

Original

Fatty liver in overweight and obese patients in Western part of Saudi Arabia

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الملخص

الهدف :- الهدف من هذه الدراسة لمعرفة الارتباط بين السمنة وتشمع الكبد المشخص بالاشعة الصوتية في مستشفى جامعة الملك عبد العزيز بجدة

الطريقة :- مراجعة ملفات المرضى الذين شخصوا بتشحم الكبد والصابين اما بزيادة الوزن أو السمنة لمدة عام في الفترة بين ابريل 2003 م الى ابريل عام 2004 م بمستشفى جامعة الملك عبد العزيز بجدة . شملت الاحصائيات العمر السن ، قياس مستوى انزيمات الكبد فب الدم من AST ، ALT ، نسبة الصفراء في الدم ، البيومين ، HBAIC ، الكلسترول ، الدهون الثلاثية ، هرمون الغدة الدرقية ، الأعراض المرضية وتضخم الكبد .

النتائج :- شملت الدراسة 235 مريضاً . بلغ المتوسط العمري 46/±14.4 سنة . بلغت نسبة الرجال (35%) و135 من اللانثا بنسبة (65%) . بلغ المتوسط انزيم AST 43.9 +/-6.18 وحدة /ليتر) . وانزيم ALT (36.2 +/-) (5.1 وحدة / ليتر . بلغت نسبة انزيمات الكبد المرتفعة في (6.4%) في 15 مريضاً فقط . في حين سجل ارتفاع الكولسترول والدهون الثلاثية في 17 مريضاً بنسبة (7.2%) فقط .

اعتبرت السمنة والوزن الزائد السبب الأساسي لتشحم الكبد في الدراسة ، وبلغ المتوسط BMI 33 +/-7.2 كلغم /مربع المتر . اعتبرت البدانة المصاحبة لمرض السكر من أهم أسباب تشحم الكبد فقد بلغ نسبته (33%) اي 78 مريضاً مصاب بالسكر والبدانة . من الاسباب الأخرى لتشحم الكبد المصاحب للسمنة هو وبلغت النسبة (14.9%) ونسبة نقص هرمون اغدة الدرقية في (3.8%)

الخلاصة والتوصيات :- تعتبر البدانة قويادة الوزن من أهم أسباب تشحم الكبد في المملكة العربية السعودية وتعتبر أكثر شيوعاً بين السيدات . يعتبر الأشعة الصوتية من أفضل الوسائل التشخيصية للوصول لتشخيص تشحم الكبد في المرضى البدناء وخاصة اذا كانت انزيمات الكبد طبيعية .

علينا بتشجيع هؤلاء المرضى ذو الوزن الزائد على تنقيص وزنهم تدريجياً مما يساعدهم في التخفيف من تشحم الكبد

مفتاح الكلمات :- تشحم الكبد ، البدانة ، زيادة الوزن ، اشعة الصوتية للبطن .

Abstract:-

Objective:- The aim of the study is to determine the association of fatty liver diagnosed by ultrasound and obesity in patients presented to King Abdul aziz university hospital.

Methods:- A clinical notes review was performed of all patients undergoing evaluation for fatty liver associated with obesity over one year period between April 2003-to April 2004. Data included age, gender, nationality, BMI, serum level of alanine (ALT) and aspartate (AST) transaminases, bilirubin, albumin, HbA_{1c}, cholesterol, triglyceride, LDL, and TSH, and clinical presentation of abdominal pain or the presence of hepatomegaly.

