granulosus*, and alveolar hydatid disease (AHD) which is caused by *E. multilocularis* (Wen *et al.*, 1993, and WHO and OIE, 2002).

Recently more sensitive molecular techniques are applied for discriminating species and strains of *E. granulosus* (Salih and Al-Jamain, 2001), to date 10 distinct genotypes (G1-G10) have been described in world based on nucleotide sequence analysis of the mitochondrial cytochrome oxidase subunit 1 (*COI*), dehydrogenase subunit 1 (*NDI*) genes and intra transcribed spacer 1 (*ITS1*), these different genotypes has been associated with

distinct intermediate hosts: sheep, pigs, cattle, horses, camels, goats and cervid (Sánchez, *et al.*, 2010; CFSPH and OIE, 2011).

The applications of molecular tools for genetic characterization of *E. granulosus* are important for understanding the population genetics, epidemiology and taxonomy of the parasite (Thompson and McManus, 2002). Different molecular tools have been applied to strain identification and molecular characterization of *E. granulosus* as summarized by Bowles *et al.*(1992); Ahmadi and Dalimi, (2002 and 2006); Bart *et al.*( 2006); Varcasia *et al.*( 2007); Bahttacharya *et al.*( 2007); Rinaldi *et al.*( 2008); Mrad *et al.*( 2010); Ergin *et al.*( 2010) and Sánchez *et al.*(2010). It has been reported that at least seven of these strains were isolated from human, but the most common one is the sheep strain (Eckert, 1998; Sánchez *et al.*, 2010). The identification of the strains has a considerable point which provides good strategic control program and management (Thompson, and McManus 2002).

Many epidemiological studies indicated that Echinococcosis is endemic in Kurdistan (Amin, 2007; Magid, 2008; Al-Nakeeb, 2004 and Abdullah, 2010 Meerkhan and Abdullah, 2012; Merza, 2012). Since there is no adequate studies

on molecular and genetic diversity of *E. granulosus* which will open a new clue in strain identification and determination of strains which are infective to human this study is regarded as a first attempt in this domain in Kurdistan.

#### MATERIALS AND METHODS

**Samples:** The human hydatid cysts (Figs. 1 and 2) were collected from 12 patients post-operatively in Slemani scientific teaching hospital and Shorsh hospital, while animal intact cysts were obtained from Slemani abattoir, which included 10 cysts from goats, 12 from cattle and 20 cysts from sheep. The samples were transported to the laboratory in a cool box, then fluid and germinal layer of each cyst were washed three times or until the supernatant looked clear. The sediments were microscopically examined for fertility afterwards, the samples separately (protoscolices and germinal layer) were stored in sterile capped containers containing about one volume (v/v) of 70% ethanol at 4 °C (Rahimi *et al.*, 2007 and Sharbatkori *et al.*, 2009).

**DNA extraction:** Germinal layer was washed three times with phosphate buffer saline (PBS) (pH 7.2) or normal saline to remove the ethanol (Bahataria *et al.*, 2007) genomic DNA was extracted using tissue extraction kit (Genaid, Korea), the DNA dissolved in TE buffer and stored at -20°C until use. The genomic DNA was confirmed by running on Agarose gel 1.5% Fig. (3).

**PCR process:** The PCR was performed according to Dinkel *et al.* (2004) with few modifications, in 25µl volume using a master mix (Cinagene, Iran) contain 10-100 ng of DNA and 50 pmol of each primer E.g.ss1for. (5' GTA TTT TGT AAA GTT GTT CTA 3') and E.g.ss1rev.(5' CTA AAT CAC ATC ATC TTA CAA T 3').

The reaction was carried out in the Thermo cycle (AB Biomed applie Sangafura) under the following conditions: an entail stepping (denaturation) at 95°C for 4 min followed by 35 cycles at 94 °C for 45 s, 55 °C for 30s, 72 °C for 45 s and 72 °C for 7 min, as a final extension step .The results of PCR were detected on 1.5% ethidium bromide stained Agarose gel



Figure (1): Intact cyst isolated from human liver

(Ammersham U.S.A.). Then the PCR product purification (illustra™ GFX™ PCR DNA and Gel Band Purification Kit) were used according to the kit instructions:

**Nucleotide sequencing:** About 45µl of the PCR product were purified using illustra™ GFX™ PCR DNA and Gel Band Purification Kit and sent for sequencing in Bioscience Lab. Nottingham, UK.

