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Evaluation of Visceral Leishmaniasis in Gadarif State Population using Ultrasonography

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Abstract: ***This study was intended to assess and evaluate the visceral leishmaniasis in Gadarif state using abdominal ultrasound scan in order to assess the feature changes in abdominal viscera due to this parasitic infection, A retrospective case–control study was conducted among 215 patients (male = 140 and female = 75), coming from kala-azar endemic areas (areas from where VL is regularly reported Gadarif state) with fever of more than 15 days and not responding to antimalarial and antibiotics during the period March 2012 to August 2013 at Omdurman Tropical Diseases Teaching Hospital in Sudan. CMRS Research Council Board, Khartoum, Sudan, Approve this research to be conducted at this period, where the U/S (version Aloka (500) (manufacture 2007). The result showed the commonest ultrasound findings in VL participants were hepatomegaly, splenomegaly and ascites. While this study reveals that the most affected gender from in this population were male (65.1%), the majority from south Gadarif state region accounted for (62.8%) where the most people experience distended bladder and vomiting in (39.5%) and (34.9%) respectively, lower corner of the liver appear to be rounded in (55.3%) which indicated the persistent hepatomegaly with hyperecogenic (46.5%) homogenous (83.7%) liver texture. Same texture noted for spleen and both kidneys. Other complications such as focal liver lesions (4.7%) and dilated portal vein (2.3%) were detected. Conclusion: Ultrasound scanning presents an effective role in VL, because of its ability to detect the consequences of this disease in various abdominal organs such as liver, spleen and pancreas earlier, which in turn allowing the possibility to treat these complications and prevents the deterioration of a patient's health status.***

Keywords: Leishmania, ultrasound, Gadarif state, VL.

1. Introduction

Leishmaniasis is a parasitic disease caused by the *Leishmania* parasite. This parasite typically lives in infected sand flies. Patients can contracted leishmaniasis from a bite from an infected sand fly. There are three forms of the disease. Different species of the parasite cause each form. Cutaneous leishmaniasis affects skin and is usually not serious. Visceral leishmaniasis damages internal organs and can be life-threatening. Visceral leishmaniasis is also known as kala azar. Mucocutaneous leishmaniasis can lead to partial or complete destruction of the mucous membranes found in nose, throat, and mouth, the frequency distribution of common region affected by VL for 215 patient where the main region where the study was conducted is Gadarif state; revealed that most area affected by this type of disease. The disease is found everywhere in the world except Australia and Antarctica. However, about 95% of cutaneous cases occur in the Americas, the Mediterranean basin, central Asia, and the Middle East. Sudan and Brazil contribute about 90 % of the global annual incidence of VL [Alwar, et.al 2012]. Bihar, an eastern Indian state, alone accounts for about 80 % of the total Indian VL cases, where 33 of 38 districts are endemic [. Das et.al 2010]. VL is 100 % fatal, if left untreated, within 2 years [Collin et.al 2006]. Recently, VL has emerged as an important opportunistic infection associated with human immunodeficiency virus (HIV). HIV/VL co-infection has been reported in as many as 35 countries. In southern Europe, up to 70 % of adult VL cases are found associated with HIV infection. However, the HIV/VL co-infection is yet not a serious problem in India.

According to the World Health Organization (WHO), poverty is a determining factor for the disease. Leishmaniasis often occurs in areas where the following conditions are common: poverty, malnutrition, famine, illiteracy, large migrations caused by urbanization, emergency situations, or environmental changes. Kim, 2015 who stated that Symptoms often don't appear for months after the bite. Most cases are apparent two to six months after infection. Symptoms include: weight loss, weakness, cough, fever that lasts for weeks or months, enlarged spleen, enlarged liver, and decreased production of red blood cells (RBCs), bleeding, other infections, night sweats, thinning hair, scaly skin and dark, ashen skin can be the main manifestation of this type of disease.