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Results: - A total of 235 subjects were enrolled in the study. The mean age of the study group was 46 +/- 14.4 years with 82 males (35%) and 153 females (65%). Mean +/- SD aspartate aminotransferase level was 43.9 +/- 6.18 units /L, alanine aminotransferase was 36.2 +/- 5.1 units /L. Values of transaminase above the normal range was present in 15 (6.4%) patients only. Whereas values of cholesterol and triglyceride above normal range was seen in (7.2%) 17 patients. Over weight and obesity were the main risk factors in our study group. Mean BMI was 33.6 +/- 7.5 Kg/m². Obesity with diabetes is the most important risk for fatty liver. 78 (33%) of our study group patient were diabetic. Other risk factors associated with fatty liver are metabolic syndrome which is reported in 14.9% and hypothyroidism in 3.8% subjects.

Conclusion and recommendations: -

Overweight and obesity is the most important risk factor for fatty liver in Saudi Arabia. It is more prevalent in females. . Ultrasound appears to be a useful non-invasive tool to determine liver involvement with fatty liver in obese adult even in the absence of hypertransaminasemia.

We should encourage obese subjects for gradual weight reduction to improve the liver abnormalities

Key words: - Fatty liver, NASH, obesity, overweight, and abdominal ultrasound

Introduction

The term nonalcoholic fatty liver (NASH) was first used by Dr. Ludwig and colleagues in 1980 to describe a previously recognized clinicopathologic syndrome¹. The original syndrome was described predominantly in obese, diabetic women, who denied alcohol use, but in whom the hepatic histology was consistent with alcoholic hepatitis².

Nonalcoholic fatty liver disease is now recognized as the most common liver disease in the United States, with a prevalence of approximately 5% in the general population³ and reaching 25% to 75% in patients with obesity and type 2 diabetes mellitus⁴. A prevalence of 7-10% has been reported in the general population of Saudi Arabia^{5,6}.

Nonalcoholic fatty liver disease covers a spectrum of disease ranging from simple fatty deposition in the liver to inflammation and finally to fibrosis and cirrhosis^{7,8}. Although the exact etiology is not clear. It could possibly be part of large metabolic syndrome associated with insulin resistance, diabetes, obesity and hypertension. Patients typically present with a symptomatic serum aminotransferase elevation of 2-3 times normal⁹. Symptoms may include fatigue and abdominal pain. . Physical examination may show hepatomegaly¹⁰. The gold standard test for diagnosis is liver biopsy. Although the procedure is effective as a prognostic indicators but it is invasive and costly tool to diagnose fatty liver¹¹. The imaging modalities most often used to identify hepatic steatosis

include computed tomography and ultrasonography. Hyperechogenic (bright) liver indicates steatosis in ultrasonography¹². No medical treatment has been found to be totally effective¹³. Patients who are overweight or obese should be encouraged for gradual weight reduction which has been associated with improvement in liver abnormalities¹⁴. The prevalence of overweight and obesity is increasing in Saudi Arabia amongst Saudi and expatriates especially in females due to a change in dietary habit and sedentary life style. We studied the association of fatty liver diagnosed by ultrasonography and obesity in patients presented to King Abdul Aziz university hospital.

Methods

A clinical notes review was performed on all patients undergoing evaluation for fatty liver with obesity over one year period between April 2003 to April 2004 at King Abdul aziz University Hospital. Fatty liver was diagnosed by ultrasonography using an ATL HDI 5000 abdominal probe at 205-3 MHz. Longitudinal, subcostal, ascending, and oblique scans were performed. The ultrasonographic criteria of liver, kidney echo discrepancy, Presence of hyperechoic (bright), echo penetration into the deep portion of the liver, and clarity of liver blood vessels structures were used to diagnose fatty liver.

In most patients' medical charts serum level of alanine (ALT) aspartate (AST) transaminases, bilirubin, albumin, cholesterol, triglyceride, LDL,

and TSH were documented. Obesity was defined as body mass index. (BMI > 30 Kg/m²), overweight (BMI =25-29.9 Kg m/2) Records data from study participants obtained at initial clinic visit included age, gender, nationality, weight, height, BMI, and clinical presentation of abdominal pain or presence of hepatomegaly.