#### RESULTS

The *12SrDNA* gene of *E. granulosus* has been routinely used to amplify a single band of 253bp length, this protocol designed for sheep strain (G1) identified by Dinkel *et al.* (2004). The primer generates the expected band 253bp length, after completion of PCR all samples showed a similar pattern on 1.5% Agarose gel electrophoresis (Fig.5). The amplicons were from rDNA gene which is 700bp the primer amplified the fragment between 335bp and 586bp. The PCR product was purified and sequenced to determine the genetic variation within sheep strain, micro variations were observed. The sequences were aligned with the previously published G1 (GenBank AY462129) using multiple sequence alignment ClustalW method (BioEdit software program) (Fig. 4). Slight micro variations were observed in three samples which might be due to the occurrence of transverse mutation of Leucine to Tryptophan in position 164 (T 164 G) and in position 191 the transverse mutation of Serene to Methonine (G 191 T) in both cattle (ca2) and sheep (sh1) isolates. In cattle (ca1) isolate also transverse mutation of Aspartic acid to Valine in position 209 (A 209 T) was observed Table (1).



Figure (2): Daughter cysts from human liver cyst

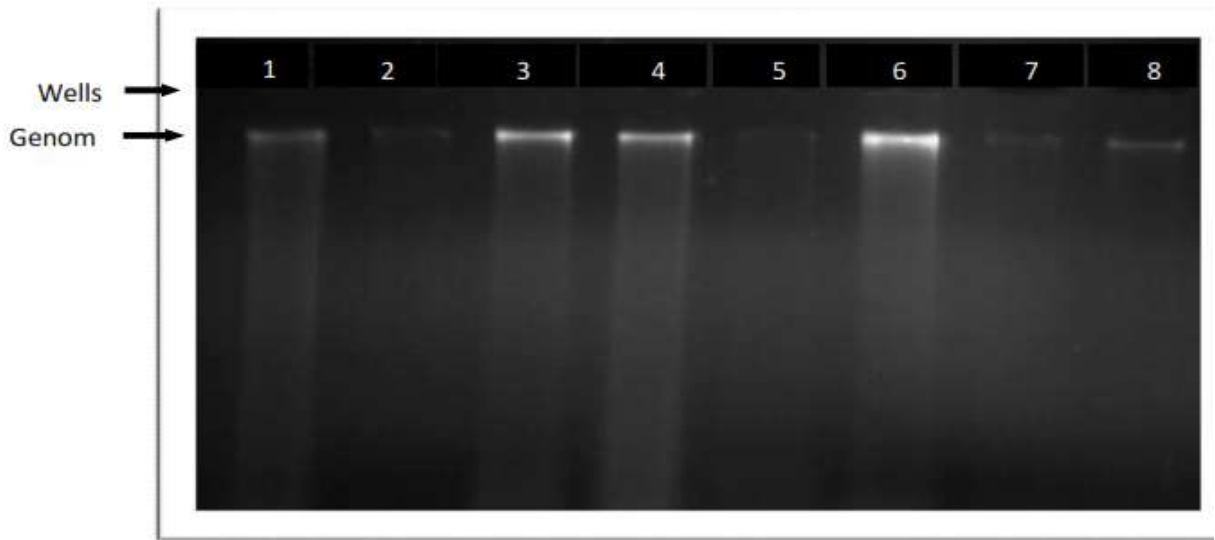


Figure (3): Represents genomic DNA isolated from the germinal layer of hydatid cysts.



Figure (4): Electrophoresis of PCR products for *COI* gene A= ladder; the 1-10 were the HC isolated from different intermediate hosts (1, 2 and 3 from human; 4, 5 and 6 from sheep; 7 and 8 from goats; 9 and 10 from cattle).

