



NITRATE INDUCED TOXICITY ON SOME HAEMATOLOGICAL PARAMETERS OF CHARLES FOSTER RATS

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ABSTRACT

Nitrate can cause multiple physiological effects if allowed to build up to high concentrations in animals. This work is concerned with the study of short term (14 days oral intoxication) nitrate exposure to male and female Charles foster rats that were divided into 4 groups. Ist group was allowed free access to distilled water whereas IInd, IIIrd and IVth groups were provided with water possessing nitrate concentration 45 mgL⁻¹, 90 mgL⁻¹ and 135 mgL⁻¹ NO₃⁻ respectively. Under these conditions the haematological parameters such as T-RBC count, Hct and Hb showed increasing trend while TLC and blood platelets showed decrease in response to the stress imposed. Certain variations were observed in differential leucocytes count. Nitrate contaminated water seems to have disturbed the physiology and metabolism of experimental mammals (rats).

KEY WORDS Charles foster rats, Haematological parameters, Nitrate contaminated water, Nitrate toxicity

INTRODUCTION

Excessive use of nitrogenous fertilizers subsequently leads to ecosystem pollution by the accumulation of nitrates in vegetables and fodder as well as the contamination of surface and ground water [1]. Especially, nitrates and nitrites are of great importance and concern to man and animals because they possess mutagenic, carcinogenic, teratogenic and embryotoxic activities [2]. Nitrates/nitrites are likely to exert harmful effects on the respiratory function as a consequence of acute intoxication while being responsible for methaemoglobinemia [3,4]. The major metabolites of nitrates are nitric oxide and nitrosamine. The latter one is highly carcinogenic and associated with a high risk of stomach, liver and esophagus carcinomas [5]. Several clinical studies documented hepatorenal and/or hepatotoxicity in humans were associated with excess nitrate intake [6]. Nitrates, in case of their oral absorption, are reabsorbed rather quickly in intestines and over 80% are released in a mass in the urine [7] and the high rate of absorption is may be due to the shortness of the nitrate ion radius. Nitrites are formed in the buccal cavity by bacterial reduction of about 20% of the nitrates ingested which escaped from elimination, circulating between the buccal cavity and the digestive system [8]. It has been shown that nitrite treatments in intact RBC causes a noticeable oxidation of oxyhaemoglobin to methaemoglobin by radical generation along with a decrease in glutathione level in the intracellular

medium associated with membrane lipid peroxidation [9].

Nitrate transformation into *N*-nitroso compounds in the stomach in the presence of secondary amines makes them still more dangerous [10,11]. Although secondary amines represent the essential constituents of human food, risk of cancer can only be reduced if the nitrate or even nitrite levels in food remains as low as possible [12]. [13] have stated the importance of haematological parameters because of their relationship with respiration (RBC, Hct, and Hb levels) and defense mechanism (WBC level).

The aim of the study was to investigate the effect of nitrate on some haematological parameters of Charles foster rats at different oral doses i.e. 45, 90 and 135 mgL⁻¹ NO₃⁻ dissolved in water.

MATERIAL AND METHODS

The animal clearance was obtained from Institutional Animal Ethics Committee (IAEC) of Central Drug Research Institute (CDRI), Lucknow.

A total of 32 rats (16 males and 16 females), weighing 200-250 g each, were divided into 4 groups. Each group contained 4 male and 4 female rats, kept in different cages. The II, III and IV group of rats were provided with water possessing 45 mgL⁻¹, 90 mgL⁻¹ and 135 mgL⁻¹ NO₃⁻ concentration respectively. The I group (control group), was