Correlation between liver enzymes, lipid profile and APRI test in obese and non obese individuals

Thesis

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AAR	AST/ALT ratio
ALP	Alkaline phosphatase
ALT	Alanine aminotransferase
Apo	Apolipoprotein
APRI	AST-to-platelet ratio index
AST	Aspertate aminotransferase
BARD	BMI, AST/ALT ratio (AAR) and diabetes
BMI	Body mass index
CBC	Complete blood count
CLD	Chronic liver disease
COPD	Chronic obstructive pulmonary disease
CT	Computerized tomography
DM	Diabetes mellitus
ECM	Extracellular Matrix
ELF	European liver fibrosis
FBS	Fasting blood suger
FFA	Free fatty acids
FIB-4	Fibrosis 4 Score
GGT	Gamma-glutamyle transepeptidase
HA	Hyaluronic acid
HBs Ag	Hepatitis B surface Antigen
HBV	Hepatitis B virus
HCC	Hepato cellular carcinoma
HCV	Hepatitis C virus
HCV Ab	Hepatitis C virus Anti-body
HDL	High density lipoproteins
HE	Hepatic encephalopathy
IDL	Intermediate density lipoproteins
IR	Insulin resistance
LCAT	lecithin cholesterolacyl transferase

LDL	Low density lipoproteins
LP	Lipoprotein
LPL	Lipoprotein lipase
LTx	Liver transplantation
MRI	Magnetic resonant image
MRS	Magnetic resonance spectroscopy
NAFLD	Non-alcoholic fatty liver disease
NASH	Non-alcoholic steatohepatitis
NFS	NAFLD fibrosis score
NICU	Neonatal intensive care unit
PCOS	Polycystic ovarian syndrome
PLT	Platelets
TE	Transient elastography
TG	Triglycerides
US	Ultrasound
VLDL	Very low density lipoproteins
WBCs	White blood cells

Introduction

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems. People are considered obese when their body mass index (BMI), (a measurement obtained by dividing a person's weight in kilograms by the square of the person's height in metres) exceeds 30 kg/m2 ***(WHO, 2013).***

Obesity is a leading preventable cause of death worldwide, with increasing prevalence in adults and children, and authorities view it as one of the most serious public health problems of the 21st century. Obesity is stigmatized in much of the modern world (particularly in the Western world), though it was widely perceived as a symbol of wealth and fertility at other times in history, and still is in some parts of the world ***(Woodhouse, 2008).***

The reported prevalence of obesity in several series of patients with NASH varied between 30 and 100%, the prevalence of type 2 DM varied between 10 and 75%, and prevalence of hyperlipidemia varied between 20 and 92%. Some children with NASH have type 1 DM. The prevalence of NASH increases by a factor of 4.6 in obese people ***(Tarantino et al., 2007).***

In Egypt, obesity levels decreased slightly, but remained among the highest in developing countries ***(Grummer-Strawn et al., 2000).***

Obesity raises the risk of morbidity from hypertension, dyslipidemia, type 2 DM, coronary heart disease, stroke, gallbladder

disease, osteoarthritis and respiratory problems (sleep apnea), and can cause cancers of uterus, prostate, and colon. Higher body weights are also associated with increase in cause-related mortality ***(Tuomileto, 2004).***

Non-alcoholic fatty liver disease (NAFLD) is a spectrum of clinicopathological conditions characterized by lipid deposition mainly triglycerids in the liver cells of the patients who have no history of excessive alcohol consumption (***Reddy and Rao, 2006***).

NAFLD and non-alcoholic steatohepatitis (NASH) are the most common chronic liver diseases in the West. Both NAFLD and NASH are associated with an often asymptomatic elevation of serum ALT and gamma GT. Ultrasound monitoring can suggest the presence of a fatty infiltration of the liver; differentiation between NAFLD and NASH however, often requires a liver biopsy. Such differentiation is important because NASH is associated with a much higher risk of liver fibrosis and cirrhosis than NAFLD (***Tuyama and Chang, 2012*****).**

NAFLD is present in 20 to 40% of the general population in industrialized countries and is the most prevalent chronic liver disease (***McCullough, 2005***).

The prevalence of NAFLD in one study was done about NAFLD in obese Egyptian children was 19.7% (simple steatosis 10.5% and NASH 9.2%). BMI, grade III echogenicity of the liver and dyslipidemia were highly predicting factors for NASH ***(Muhammad, 2007).***

Probably around 10% of NAFLD patients will progress to NASH over a period of 10 years. Cirrhosis later develops in 5-25% of patients with NASH and 30-50% of these patients die from liver-related causes over a10-year period ***(McCollough, 2005).***

Cirrhosis in patients with NASH can also decompensate into subacute liver failure, progress to hepatocellular cancer (HCC), and recur after liver transplantation ***(McCollough 2005).***

They are closely associated with obesity, type 2 diabetes mellitus, and metabolic syndrome. The epidemics of diabetes and obesity have also fueled an increasing prevalence of fatty liver disease (***Tuyama and Chang, 2012***).