Table (1): The base pair change and mutation within sheep strains

Source of HC	bp change	Position	Amino acid change
human (hu)	100 % Identical with sheep strain (GenBank AY462129).		No mutation
sheep (sh)	T → G	164	Leucine → tryptophan
	G → T	191	Serene → Methionine
goat (go)	100 % Identical with sheep strain (GenBank AY462129).		No mutation
cattle (ca1)	A → T	209	Aspartic acid → Valine
cattle (ca2)	T → G	164	Leucine → tryptophan
	G → T	191	Serene → Methionine

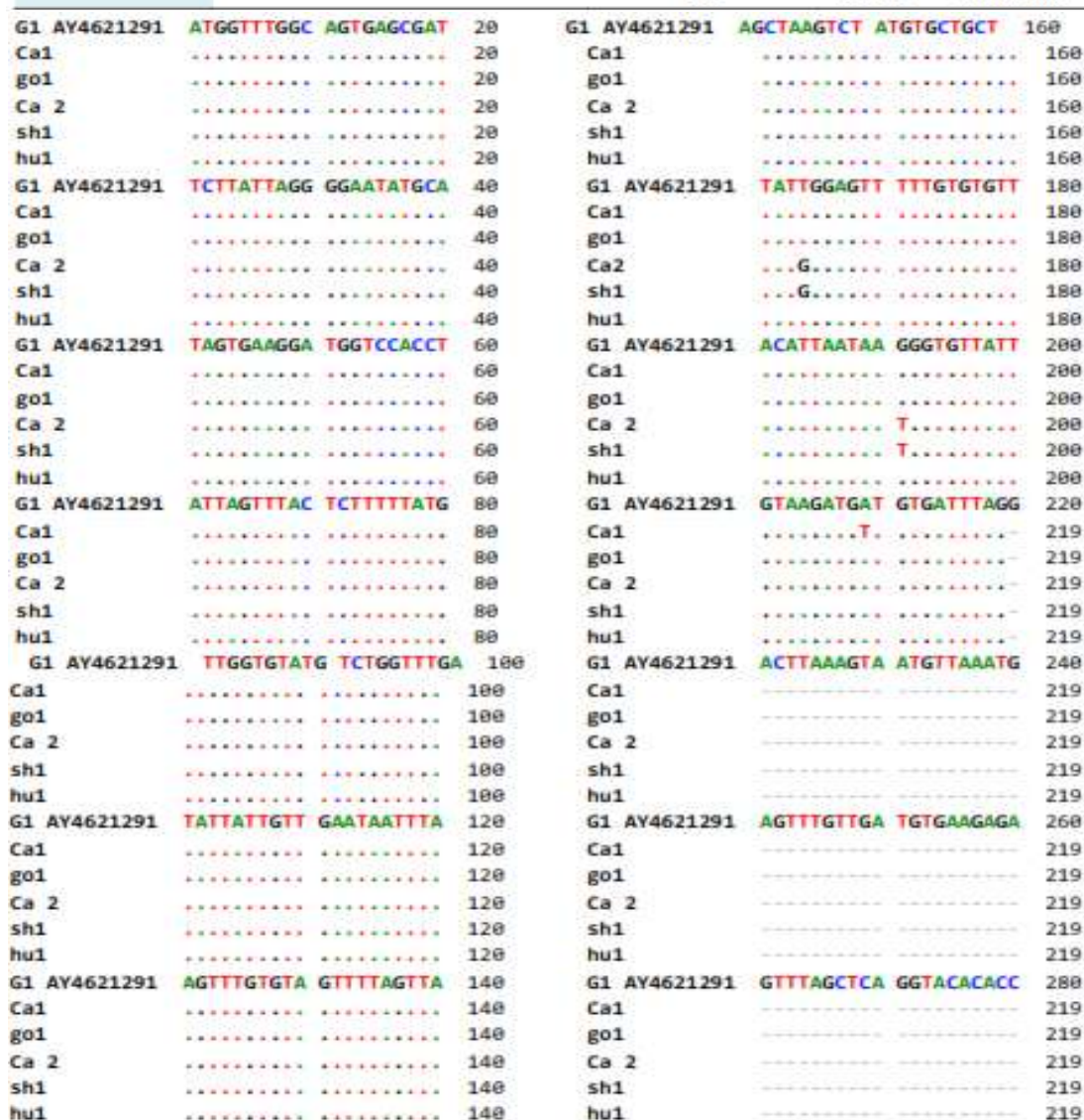


Figure (5): Partial sequence alignment of 12S rDNA gene of five samples isolated from different sources in Slemani Province, ca=cattle, go=goats, sh=sheep and hu=human.

## DISCUSSION

The identification of the strains responsible for human echinococcosis is nowadays a significant point which has to be taken into consideration in order to focus and to adapt the control measures and the means of diagnosis (Thompson, and McManus 2002).