Leishmaniasis can invade any part of the digestive tract, whether asymptomatically or Manifested as esophageal symptoms, epigastric pain, diarrhea or rectal discomfort. It should be noted that these symptoms may also be caused by other confections such as CMV or Candida (Alvar, et.al 1997). In this respect, the duodenum is the digestive tract location that is most commonly reported (Jawhar 2011). The colon is rarely affected; the cases published (most of which include the presence of diarrhea). Intestinal involvement and the consequent malabsorption in visceral leishmaniasis infection are more common in coinfected patients. The precise mechanism by which this malabsorption takes place remains to be established but a multifactorial mechanism is known to be involved (Baba et.al 2006). Endoscopic examination of these patients is usually prompted by epigastric pain and diarrhea. Results are irregular but usually nonspecific, with mild inflammatory alterations and atrophic mucosa. However, in over 50% of the cases considered there are no macroscopic alterations. This was the case in the present study, in which the biopsy analysis was necessary to confirm the diagnosis (Jawhar 2011). The possibility of infection by Leishmaniasis should always be considered in

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immunosuppressed patients, particularly those who are HIV-positive and present symptoms of diarrhea, and especially if, in addition, they develop skin lesions and cytopaenia, as occurred in the case presented here. The pathologist should also take into account the potential presence of this parasite when examining a sample from the colon of an immunocompromised patient.

Lipid disorders along with hypertriglyceridemia in VL cases have been reported earlier but none of them has ever studied the correlation between magnitude of serum triglyceride and the disease severity (Bertoli et.al 1982, Mebazaa et.al 1984-Lal et.al 2007) Recently, a study conducted on in vitro development of *Leishmaniasis donovani* promastigotes exhibited that triglycerides are very much essential for *Leishmaniasis* parasite growth [Muniaraj et.al 2012].

2. Material and Methods

A retrospective case–control study was conducted among 215 patients (male = 140 and female = 75), coming from kala-azar endemic areas (areas from where VL is regularly reported Gadarif state) with fever of more than 15 days and not responding to antimalarial and antibiotics during the period March 2012 to August 2013 at Omdurman Tropical Diseases Teaching Hospital in Sudan. CMRS Research Council Board, Khartoum, Sudan, Approve this research to be conducted at this period, where the U/S (version Aloka (500) (manufacture 2007). Probes (transducers) curve linear (3.5, 5, 7.5, 10 MHz) and convex (3.5, 5, 7.5 MHz). is main tools for survey screening, detection and diagnosis in addition to other pathologic and laboratory investigations. Data including (a) personal information (age, gender, locality and duration of illness) (b) Ultrasonic findings of abdominal examination (size of spleen, liver, lymph nodes, caliber of portal vein and vena cava , level of plural and ascitic fluid, echogenicity of pancreas and kidneys) were all been evaluated.

The ultrasound examinations were done after explaining the procedure to the patients. The patients came fasting for 8 hours, positioned in the couch comfortably in supine position. Couple gel was applied to the abdomen; the patients were allowed to breathe quietly and deeply. The transducer was chosen and the gain was corrected. The scanning was taken in all directions (longitudinal and transverse views). As for spleen, the long axis was measured (normal size<13 cm, mild splenomegaly 13 – 15 cm, moderate splenomegally15.1 – 19.9 cm, marked splenomegaly >20 cm). Liver was measured in mid clavicular line (normal size <13 cm, mild hepatomegaly 13.1 – 15 cm, moderate hepatomegaly 15.1 – 18 cm, and marked hepatomegaly >18 cm). Lymph nodes were measured in the long axis (normal size <2 cm, mild lymphadenopathy 2.1 – 2.5 cm, moderate lymphadenopathy 2.6 – 3 cm and marked lymphadenopathy >3 cm). Regarding IVC diameter (normal < 2.4 cm, dilated if >2.5 cm) and portal vein diameter (normal 13 mm, dilated >13 mm). Concerning pancreas size it was measured in long axis (normal 15 – 20 cm, increased >20 cm) and kidneys size were measured in long axis (normal 8 - 12 cm, increased >12 cm). Plural fluid/effusion were present if the distance between the lung and chest wall =50 mm (500 ml) and ascites was present if >100 ml free fluid was presented in the peritoneal cavity.

