development of a serum test to diagnose an ectopic pregnancy with high accuracy would be of great clinical significance.

Creatine kinase (CK) is an intracellular enzyme that catalyzes the formation of adenosine triphosphate (ATP) from creatine phosphate and adenosine diphosphate (ADP). It is therefore abundant in metabolically active tissues with significant energy demands, specifically skeletal and smooth muscle, myocardium, and brain [5].

Three distinct isoenzyme forms of CK have been identified, namely, CK-MM, MB, and BB (M: muscle, B: brain) [5]. Because an increase of CK plasma concentration always reflects injury to a tissue of high CK activity, CK measurements are particularly useful in the diagnosis of acute myocardial infarction, in which determination of CK-MB isoenzyme levels is much more specific than total CK [6,7].

In tubal pregnancy, the zygote penetrates the tubal epithelium and lies next to the muscular layer as the fallopian tube lacks a submucosal layer. This invasion into the muscle causes an increase in muscle cell creatine kinase (CK) in blood [8].

The extent of penetration into the muscle will depend upon the site of implantation. In 1993, Lavie *et al* [9] reported that an initial maternal serum CK was predictive of tubal pregnancy in first trimester. Subsequently, three studies [10-12], were able to reproduce their findings.

Another study by Kurzel *et al* [13] found an elevated mean CK level but with questionable clinical utility and four studies [14-17] reported no elevation in serum CK in tubal pregnancy.

The current study was designed: (a) to further evaluate the diagnostic value of total CK in women with EP, spontaneous abortion, and normal pregnancy; (b) To determine, whether serum CK level might be a marker for diagnosis of tubal rupture ectopic pregnancy; and (c) To measure CK-MB isoenzyme concentrations in the previously mentioned samples and to investigate the possible discriminatory ability of MB fraction.

Methods

Forty women with EP, 17 intrauterine abortive and 24 women with normal intrauterine gestation (controls) were followed up at Al-Kadhimyia Teaching Hospital, Baghdad, Iraq, between November 2010 and June 2011. Descriptive characteristics such as the age, height and weight of the patients were taken.

Diagnosis of EP was based on clinical assessment and transvaginal ultrasonography. All EP were treated by laparotomy and confirmed by histopathology. From all women, blood was drawn by routine venipuncture. Blood samples were centrifuged at 3000 rpm and sera were stored at -20 ^{o}C.

Exclusion criteria were the absence of any medical disorder that would raise the serum CK. Inclusion criteria were the confirmation of intrauterine pregnancies in the control group and abortive group with a positive serum human chorionic gonadotropin (hCG). For the cases with ectopic pregnancy; diagnosis should be confirmed by transvaginal ultrasound and a positive hCG.

Human chorionic gonadotropin (hCG) levels were measured by monoclonal antibody Enzyme Linked Immuno-Sorbent Assay (ELISA) techniques for follow up or confirmation of the diagnosis. Total serum creatine kinase and CK-MB values were determined by spectrophotometric analysis.

Values are presented as mean ± standard error for mean (S.E.M.). Comparison of means between different groups was performed with Student's t test.

Receiver Operator Characteristic (ROC) curves was constructed to plot sensitivity against specificity.

The areas under the ROC curves (AUC) were calculated and compared with the AUC (0.5) of the non-diagnostic test (the line with slope of 1). For cut-off values of significant sensitivity and specificity (> 70%), contingency tables (cross-tabs) were constructed for the calculation of positive and negative predictive values. Confidence intervals of sensitivity, specificity,