The present study confirmed that the common strain which was isolated from human and animals was the sheep strain. This result agreed with Salih and Al-Jamain, (2001); McManus and Thompson (2003); Dinkel *et al.* (2004); Bart *et al.* (2006); Ergin *et al.* (2010) and Sanchez *et al.* (2010) possibly because it is the most common one in the animal host (Renaldi *et al.*, 2008). The use of specific primer for strain identification is the most reliable method for epidemiological studies; this technique has the advantage that there is no need for DNA sequencing or other DNA markers (Dinkel *et al.*, 2004).

The present study has given interesting result when applied to the 54 samples from human and animals and it is more reliable for large samples, there is no specific primer for all strains of *E. granulosus*, so further molecular studies are recommended to find the specific primer for each strain. The slight mutation and micro variation may be due to the geographical factor which needs further studies to be carried out to determine the specificity of this primer.

## REFERENCES

- Abdullah, A.M.(2010).Epidemiological, Comparative Enzymatic and Total Protein content of Hydatid cyst of *Echinococcus granulosus* isolated from Sheep and Goats in Duhok province, Kurdistan Region of Iraq. M.Sc. Thesis, College of Education, University of Duhok.
- Ahmadi, N., and Dalimi, A. (2002). Molecular characterization of *Echinococcus granulosus* isolated from sheep and camel in Iran. Arch. Razi. Ins. (53).
- Ahmadi, N., and Dalimi, A. (2006). Characterization of *Echinococcus granulosus* isolate from human, sheep and camel in Iran. J. Elsevier B.v. 6: 85-90.
- Al-Nakeeb, R. A. S., (2004). Seroepidemiological and therapeutic study on hydatid cyst infection in Kirkuk and Tikrit provinces.M.Sc. Thesis, College of Medicine, University of Tikrit.
- Amin, H.A., (2007). Prevalence of hydatid cyst in human and animal in Sulaimanya and Saed Sadq.M.Sc. Thesis, College of Medicine, University of Sulaimanya.
- Bowles, J., Blair, D., McManus, D.P. (1992). Genetic variants within the genus *Echinococcus* identified by mitochondrial DNA sequencing. J. Mol. Biochem. Parasitol., 54:165–174.
- Bart, J.M., Abdukader, M., Zhangu, Y.L., Lin,R.Y., Wang,Y.H., Nakao,M., Ito, A., Craig,P.S., Piarroux,R.,Vuitton,D.A., and Wen, H.(2006). Genotyping of human cystic echinococcosis in Xinjiang,PR China. J. Parasitol. 133:571-579.
- Bhattacharya, D., Bera A.K., Bera,B.C., Maity, A., and Das, S.K. (2007). Genotypic characterization of Indian cattle, Buffalo and sheep isolate of *E. granulosus* .vert. parasitol., 143: 371-374.
- Center of food security and public health (CFSPH) and OIE (2011). Echinococcosis. IOWA State University. College of veterinary Medicine.
- Dinkel, A., Njoroge M.E., Zimmermann A., Walz M., Zeyhel E., Elmahdi I.E., Mackenstedt U., and Romig T. (2004). A PCR system for detection of species and genotypes of the *Echinococcus granulosus*-complex, with reference to the epidemiological situation in eastern Africa. J. parasitol., (34), 645-653.
- Eckert, J., (1998). Alveolar echinococcosis (*Echinococcus multilocularis*) and other forms of echinococcosis (*E. vogeli* and *E. oligorthrus*). In: Palmer, S. R.; Soulsby, L. & Simpon, D. I. (Editors), Zoonoses. Oxford University, Oxford, 689-716.
- Ergin,S., Saribas,S., Yuksel,P., Zengin, K., Midillin, K., Adas,G., Arikan, S., Aslan,M., Uysal, H., Caliskan, R., Oner, A., Kucukbasmaci, O., Kaygusuz,A., Torun, M. M., and Kocazeybek,B. (2010). Genotypic characterization of *Echinococcus granulosus* isolated from human in turkey. afire. J. of microbial.Research, 4 (7):551-555.
- Gillespie, S., and Pearson, R.D. (2001). Principles and practice of clinical Parasitology. John Willy and Sons, Virginia.
- Jawetz, M., and Adelberg's. (2007). Medical Microbiology. Twenty-Fourth Editions. The McGraw-Hill Companies, Inc. New Yourk.
- Magid, N. (2008). Prevalence of hydatid cyst among slaughter animal in Duhok province, M.Sc. Thesis, College of Veterinary Medicine, Duhok University.
- Markell, E.K., John, D.T., and Krotoski, W.A. (1999). Medical Parasitology. 8th ed., W.B. Saunder Company, 253-261.
- McManus, D. P. and Thompson RCA. (2003). Molecular epidemiology of cystic echinococcosis. J. Parasitol. 127; 37–51.
- Meerkhan A. A. and Abdullah A. M. (2012). The epidemiology of hydatidosis in different slaughtered animals in Duhok abattoir, Kurdistan region of Iraq. Second international conference, (EEBS'2012) Oct. 13-14, 2012 Bali (Indonesia).
- Merza, A.S. (2012). Study on epidemiological and some biochemical parameters on hydatid cyst (laminated layer, germinal layer and surrounding host tissues) isolated from different intermediate hosts. M.Sc.