3. Result

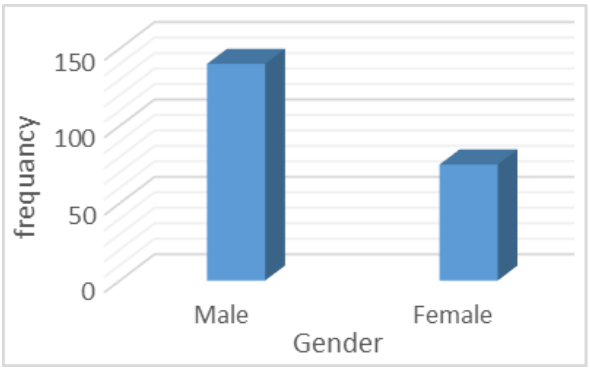

Figure 1: Showed the frequency distribution of gender among study population

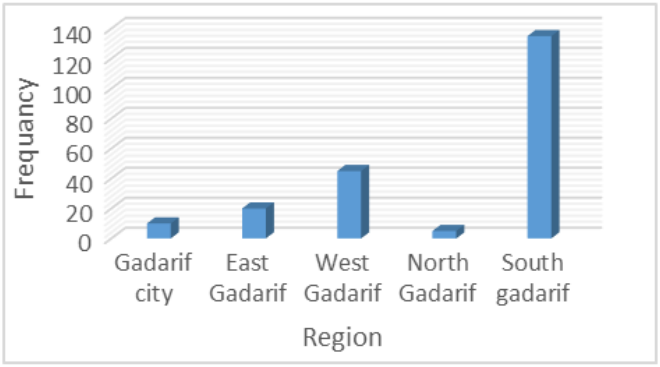

Figure 2: Showed the frequency distribution of most affected region by this type of disease in which gradrif state is main region

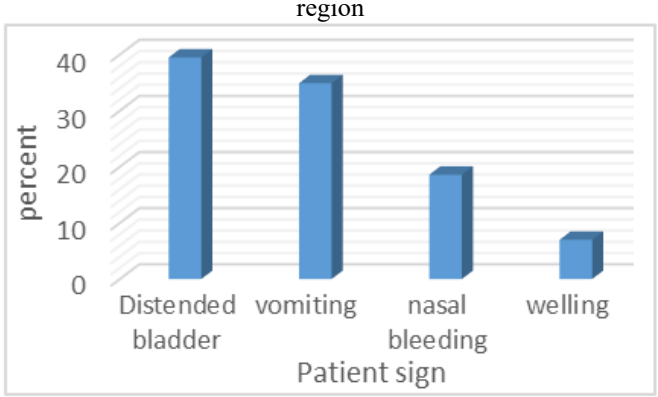

Figure 3: showed the frequency distribution of patient signs that charctrze VL in study population.

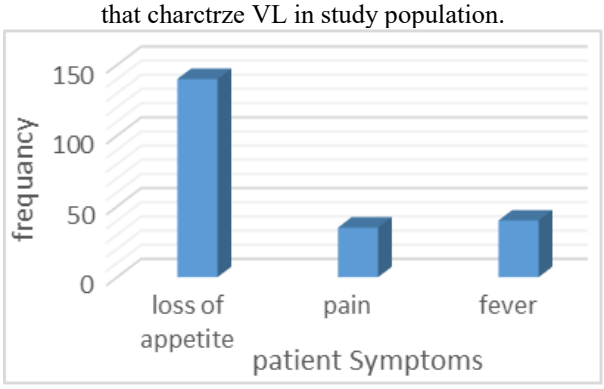

Figure 4: showed the frequency distribution of patient symptoms that charctrze VL in study population

