Biokemistri Vol. 9, No. 2, December, 1999
Printed in Nigeria

0795-8080/99 $3.00 + 0.00

BKR 9938/9207

SOME BIOCHEMICAL AND HAEMATOLOGICAL PARAMETERS OF RATS FED TWO LOCALLY PREPARED WEANING FOODS

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(Received March 31, 1999)

ABSTRACT: Some biochemical and haematological parameters of male weanling albino rats fed two locally prepared weaning foods labelled JK and LI diets were studied. JK diet was prepared from maize, soya beans and groundnuts in the ratio 3:1:1 (w/w/w), eight (8) domestic fowl eggs and seventeen (17) table spoonfuls of groundnut were added per kilogram diet. LI diet was prepared from maize, sesame seeds, groundnut cake and crayfish in the ratio of 4:4:1:1 (w/w/w/w). The rats were fed *ad libitum* and supplied with drinking water for 27 days. Control rats were fed likewise using laboratory chow. Serum analysis of the rats fed the different types of diets, for total protein, albumin, glucose and some macro- and micro-elements showed no significant difference ($P > 0.05$). Analysis of the blood for Hb, MCHC, RBC and PCV also showed no significant difference ($P > 0.05$), while clotting time, MCH, MCV and WBC counts differed significantly ($P < 0.05$) in rats fed the two diets. There may be the need to improve on these diets and see the possibility of using them as weaning foods for humans.

Key Words: Weaning foods; Soya beans; Groundnuts; Haematological indices.

INTRODUCTION

Hunger and malnutrition continue to cause enormous worldwide human suffering. The most serious
nutritional deficiendies are the various forms of protein energy malnutrition (PEM), particularly as it affect infants and young children (1). Sub Sahara Africa has suffered a long term decline in food supplies coupled with the incessant economic hardship which aggraveted the already existing problem of malnutrition (2).

A subject which deserved more attention in infant nutrition is the provision of adequately nourishing weaning foods (3) from locally available food stuff (4).

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Good health is necessary dependent on the adequacy of the nutrients in the diet of an individual (5). Malnutrition could result from relative or absolute deficiency or excess of one or more nutrient; this may or may not manifest clinically and where it does not manifest, the disease may be detected only from biochemical and haematological indices of nutritional status (6,7). This paper is therefore aimed at assessing some biochemical and haematological parameters of rats fed JK and LI diets.

MATERIALS AND METHODS

All the reagents and chemicals used in this work are of analytical grade.

Preparation of weaning foods:

JK diet was prepared from yellow maize, soya-beans and groundnuts in the ratio of 3:1:1 (w/w/w) respectively. Eight domestic fowl eggs and seventeen table spoonfuls of groundnut oil were added per kilogram JK diet. The maize was washed and sun dried; the groundnut was blanched and the soybeans soaked in hot water to remove the testa, pounded gently in a mortar to remove the seed coat, boiled for 30 minutes to reduce the smell and sun dried. The mixture was milled into fine powder.

LI diet was made up of yellow maize, sesame seeds, groundnut cake and crayfish separately milled into fine powder and mixed in the ratio of 4:4:1:1: (w/w/w/w) respectively. The maize was allowed to sprout for 48 hours, washed and sun dried before milling; while sesame seeds were washed to remove the coats, sun dried and then fried before milling.

The laboratory chow was supply by Pfizer Nigeria Ltd Kaduna.

Animals and their feeding:

Thirty six male weanling albino rats (*Rattus albinus* Wistar) of 21 days and having average initial weight of 45 ± 3g were used.

The animals were stabilized on laboratory chaw for three days and randomly separated into three groups: JK, LI and control. The rats in each group were separately placed in labelled metabolic cages.

JK and LI groups were fed *ad libitum* with JK and LI diets respectively for 27 days. The control group was fed likewise with laboratory chaw as the control feed. All the groups were provided with drinking water throughout the experimental period.

Feed consumption rate and weight by the rats in each group during the experimental period were closely monitored.

Collection of blood:

In the morning of the 28th day of the experiment the animals were killed by anaesthesia using diethyl ether and the blood collected by cardiac puncture. Parameters that required the use of whole blood were determined immediately after collection, while for those determined in serun, the blood was allowed to clot for 20 minutes, centrifuged at 64 x g for 5 minutes in a bench centrifuge and the serum collected into clean labelled blood sample bottles and stored at -20°C till required.