Exclusion criteria for the study included primary liver disorders other than fatty liver that could account for steatosis including Wilson disease and hemochromatosis. Study patients denied alcohol consumption or use of steatogenic medications.

Results were expressed as mean +/- standard deviation. Using Student's t test assuming equal values. Chi-square test, performed statistical analysis. Test considers being significant if p value is less than 0.05.

Results: -

A total of 235 overweight and obese adult patients were enrolled in the study. The mean age of the study group was 46 +/-14.4 years with 82 males (35 %) and 153 females (65 %) with male to female ratio of 1:1.9. (4%) 115 of them were Saudi and (51) 120 were non-Saudis (chart 1).

Table - 1: Laboratory data in obese patients with fatty liver

Laboratory tests	Mean +/- SD	Median	Range
ALT	43.9+/6.18	31	17-519
AST	36.2+/-5.1	25	19-536
HbA1C	8.4 +/-1.6	8	6-12 %
Albumin	38+/-4.6	39	16-47
Bilirubin	12.4+/-18	8	2-144
Cholesterol	5.3+/-1.4	5.2	2-14.3
Triglyceride	5.3+/-1.4	1.6	0.1-12.1
TSH	6.64+/-13.5	3.31	0.2-95

ALT = alanine aminotransferase NR (7-53 IU/L)
 AST= aspartate aminotransferase NR (11-47 IU/L)
 HbA1C=glycated hemoglobin
 Albumin = 36-50 gm/L
 Bilirubin=1-18 mmol/L
 Cholesterol=1.3-5.2 mmol/L
 Triglyceride=0.6-2.3 mol/L
 TSH = 0.27-4.2 IU /L

Biochemical Abnormalities

Mean serum aspartate aminotransferase level was 43.9+/-6.18. units /L, alanine aminotransferase was 36.2+/-5.1 units /L. and bilirubin 12.4+/-18 mmol/L Values of transaminase above the normal range was present in 15 patients (6.4%)only. Hyperbilirubinemia was seen on the same patients with hypertransaminasemia. The incidence of hypertransaminasemia was statistically not significant in relation to BMI or age of patients. Four of the patients who had high levels of both enzymes (ALT, AST) above four fold of the normal value were mainly due to secondary diseases involving the liver, two patients had hemolytic anemia, one had congestive heart failure and the fourth had glycogen storage disease.

Values of cholesterol and triglyceride above normal range was present in (7.2%) 17 patients, 13 of them were diabetics. Mean cholesterol level was 5.3+/-1.4 mmol/L and mean triglyceride level was 5.3+/-1.4 mmol/L. The incidence of hypercholesterolemia and hypertriglyceridemia was not correlated to hypertransaminasemia in patients with fatty liver reported by ultrasound.

TSH was done in 68 patients (29 %) to rule out hypothyroidism as a cause of obesity, overt hypothyroidism was noted in nine (3.8%) cases who were obese and who had fatty liver by ultrasound. (Table-1)

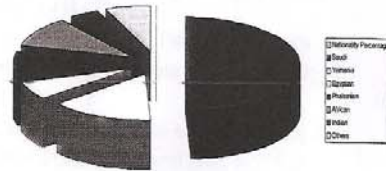
Risk Factors:-Over weight and obesity were the main risk factors in our study group. Mean BMI was 33.6 +/-7.5 Kg/m². The mean BMI in females was 33.5 +/-7.2 Kg/m². And in males 33.5+/-7.7. There was statically significant difference in the BMI between males and females with p value <0.005. Significant different in BMI between Saudi and non Saudi was also observed as illustrated in table 2.

A significant relationship was found between the presence of fatty liver and female sex (p value was 0.05). No significant relationship was found between the presence of fatty liver and age.

Diabetics were an important risk factor associated with obesity and fatty liver. 78 (33 %) of our study group patients were diabetics. The mean duration of diabetic was 136+/- 3.3 years and mean HbA1C was 8.4 +/-1.6, which was done in 13 patients only.