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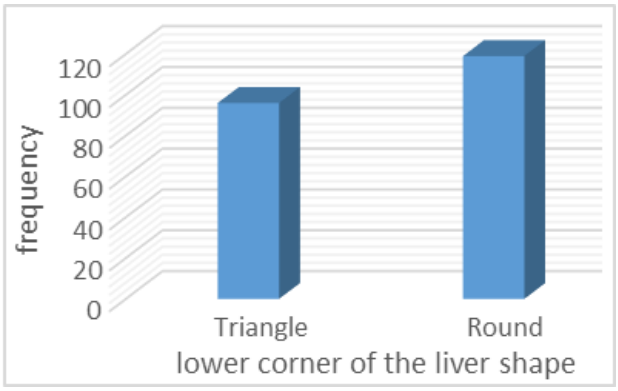

Figure 5: Demonstrate the lower corner liver lobe shape which is stronge indicator of liver enlargement and disease

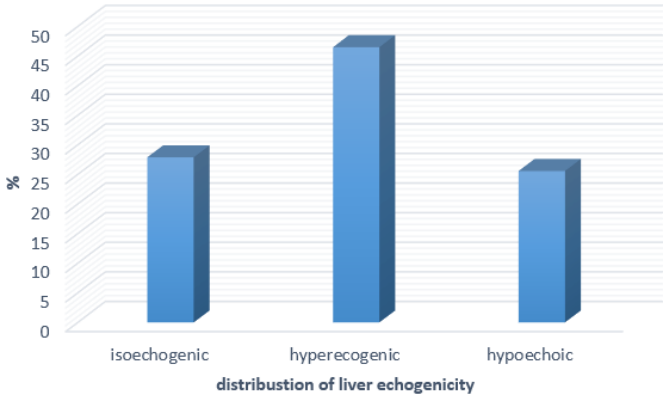

Figure 6: The percentage of liver echogenisty after successful US examination

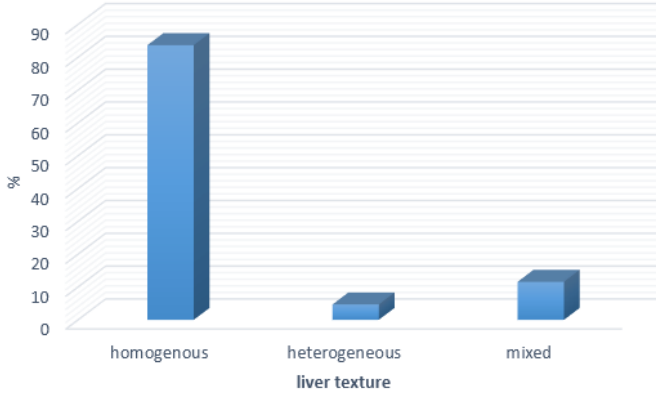

Figure 7: The percentage of liver texture revealed during US scan

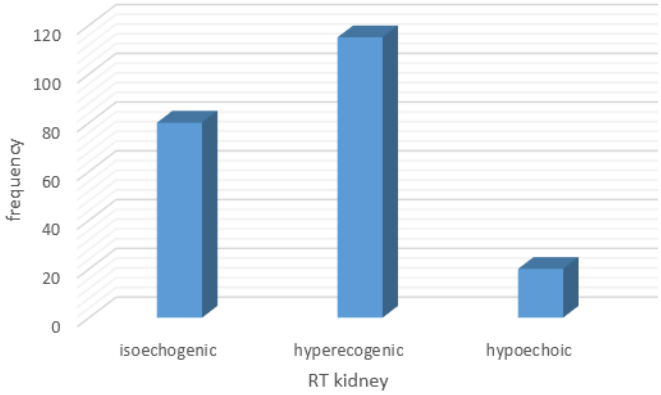

Figure 8: The frequency distribution of Right kidney echogenisty after successful US examination.

