

Original Article

Proximate analysis of wheat supplemented diet and its anti-trypanosomal effect

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ABSTRACT

The proximate properties of wheat supplemented diet and its percentage composition were determined. The percentage proximate composition of wheat seed were carbohydrates 11.690 ± 0.017% lipid, 1.750 ± 0.005% Moisture content, 1.750 ± 0.005% Protein. Whereas the percentage composition of the wheat supplemented diet were carbohydrates 13.656 ± 0.011% lipid, 1.460 ± 0.010% Moisture content, 1.750 ± 0.005% Protein. Prophylactic treatment with wheat supplemented diet extends the lifespan of infected rats by 4 extra days from the Control (infected untreated). Wheat supplemented diet also extended the lifespan by 4 days. This study has demonstrated that wheat supplemented diet may be useful in the management of African Trypanosomiasis.

Keywords: Anti-trypanosomal, Wheat-supplemented diet, African Trypanosomiasis

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INTRODUCTION

African Trypanosomiasis, also known as sleeping sickness, is a severe disease that is left untreated (Pentreath and Kennedy, 2004). The mechanisms of pathogenicity and adverse reactions resulting from some drug treatments are partially understood and remain a considerable challenge to sustainable control of the disease (Pentreath and Kennedy, 2004). There are indications that organs are invaded by trypanosomes with the central nervous system involvement leading to coma and death (Sternberg, 2004).

Wheat and its products are part of the staple western diet. Fermented wheat germ product called zvermer has been reported to inhibit cell growth and proliferation mainly by inhibiting ribonucleotide reductase, which is used to make new DNA to support cell replication (Sukkar and Edoardo, 2004). Sharma et al (1999, 2002), also, reported

that fermented wheat germ has positive influence on gastrointestinal health by lowering gastric pH, increasing stomach short chain fatty acids, increasing mucinase activity and improving mucosal permeability. We have earlier reported the beneficial administration of zvermer to mice. Fermented wheat germ could be a potential candidate in the management of African sleeping sickness. Trypanosoma brucei, the causative agent of African sleeping sickness, replicates in the blood stream. In this report, we investigate the effect of wheat-supplemented diet on the growth and replication of T. brucei in mice.

MATERIALS AND METHODS

Feed Composition

The feed was formulated with the different classes of feed (wheat bran, wheat germ, wheat) was used to formulate the diet. The dried milled wheat bran was used as control, pure soybean oil was used as lipid source, rice husk was used as fiber source.

ingredients of the feed included DL-methionine and vitamin/mineral mix

Table 1: Feed Composition (g/kg)

Feed component	Weight(g/kg)
Corn/wheat starch	516
Soya bean	250
Oil	40
Cellulose (Rice husk)	40
Vitamin/mineral mix	50
DL - Methionine	4
Sucrose	100
Total	1000

Source: Ekanem *et al.* (2006)

Inoculation of Rat

Parasite-infected blood was obtained from the tail of infected rats at high parasitaemia and used to maintain parasite suspension in 0.90% saline solution which was inoculated into the peritoneal cavity of uninfected rat weighing approximately 180 to 200g. The suspension contained 3 to 4 trypanosomes per view at $\times 40$ magnification (approximately 10^6 cells per ml).

Parasite Count

Parasitaemia was determined by counting the number of trypanosomes per view under light microscope at $\times 40$ magnification from thin blood smear obtained from the tip of the tail of infected rats.

Proximate Analysis

Proximate analysis was carried out as described in AOAC (1999) to estimate moisture, crude fibre, fat and ash content. The

carbohydrate content was estimated using anthrone method.

Experimental Design

In the experiment, there were three groups of rats and each comprised of four rats. Group 1 comprises of infected rats fed with Control diet (control), group 2 were infected early treated (treatment commenced the first day of sighting parasite in the blood) and group 3 were infected prophylactic treated (treatment commenced 72hr before infection).

Statistical Analysis

The group means \pm standard error (SEM) was calculated for each analysis and significant difference between means was evaluated by analysis of variance (ANOVA). Post test analysis was done using the Duncan multiple comparison tests. Values of ($p \leq 0.05$) were considered as statistically significantly (Adamu and Johnson, 1997).

RESULTS

0.005%, lipid (11.690 ± 0.017%), Moisture content (7.756 ± 0.005%), and Protein (5.876 ± 0.005%), composition.