- Thesis. Univ. of Zakho. Faculty of science. Biology dept.
- Mrad, S., Mrad, M.O., Filisetti, D., Mekki, M., Noure, A., Sayadi, T., Candolfi, E., Azaiez, R., Mezhoud, H., and Babba, H. (2010). Molecular identification of *Echinococcus granulosus* in Tunisia: first record of Buffalo strain (G3) in human and Bovine in the country. *J. open, veter. Science*. 4:27-30
- Rahimi, H.R., Kia E.B., Mirhendi S.H., Talebi A., Fasihi H. M., Jalali-zand N., and Rokni M.F. (2007). A new primer pair in ITS1 region for molecular studies on *Echinococcus granulosus*. *J. Public Heal.* (36); 45-49.
- Rinaldi, L., Maurelli, M.P., Capuano, F., Perugini, A.G., Veneziano, V. and Cringoli, S. (2008). Molecular update and cystic echinococcosis in cattle and water Buffaloes of southern Italy. *J. Blackwell verlag. Zoonosis, pub.Hel.* 55:119-123.
- Salih, N.E., and AL-Jamain, (2001). DNA analysis of echinococcus of human and sheep origin in Ninevah province, Iraq by PCR-RAPD technique, *J. Rivista di Parassitol.* 17(3):221-232.
- Sánchez, E., Cáceres O., Náquira C., Garcia D., and Patiño G. (2010). Molecular characterization of *Echinococcus granulosus* from Peru by sequencing of the mitochondrial cytochrome C oxidase subunit 1 gene em Inst Oswaldo Cruz, Rio de Janeiro, 105(6).
- Sharbatkori, M., Kia, E.B., Harandi M.F., Jalalizand N., Zahabiun F., and Mirhendi H. (2009). Comparison of five simple methods for DNA extraction from *Echinococcus granulosus* protoscoleces for PCR amplification of Ribosomal DNA. *J. Parasitol.* 4 (2): 54-60.
- Thompson, R.C.A., McManus, D.P., (2002). A etiology parasites and lifecycles In: Eckert J, Gemmell M.A., Meslin FX, Eds. WHO/OIE
- Varcasia, A., Canu, S., Kogkos, A., Pipia, A.P., Scala, A., Garippa, G., and Seimenis, A. (2007). Molecular characterization of *Echinococcus granulosus* in sheep and goats of Peloponnesus, Grece. *J. Parasitol. Res.* 101: 1135-1139.
- Wen, H., New, R.R.C., and Craig P.S. (1993). Diagnosis and treatment of human hydatidosis. *J. clin. Pharmac.* 35: 565-574.
- World Health Organization Office International des Epizooties. (2002). WHO/OIE manual on echinococcosis in humans and animals: a public health problem of global concern. World Organization for Animal Health, Paris, France. p. 211-213.