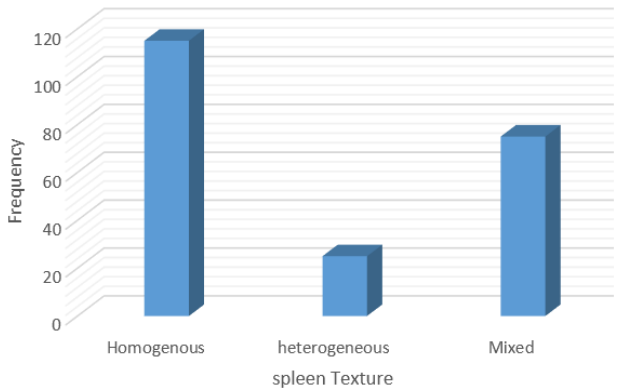

Figure 9: The frequancy distribution spleen texture during US scan

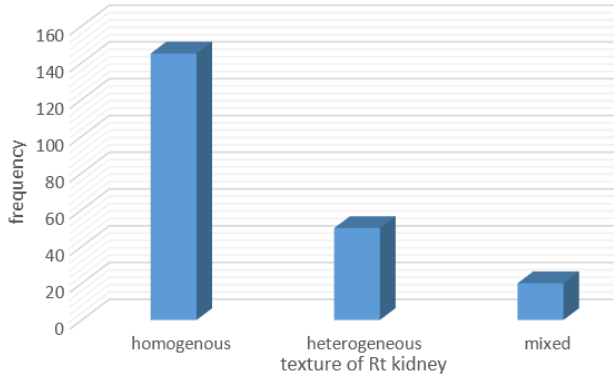

Figure 10: The frequancy distribution RT. Kidney texture during US scan.

Table 1: Independent sample t-test for study variables

	t	Sig. (2-tailed)
	t-test for Equality of Means	
	t	p-value
Disease duration	2.671	0.008
TWB	2.677	0.008
Hp	2.982	0.003
Size Rt lobe	4.221	0.000
Size Lt lobe	6.477	0.000
GB Wall thickness	1.228	0.221
GB Lumen W	3.268	0.001
Aorta Caliber	9.808	0.000
Aorta thickness	4.611	0.000
CBD Caliber	1.519	0.130
CBD Thick mass	1.725	0.086
Length of the Rt kidney	9.108	0.000
Width of the Rt kidney	8.122	0.000
Length of the Lt kidney	4.259	0.000
Width of the Lt kidney	4.190	0.000
Length of the spleen	20.530	0.000
Width of the spleen	12.257	0.000
Caliber Portal vein	3.274	0.001
Thickness Portal vein	.910	0.364
Caliber of IVC	5.174	0.000
Thickness of IVC	2.279	0.024

Table 2: Showed the difference in patient related variables according to the shape of the lower corner of the liver.

Lower corner of liver		N	Mean	Std. Deviation
Disease duration	triangle	96	1.4144	1.11347
	round	119	3.1185	6.16720
TWB	triangle	96	4374.84	1701.745
	round	119	3662.86	2110.142
Hp	triangle	96	7.6302	1.90717

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Table 3: Showed the difference in abdominal visceral measurement according to the shape of the lower corner of the liver

Lower corner of liver		*N*	*Mean*	*Std. Deviation*
Size of liver Rt lobe	triangle	96	122.34	30.071
	round	119	140.88	33.496
Size of liver Lt lobe	triangle	96	62.86	20.779
	round	119	77.35	11.506
GB Wall thickness	triangle	96	2.0729	0.84908
	round	119	2.2353	1.04724
GB Lumen width	triangle	96	13.95	3.062
	round	119	12.53	3.244
Aorta Caliber	triangle	96	11.48	2.783
	round	119	14.86	2.267
Aorta thickness	triangle	96	1.81	0.529
	round	119	2.19	0.655
CBD Caliber	triangle	96	3.36	0.896
	round	119	3.55	0.851
CBD Thick mass	triangle	96	.0145	0.00521