There were 25 cases (14.9%) of metabolic syndrome associated with non-alcoholic fatty liver. Metabolic syndrome is characterized by obesity, hyperinsulinemia, peripheral insulin resistance,

Chart -1: -Percentage of different non-Saudi nationality with fatty liver



diabetes, hypertriglyceridemia and hypertension.

Hypothyroidism was another risk factor associated with obesity and fatty liver, which comprised of 10 cases (4.2 %).

Almost all patients had abdominal pain as clinical indication to have abdominal ultrasound. Hepatomegaly with fatty infiltration as assessed by ultrasound was reported in 78 cases (33%) with mean liver size of 18.3+/-4.3 cm.

Discussion

Obesity, defined by a body mass index (BMI) 30 Kg/m2 is clearly associated with NASH. Furthermore it was associated moderately overweight 10-to 40 percent more than their ideal body weight ¹⁴. We had found in this study that NASH to be very common in over weight and obese adults in western part of Saudi Arabia (Jeddah), and commonly observed in females of childbearing age. Previous epidemiological surveys have shown high prevalence of overweight and obesity among Saudi subjects ^{15, 16}. The prevalence of obesity in Saudi females subjects was the highest reported all over the world and a report of increasing obesity in females from different Arab community ^{17, 18, and 19}. The incidence of hypertransaminasemia in patients with fatty liver diagnosed by ultrasound is similar to other reports in the literature ²⁰.

Obesity and type 2 diabetes often clusters together, hence 33 % of our subjects were diabetics however our study did not show any relationship between duration of diabetes or glycemic control with the severity of fatty liver. This could be biased result and explained by rather small sample size and the fact that Hb A1C was measured in 13 subjects only because this test was rarely a available in the hospital.

Other risk factors associated for fatty liver like metabolic syndrome, which is characterized by obesity,

Table-2: Comparison of BMI IN Kg/m2 between sex and nationality in patients with fatty liver

Character	Mean +/-SD	Median	Range	P value
Male BMI	33.5+/-7.7	32	25-63	
Females BMI	33.5+/-7.4	32	25-71	<0.005
Saudi BMI	33+/-7.2	31	25-61	
Non Saudi BMI	33.9+/-7.76	32.5	25-71	<0.005

hyperinsulnemia, peripheral resistance, diabetes, hypertriglyceridemia and hypertension was reported in 14.9% of our study group which was similar to other reports in the literature ²¹.

Hypothyroidism was one of the risk factors associated with obesity and fatty liver which has been observed in 3.8 % of our study group ²².

Hypertransaminasemia was observed in-patients with severe fatty liver; two patients had hemolytic anemia due to a deficiency of red cell Mg 2+ - adenosine triphoshatase. , and one young adult patient had glycogen storage disease ²³. The fatty liver could be discovered incidentally during routine abdominal ultrasound as workup of abdominal pain which is typically vague, non descript aching in character ²⁴. The common clinical finding of fatty liver was hepatomegaly, however no other stigmata of chronic liver disease like spider navi, palmer erthyema were noted in our study .A fourteen year old boy who had sickle cell anemia developed symptoms of hepatic encephalopathy which indicated decompensated liver disease due to fatty liver after exclusion of other causes of liver cirrhosis .

Liver biopsy to assess stages of the disease and histological changes of steatosis were not carried out in any patient enrolled in the study because of the risk of the biopsy and also because the findings will not contribute to future management

In conclusion

Overweigh and obesity is coexisting risk factors for fatty liver in Saudi Arabia, and it is more prevalent in females. . Ultrasound appears to be a useful non-invasive tool to determine liver involvement with fatty liver in obese adults even in absence of hypertraminasemia ²⁵. No medical treatment has been found to be totally effective. Patients who are overweight or obese should be encouraged for gradual weight reduction which has been associated with improvement in liver abnormalities ²⁶.

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