Proximate composition of wheat

The proximate composition of wheat used for this work (Table 2) shows that carbohydrate forms the highest 72.503 ± Table 2: Proximate composition of wheat used in this study

FOOD CLASS	PERCENTAGE (%) ± S.D
Carbohydrate	72.503 ± 0.005
Protein	5.876 ± 0.005
Lipid	11.690 ± 0.017
Crude fibre	1.340 ± 0.017
Ash	0.833 ± 0.005
Moisture content	7.756 ± 0.005

Each value is a mean of 3 determination ± S.D

Proximate composition of wheat-supplemented diet and control diet

The result of proximate composition of wheat supplemented diet and control diet shows that wheat supplemented had high percentage of carbohydrate (53.443 ± 0.005%), lipid (13.656 ± 0.011%), Moisture

content (8.460 ± 0.010%), and Protein (18.316 ± 0.005%) compared to the Control diet that had carbohydrate (57.990 ± 0.020%), lipid (12.336 ± 0.005%), Moisture content (5.686 ± 0.005%), and Protein (16.800 ± 0.010%).

Table 3: Proximate composition of wheat supplemented diet and control diet.

FOOD CLASS	WHEAT DIET	CONTROL DIET
	Percentage (%) ± S.D	Percentage (%) ± S.D
Carbohydrate	53.443 ± 0.005	57.990 ± 0.020
Protein	18.316 ± 0.005	16.800 ± 0.010
Lipid	13.656 ± 0.011	12.336 ± 0.005
Crude fibre	2.653 ± 0.050	3.350 ± 0.010
Ash	3.470 ± 0.010	3.836 ± 0.005
Moisture content	8.460 ± 0.010	5.686 ± 0.005

Each value is a mean of 3 determination ± S.D

Pyraminosis

Figure 1 shows the results of pyraminosis tests in the selected rats fed with wheat supplemented diet compared with selected untreated (Control) rats. Wheat supplemented diet was fed to supplemented diet rats but a selected rats to assess its efficacy against pyraminosis.

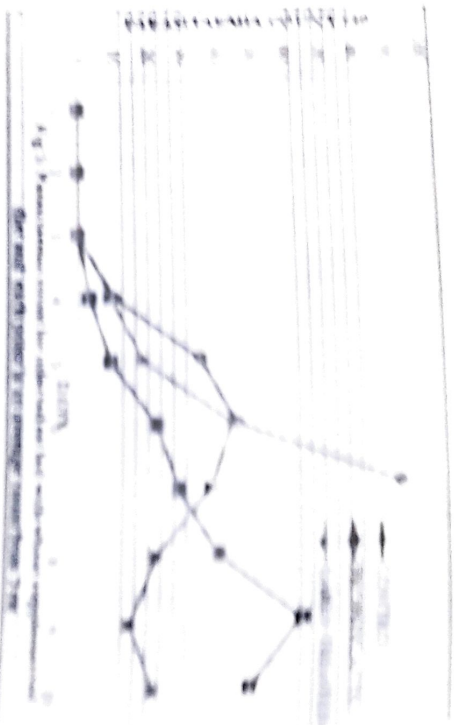


Fig. 1. Percentage of rats with pyraminosis fed with wheat supplemented diet.

DISCUSSION

Plant species have been reported to possess trypanocidal activity (Fringbaum et al., 1966; Kwon et al., 2006). Wheat is part of the regular western diet and has been reported to have therapeutic properties but no research has been done to ascertain the effect of wheat-supplemented diet on *T. brucei* infection. In the literature, mainly the effect of wheat feed intake has been studied (Schubert et al., 2002), whereas in the present study the nutrient level of wheat seed and supplemented diet were investigated. The composition of wheat supplemented diet changed compared to the seed used in the feed formulation in such a way that the carbohydrate level decreased from 72.503±0.005 for seed to 53.443±0.005 for supplemented diet. Whereas the

The pyraminosis test was conducted in rats that are normally healthy & their treatment group was pyraminosis, infection & control. The experimental group was fed with wheat supplemented diet for 10 days & the control untreated rats were fed with wheat supplemented diet for 10 days.

protein and oil content increases significantly in formulated diet for the rats. In the present study the analysis shows high percentage of water in moisture content. Increase in supplementary (Control) diet % has carbohydrate of the control diet as supplemented. Increase in protein (57.900±0.020 compare to 51.000±0.010) wheat-supplemented diet. The effect of feeding of wheat supplemented diet on *T. brucei* infection was studied in trypanosoma pyraminosis in rats. Parasitic replication and spreading in a span of the infective stage but the present study demonstrates the addition of wheat to the diet has increased rats change the