Estimation of biochemical parameters:

Serum glucose level was determined by O-toluidine method (8), serum total protein by biuret method (9) and serum albumin by the dye binding method using bromocresol green (10). The serum levels of micro and macro elements were estimated using Computerized Atomic Absorption Spectrophotemeter.

Estimation of haematological parameters:

Clothing time (CT), packed cell volume (PCV) haemoglobin (Hb), red blood cell (RBC) and white blood cell (WBC) counts were determined using the methods reported in green and Ezeilo (11). Mean cell volume (MCV), mean cell haemoglobin (MCH) and mean cell haemoglobin concentration (MCHC) were calculated (11).

RESULTS AND DISCUSSION

The results are presented in tables 1 to 3 below.

Table 1: Serum Glucose, Total Protein, Albumin (A), Globulin (G) and A/G ratio of rats fed JK, LI and control diets.

Parameters	JK	LI	Control
Glucose (mg/100ml)	89.40 ± 9.60	94.60 ± 6.00	100.00 ± 1.00
Total protein (g/100 ml)	6.24 ± 0.24	6.24 ± 0.20	6.10 ± 0.01
Albumin (g/100 ml)	4.04 ± 0.20	4.12 ± 0.13	3.75 ± 0.01
Globulin (g/100 ml)	2.20	2.12	2.35
A/G Ratio	1.84	1.94	1.60

Table 2: Levels of some elements in the serum of rats fed JK, LI, and control diets

Elements (mM)	JK	LI	Control
Na	68.59 ± 0.05	97.70 ± 0.87	89.00 ± 1.56
K	7.90 ± 0.03	8.10 ± 0.21	8.16 ± 0.56
Ca	3.40 ± 0.23	5.44 ± 0.34	4.22 ± 0.03
Mg	1.23 ± 0.01	1.39 ± 0.03	1.23 ± 0.013
Zn	0.27 ± 0.01	0.25 ± 0.001	0.45 ± 0.01
Fe	0.19 ± 0.01	0.18 ± 0.01	0.20 ± 0.01
Mn	0.01 ± 0.001	0.01 ± 0.001	0.01 ± 0.001

Table 3: Haematological parameters of rats fed JK and LI diets.

Parameters	JK	LI	Control
CT (seconds)	99.00 ± 13.87	67.00 ± 2.30	60.00 ± 4.20
Hb (g/dl)	10.83 ± 0.70	10.22 ± 1.58	8.24 ± 0.20
MCH (pg)	26.93 ± 2.45	22.20 ± 0.36	20.00 ± 1.00
MCHC (g/dl)	44.36 ± 3.10	41.73 ± 3.97	59.19 ± 2.33
RBC x 10^6 (mm^{-3})	4.37 ± 1.13	4.21 ± 0.54	5.01 ± 0.09
PCV (%)	27.20 ± 5.19	35.20 ± 6.42	31.00 ± 2.83
MCV (fl)	61.53 ± 2.84	89.26 ± 5.45	61.83 ± 4.50
WBC x 10^3 (mm^{-3})	4.52 ± 0.73	6.94 ± 1.48	4.00 ± 1.41

PEM is the commonest nutritional disorder in many part of the World. These may be manifested in the serum level of some biochemical parameters. Plasma proteins serves, among others, as a source of rapid replacement of tissue proteis during tissue depletion6. The values obtained for the total protein, albumin and glucose, in this work showed no significant difference ($P < 0.05$) with the value obtained for the control. This suggest that the diet are relatively 'adequate' to maintain the serum level of these parameter in the experimental animals. Elemental composition of the serum of the experimental animals also showed no significant difference ($P < 0.05$) with the control, except for the Na and Ca of the JK diet. The low level of Ca in the serum of abimals on JK diet and the reported presence of certain anticlotting agents in soybeans (12) may be responsible for higher CT obtained for rat on this diet. Similar observation was made for chicken fed soybeans supplemented chicken feeds (13). The Hb level of the rats on the experimantal diet does not differ significantly ($P < 0.05$) from the value obtained for the control. The suspicion of iron deficiency on the basis of anaemia can be substantiated by one or more additional test: decreased MCV, and MCH among others6. Lowered PCV may also be an indication of anaemia6. The results in the current studies however suggested that the diets are adequate in Fe. The values obtained for some haematological parameters of animals on various diets, though differ significantly ($P < 0.05$), they however fall within the range reported for some mammals (6, 14, 15).

It may be of interest, therefore, to see the possiblility of improving on the quality of these diets, and recommending them as weaning foods humans and/or rehabilitation foods for malnorished children.

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