APRI test (AST to Platelet Ratio Index) is a noninvasive diagnostic test for liver fibrosis which is simple, available, inexpensive and accurate. APRI values of ≤ 0.5 rule out significant fibrosis and cirrhosis, and a value of ≥ 1.5 rule in significant fibrosis. In patients with NAFLD, APRI values tend to increase with the degree of fibrosis ***(Manning and Afdhal, 2008).***

(Frederik C.K. et al., 2011) demonstrated that The APRI was significantly higher in the advanced fibrosis group. The AUROC curve for APRI was 0.85 with an optimal cut-off of 0.98, giving a sensitivity of 75% and a specificity of 86%. The positive predictive value for APRI was 54% and the negative predictive value was 93%.

Aim of the work

The aim of this study is to correlate between liver enzymes and lipid profile in obese and non-obese individuals, and a marker of fibrosis by APRI (AST-to-platelet ratio) test in NAFLD and not NAFLD. This will help early detection of the effect of obesity on the liver cells.

Obesity

Introduction:

Obesity is a substantial public health problem in the United States and in the rest of the industrialized world. The prevalence is increasing rapidly in numerous industrialized nations worldwide. According to a recent study Compared with a nonobese person, an obese person incurs 2741$ more in medical costs annually ***(Cawley and Meyerhoefer, 2012).***

Obesity is a leading preventable cause of death worldwide, with increasing prevalence in adults and children, and authorities view it as one of the most serious public health problems of the 21st century. Obesity is stigmatized in much of the modern world (particularly in the Western world), though it was widely perceived as a symbol of wealth and fertility at other times in history, and still is in some parts of the world ***(Woodhouse, 2008).***

Internationally, rates of obesity are higher in women than in men. Children, who are obese, have a high probability of becoming adults who are obese; hence, the bimodal distribution of obesity portends a large-scale obesity epidemic in the next few decades ***(Metcalf et al., 2011).***

In Egypt, obesity levels decreased slightly, but remained among the highest in developing countries ***(Grummer-Strawn et al., 2000).***

Obesity is a condition that substantially raises the risk of morbidity from hypertension, dyslipidemia, type 2 DM, coronary heart disease, stroke, gallbladder disease, osteoarthritis and respiratory problems (sleep apnea), and can cause cancers of uterus, prostate, and colon. Higher body

weights are also associated with increase in cause-related mortality ***(Kim et al., 2000 and Tuomileto, 2004).***

Definition:

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems. People are considered obese when their body mass index (BMI), (a measurement obtained by dividing a person's weight in kilograms by the square of the person's height in metres) exceeds 30 kg/m^2 ***(WHO, 2013).***

Measurements of obesity:

1- Body mass index (BMI): The body mass index (BMI), also known as the Quetelet index, is used far more commonly than body fat percentage to define obesity. In general, BMI correlates closely with the degree of body fat in most settings; however, this correlation is weaker at low BMIs ***(Ward, 2012).***

Although several classifications and definitions for degrees of obesity are accepted, the most widely accepted classifications are those from the World Health Organization (WHO), based on BMI. The WHO designations include the following:

Table (1): classification of body weight by BMI

BMI	Classification
< 18.5	underweight
18.5–24.9	normal weight
25.0–29.9	overweight
30.0–34.9	class I obesity
35.0–39.9	class II obesity
≥ 40.0	class III obesity

(WHO, 2000).

In children, a BMI above the 85th percentile (for age-matched and sex-matched control subjects) is commonly used to define overweight, and a BMI above the 95th percentile is commonly used to define obesity ***(Shiwaku Ket el., 2004).***

2- Other indices: used to estimate the degree and distribution of obesity include the 4 standard skin thicknesses (ie, subscapular, triceps, biceps, suprailiac) and various anthropometric measures, of which waist and hip circumferences are the most important. Skin fold measurements are the least accurate means by which to assess obesity ***(Ward, 2012).***

Figure (1): Services must accommodate obese people with specialist equipment such as much wider chairs ***(Bakewell, 2007)***.

Etiology:

Obesity is a complex multifactorial chronic disease that develops from an interaction of genotype and the environment. Our understanding of how and why obesity develops is incomplete, but involves the integration of social, behavioral, cultural, physiological, metabolic and genetic factors:

a- Genetic factors: Like many other medical conditions, obesity is the result of an interplay between genetic and environmental factors. Polymorphisms in various genes controlling appetite and metabolism predispose to obesity when sufficient food energy present. More than 41 of the sites on the human genome have been linked to the development of obesity when a favorable environment is present ***(Poirier et al., 2006).***

People with two copies of the FTO gene (fat mass and obesity associated gene) have been found on average to weigh 3–4 kg more and have a 1.67-fold greater risk of obesity compared with those without the risk allele ***(Loos and Bouchard, 2008).***

The percentage of obesity that can be attributed to genetics varies, depending on the population examined, from 6% to 85% ***(Yang et al., 2007).***

Studies that have focused on inheritance patterns rather than on specific genes have found that 80% of the offspring of two obese parents were also obese, in contrast to less than 10% of the offspring of two parents who were of normal weight ***(Kolata, 2007).***

b- Environmental factors: Almost all obesity in children is strongly influenced by environmental factors, caused by either a sedentary lifestyle or a caloric intake that is greater than needs. The contributions of specific environmental influences are the subject of considerable