4. Discussion

This study was intended to characterize the visceral leishmaniasis disease in Gadarif state population using ultrasound scan. Ultrasound measured was done to measure visceral organs dimension and laboratory test for TWB, HP, which included; size of the liver Rt and Lt lobe, gall bladder wall thickness, GB lumen width, aortic caliber, aortic thickness, CBD Caliber, CBD Thick mass, right kidney length, right kidney width, left kidney length, left kidney length, left kidney length, left kidney SPL, SPL width, caliber of the portal vein, PV thickness, Caliber of IVC and thickness of IVC which having mean± SD of 16.42±9.809, 2.3400±4.67663 mm/Hg, 3980.77±1966.386, 7.1474±2.17084, 132.60±33.248mm, 70.88±17.798mm, 2.1628±.96505mm, 13.16±3.235mm, 13.35±3.018mm, 2.02±.630, 3.47±.874, .0156±.00846mm, 97.77±17.849mm, 46.16±11.603mm, 95.44±24.750mm, 45.63±8.981mm, 143.63±30.134mm, 17.457±65.81mm, 9.88±2.649, 2.58±3.044, 11.81±3.372, and 2.21±.796mm respectively as in table (1).

where the result revealed that: Significant two tailed t-test was performed for all abdominal measurement done by using ultrasound where confidence level equal to 95% and $p<0.05$ is consider as significant associations for Size Rt lobe, size of left liver lobe, GB Wall thickness, GB lumen wall, Aorta Caliber, Aorta thickness, CBD Caliber, CBD Thick mass, Rt Length kidney, Rt kidney width, left kidney length and width, SPL Length and width, Caliber Portal vein, Thickness Portal vein, Caliber IVC, and Thickness IVC, where a significant difference noted for all these measure for patient with visceral Leishmaniasis except for GB wall thickness ($p=0.221$), CBD caliber ($p=0.130$), and for portal vein thickness, these result indicate that this type of disease and infection strongly affect the measurement of abdominal organs and blood b=vessels including the portal system and biliary tree also. As in table (2. 3)

This study revealed that male were more frequently affected by this type of disease where more than 140 patient come with VL represented about 65.1% of the data collected and female accounted for 34.9% (75 patient) from total study population. As in figure (1)

According to this study the most common sgns of this type of disease is ditemnded bladder dyring US scan where the cystitis may be existed also, in more than 39% of study popyulation followed by vomitting and nusiea 34.9% and 18.6% for nasal bleeding. This frequancy distribution may differ from study to study but according to the collected data the gadarif population affected by this type more frequantly. As shown in figure (3).

Where the most affected region by this type of disease is south gadarif in which more than 62.8% of the study population having this type of disease. And this area in contrast having poor medical condition and the general health care is poorer than the rest of the country. See figure (2).

In contrast most ptient coming with symptoms of appetite loss and fever. See figure (4). On of the most imoprtant indicater to assess the liver and its enlargement is to measure the angle of left lobe ore lower lobe of the liver in which where excreeding the tolerance indicate the liver disease sometimes ultrasonugpher tend to dicribe the sape rather than the size of angle where the rounded lwer corner indcate the liver enlergment.

Table 3. Showed the difference in abdominal visceral measurement according to the shape of the lower corner of the liver. The mean value represent the real difference.

While 37.2% of the study population having positive family history, liver US was aimed to assess the echogenic texture for liver and the rest of the abdominal viscera and the result showed that the majority of the patient with homogenous, hyperecogenic texture for liver (83.7%) (46.5%), and regular liver shape. Sometimes these finding associated with presence of mass or cyst but it's not common. And homogenous, hyperecogenic texture for left and right kidney (23.3%- 60.5%) and (23.3% -53.5%) respectively. 53.5%-51.2% for spleen also.

5. Conclusion

Ultrasound scanning presents to be an effective tool in the diagnosis of VL consequences because of its ability to detect these complications in various abdominal organs such as liver, spleen and pancreas, in turn allowing the possibility of prevent and treat related deterioration in the patient's health status

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Author Profile

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