Materials and Methods .2

:Materials .2.1

.**Study design:** This is a descriptive analytical case control study **2.1.1**

Study area: The study was conducted in Radiation Isotope Center in **2.1.2** .Khartoum city

Study population: This study included 50 patients (30 of them with **2.1.3** hypothyroidism and 20 of them with hyperthyroidism) who attended to the center during June to September 2015 as test group. And 30 apparently healthy individuals act as control group. (ages of test and control groups"25-50" and .(gender were matched

.**Inclusion Criteria:** Patients with hyperthyroidism and hypothyroidism **2.1.4**

Exclusion criteria: Pregnant women, patients with liver disease, cardiac **2.1.5** .disease, diabetes mellitus, hypertension and muscles dystrophy were excluded

Samples: About 5ml of venous blood were collected from each member of **2.1.6** test and control groups. The samples collected under aseptic conditions and placed in sterile plane containers, and after clotting centrifuged for 3 minutes at 3000 RPM to obtain serum, the obtained serum then were kept at ⁻20c till the time of .analysis

Ethical consideration: Patients who voluntarily accepted to participate in **2.1.7** .the study were included

Data collection: Data was collected from patients using questionnaire **2.1.8** (appendix I). Levels of T_3, T4, and TSH were already measured using Radio

immune assay (RIA) in the in the radiation isotope center and data was collected .from the center files

Data analysis: Data analysis was done by using the SPSS computer program **2.1.9** .version 21

:Methods .2.2

:Estimation of Creatine kinase 2.2.1

Principle of method: Creatine kinase catalyzes the phosphorylation of ADP, in the presence of creatine phosphate to form ATP and creatine. The catalytic concentration is determined from the rate of NADPH formation, measured at 340 nm, by means of the hexokinase (HK) and glucose-6-phosphate dehydrogenase .((G6P-DH) coupled reaction (Appendix II

(Estimation of aspartate aminotransferase (AST 2.2.2

Principle of method: Aspartate aminotransferase catalyzes the transfer of amino group from aspartate to 2-oxogluterate, forming oxalacetate and glutamate. The catalytic concentration is determined from the rate of decrease of NADH, measured at 340nm; by means of the malate dehydrogenase (MDH) coupled .(reaction (Appendix III

:(Estimation of alanine aminotransferase (ALT 2.2.3

Principle of method: Alanine aminotransferase catalyzes the transfer of the amino group from alanine to 2-oxogluterate, forming pyruvate and glutamate. The catalytic concentration is determined from the rate of decrease of NADH; measurd at 340nm, by means of the lactatedehydrogenase (LDH) coupled reaction .((Appendix IV

Quality control 2.2.4

The control materials (normal and abnormal) were used in this study .and the values obtained fall within the defined limits