National University of Science and Technology

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

PROJECT TITLE :

A QUALITATIVE AND QUANTITATIVE COMPARISON OF TWO METHODS OF THE DETERMINATION OF IODINE CONCENTRATION IN URINE

By : CAROLINE CHIWARA
STUDENT NUMBER : N9301084X

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SUPERVISED BY : PROFESSOR DR. T. DJAROVA

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ABSTRACT

The prevalence of iodine deficiency disorders is widespread throughout the world affecting billions of people. Iodine deficiency disorders (IDDs) manifest in various forms afflicting the body from simple goitre to cretinism. In view of the debilitating effects of IDDs on both the people's health and on the nation's economy, it has become imperative to determine the iodine status of a population and thus establish the extent of IDDs inorder to develop and monitor prophylaxis measures to eliminate these disorders.

Urinary iodine determination has received world wide approval as a means of evaluating the iodine status of individuals. Various methods have been developed. These however, differ widely in speed, precision, technical demands and in the removal of interfering substances. This necessitates the need for establishing the most reliable and best technique for assessing IDD in any given situation.

Many methods exist for urinary iodine determination. According to the World Health Organisation, there are six general methods worldwide which are designated Method A to Method F. These methods used all involve the Sandel-Kolthoff reaction of reduction of the ceric ions but differ in precision, speed, technical demands, and removal of interfering substances. In this analysis, Methods A

and F were chosen for comparison because of the relative high precision speed, accuracy, low cost and ease of operation. These methods differ in that Method A involves the removal of interfering substances while Method F is a direct analysis. Such a comparison will help establish the necessity of removal of interfering substances and to determine the best method for implementation.

Standard curves for both methods were first prepared using varying iodine concentrations. In Method A, and acid digestion of 24 Hour urine samples was carried out at high temperatures of about 110 degrees celsius. Ceric ammonium sulphate and Arsenious acid solutions were then added and the reaction involved in the reduction of the yellow ceric ion to colourless cerious ion by the iodide ion present in the urine. The rate of colour change gave an indication of the iodine level in the urine and hence the individual's iodine status. Method B was a direct spectrophotometric determination of the colour generated during the reaction without any prior digestion of the sample. Urine filtrates were mixed with ceric ammonium sulphate and arsenious acid solution before heating in a water bath at 37°C. The yellow colour was fixed with Brucine sulphate thus stopping the reaction after a few minutes.

The mean concentration of iodine in urine using Method A was found to be 8,06 µg/dl with SD ± 1.86 while using Method F the mean was 7.12 µg/dl and SD ± 1.79. However there were no significant differences between the methods at the 95% confidence level in precision and accuracy.