Acid-base metabolic disorders are conditions that alter the normal body homeostasis that regulate the pH of blood in order to maintain normal biochemical functions. Maintenance of a constant pH is important for enzyme function, cellular uptake and use of metabolites and minerals, conformation of biological structures and uptake and release of oxygen. Patients with diabetes mellitus are prone to development of diabetic ketoacidosis (DKA) which is excessive production of ketone bodies such as acetone and ~-hydroxy butyric acid with resultant reduction in pH of blood. Acute and chronic kidney diseases also usually lead to excessive loss of bicarbonate ion in urine which eventually causes acid-base metabolic imbalance in the body. These two medical conditions necessitate frequent blood sampling in order to monitor and manage the resultantacidosis. However, arterial puncturing is invasive and apart from being more painful, could also be hazardous. Therefore, there is need to determine whether venous blood gas (VBG) analysis could replace arterial blood gas (ABG) analysis. Traditionally, arterial blood samples collected via the invasive arterial-puncture are used to assess the acid-base status of the blood. The proposed study aims at evaluating the validity of venous blood acid-base analysis and its clinical agreement with arterial blood in the diagnosis of acid-base disorders. In addition, reference values of acid-base parameters such as pH, Partial pressure of carbon dioxide (pC02), Partial pressure of oxygen (P02), bicarbonate ion (HC03 "), base excess *(BIE)*, and Oxygen Saturation (02) in addition to electrolytes such as potassium, sodium, chloride and ionic gap will be established in venous blood samples. Thus, a cross-sectional study composed of two groups; cases (patients with acid-base disorders such as DKA and kidney disease) and controls (healthy individuals), will be carried out. A total of 250 subjects (cases) with acid- base metabolic disorders in the medical wards, Critical Care Unit and Renal Unit at KNH will be recruited. An additional 120 healthy subjects will be recruited for the establishment of reference values for acid-base parameters. About 2.0 m1 of both venous and arterial blood samples will be removed simultaneously from each patient and an equal volume of venous blood will be taken from each subject in the control group. Specific organ (liver, kidney, heart and the pancreas) function tests will be carried out by determining the levels of the following enzymes and endogenous compounds; aspartate Transaminase (AST), alkaline phosphatase (ALP), Alanine Transaminase (ALT), gamma glutamyl transferase (y-GT), bilirubin, urea, creatinine, uric acid, inorganic phosphorus, total protein, albumin, creatine phospho kinase (CPK) , lactate dehydrogenase, (LDH) and 0,- amylase. This study will be expected to introduce the use of venous blood gas (VBG) in the diagnosis of acid-base disorders instead of arterial samples. Immediate benefit to the patients will be decreased pain during sampling and also samples can be drawn using the same intravenous (IV) line that is used to draw blood for other laboratory tests, thus necessitating only one puncture. In addition, the sensitivity and predictive values of VBG and the level of agreement between VBG and ABG, will be established.