## الخلاصة

ان مرض الاكياس المائية هو من احد الا امراض الشائعة ذات منشأ حيواني وانتشار عالمي والتي تسببه بيرية الدودة الشريطية للكلاب (*E. granulosus*) في الاغنام والماعز والمواشي وغيرها من المجترات وتصيب الانسان ايضا لهذا المرض تأثير اقتصادي وصحي. اجريت هذه الدراسة للتعرف على السلالات الموجودة من هذه الدودة لما لها من اهمية في المعالجة ووضع برامج السيطرة. ويتم تحديد السلالات بالاعتماد على تميز المادة الوراثية Genetic characterization تم اكتشاف عشرة سلالات لهذه الدودة واشير لها ب G1-G10. ان سلالة الاغنام (G1) هي اكثرهم شيوعا وهي المسؤلة عن الاصابات البشرية بصورة عامة وبعض من السلالات الاخرى تم عزلها من الانسان مثل (G2, G3, G4, G5) و (G6). ان التحديد الجزيئي لسلالات هذا الطفيلي تعتبر الخطوة البيدائية للتخطيط الجيد لبرامج السيطرة وتقليل نسبة الاصابة. اجري هذا البحث لغرض تحديد سلالات الاغنام من العينات المعزولة من المضائف الوسطية من ضمنها الانسان بواسطة تضاعف المادة الوراثية (DNA) وباستخدام الباديء الخاص لسلالات الاغنام وكذلك تحديد التغيرات والطفرات داخل هذه السلالات بطريقة التتبع لدينا بعد عملية التضاعف. ان الباديات الخاصة للسلالات تعتبر تقنية عالية الجودة للدراسات الوبائية الجزيئية لهذا الطفيلي مع امكانية تحديد باديات اخرى للسلالات المتبقية. اظهرت الدراسة الحالية ان سلالة الاغنام هي اكثر السلالات شيوعا في كردستان-العراق مع وجود بعض الاختلافات البسيطة في المادة الوراثية داخل هذا السلالة.

## بوخته

نه خووشي كيسه تورده كهى ناوى نه خووشي كى بهر بلاوه له جيهاندا وه يه كيكه له نه خووشي ناسراوه سهراوه سهراوه حهيوانيه كان وه به هوى قوناغى كرمو كهى كرمى شريتي قهزه مى سهگه وه توش ده بين. له دوو روه وه كارى گهري هيه له سهراوه له روى نابوريه وه وه ههروه ها له روى پزيشكيه وه گرفت له كومه لگادا دروست دهكات. پشت بهست به ريگاي ورديله يى بوماوه يى ههتا نيستا ده ژيرجورى (strain) نه كرمه ديارى كراوه كه به (G1-G10) ناو زهه كراوه. مرؤف به زورى به هوى ژيرجورى يه كه كه به ستره ينى مه ر ناسراوه توش ده بيت (G1)، وه هه نديتريان له مرؤفدا دوزراونه ته وه واته تواناي توش كردنى مرؤفيان هه يه وهك (G2, G3, G4, G5) وه (G6). ديارى كردن و دوزينه وهى ژير جوره كانى نه نه خو شخه ره له ريگه ورديله يى بوماوه يه وه به ههنگاوى يه كه كه نه زمار دهكريت بو باش بهر پوه چون و كهه كردنه وهى رپزهى توشبون به كيسه تورده كهى ناوى. نه تويژينه وهيه نه نجام درا به مه به ستي ديارى كردنى ژير جورى مه (G1) له خانه خوئ ناوه نده كانى كرمى تورده كهى ناوى كه مرؤف يه كيكه له وان به به كار هينانى ده ستي كه رى تايبهت (specific primer) (وه نهو گوران كاريانه ي له به شيك له بوماوه ماده يى جينى (12SrDNA) رويداوه به هوى ديارى كردنى دانه دوايه كه كانى پارچو كهى ناوه كه تر شه كان (Nucleotide sequence).

ده ستي كه ره تايبه ته كان رولى گرنگيان هه يه له ليكولينه وه په تايبى يه كاندا وه له تونادا هه يه كه ده ستي كه رى تايبهت بو هه موو ژير جوره كانى تر بدوزرينه وه. دوزينه وهى ژير جوره كانى نه مشه خو ره رولى گر ن نه بينيت له كردارى باش بهر پوه چون و دهست به سهراگرتنى نه نه خو شيه. دهر نه نجامى نه تويژينه وهيه دهرى خست كه ژيرجورى مه (G1) جورى بهر بلاوه له كوردستان دا وه هه موو نموونه كان لهم جوره دهر چون له گه ل بوونى هه نديك گوران كارى كهه (بازدان) له نيوان بوماوه ماده ي نه ژير جوره دا.