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Full Length Research Paper

Comparison of an African herbal formula with commercially available haematinics

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The haematological changes observed with commercially available haematinics (Fagon 9® and Chemiron®) were compared with those of a local haematinic referred to as African Herbal Formula (AHF). Results showed that AHF produced effects in haemoglobin (Hb) and packed cell volume (PCV) levels which are reasonably comparable with the reference commercial and chemically defined haematinics.

Key words: Haematological changes, haematinics, African Herbal Formula, *Trypanosome brucei brucei.*

INTRODUCTION

The incidence of trypanosomiasis remains a source of concern in the tropics and other parts of the world. Efforts towards its management and eradication encompass various aspects of science which include among many others, assessment from time to time, of the risk factor when infected (Omoogu and Akinboade, 2000), development of new methodologies to determine prevalence of trypanosome-infected animals (Clausen et al., 1992, Picozzi et al., 2002) studies of trypanosome biochemistry (Heise and Opperdoes, 1999) as well as development of new drugs (de Koning, 2001, Opperdoes and Michels, 2001) . In Nigeria, attempts are being made to develop cheap and effective drugs from medicinal plants for both the management and treatment of trypanosomiasis (Okochi et al., 1999, 2000; Aguiyi et al., 1999).

We were working on a research project designed to screen local medicinal plants as potential trypanocides when we came across an herbal formula code-named African Herbal Formula (AHF). It is used in Nigeria as a health aid for the treatment of anaemia by the local people, some of who cannot afford the high cost of western treatment. It was developed by a traditional healer from local medicinal plants and has remained popular among the lower socio-economic class for more than twenty years. And presently, it is also gaining popularity among the middle class group.

Physico-chemical analysis of AHF by the consultancy group of the school of Pharmacy, College of Medicine, University of Lagos, Nigeria showed that qualitatively, the product contains carbohydrates, proteins, tannins, saponins, coumarins and iron. No alkaloid was detected in AHF.

Even though the identity of the active principle is not yet defined, we were spurred to initiate investigations into the effectiveness of this product because many of its end users, including sickle cell patients, interviewed randomly, responded positively about its beneficial effects on their well-being. Moreover, the mere fact that it is being used by the local populace, demands that AHF should be subjected to scientific investigation in order to ascertain its safety, efficacy, active principle and mode of action.

Besides, anaemia is an important component of health problems in this part of the world and in many developing nations because of the prevalence of parasitic infections and blood-related diseases, such as malaria and sickle

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cell anaemia. The physiological consequence of anaemia is well understood. There is deficient level of circulating haemoglobin, the essential transport vehicle of oxygen, which is necessary for proper cell functions in the organs and tissues of the body.

Since trypanosomiasis is one of those parasitic diseases characterized by severe anaemia, we found AHF handy as a research material. Preliminary studies in our laboratory with AHF showed that it has potential haematinic properties. This study, therefore, is designed to compare the effects of AHF aqueous extract on packed cell volume (PCV) and haemoglobin (Hb) levels with those of two commercially available blood tonics, Chemiron® and Fagon® in experimental rats, infected with *Trypanosoma brucei brucei*. This is also one in the series of experimental approaches to document scientific investigations on the efficacy of AHF in the treatment of myraid of blood related diseases.

MATERIALS AND METHODS

Experimental animals

Adult male and female albino rats were obtained from the animal house of the College of Medicine of the University of Lagos, Nigeria and were allowed to acclimatize for a week in the animal unit of the Department of Biochemistry before studies were commenced. All of the experimental rats were fed with the commercial pellets (Pfizer, Nigeria PLC, Ikeja) and water *ad libitum* throughout the period of the study.

Source of AHF

AHF was obtained from a member of the traditional healer (who formulated it from plant parts) family while the reference samples of Fagon® and Chemiron® were purchased over the counter.

Preparation of extract

Powdered AHF (15 g) was dissolved in 100 ml distill water, stirred for 10 min and filtered to remove cellulose fibres. The reference samples were treated in the same manner. The resulting solutions were kept in the refrigerator at 4^{o}C prior to use. After three days of refrigeration any unused extract was discarded and a fresh one was prepared. Chemiron® was supplied as a liquid blood tonic. Fagon® was supplied as tablets and 15 g of the tablets were crushed and dissolved in 100 ml of water and mixed properly to make a suspension because fagon did not product a true solution.

Distribution of Study Rats

The experimental rats, weighing between 110- 140 g were randomly distributed into different groups.The groupings consisted of four rats each. Further details of distribution are presented below:

Group A: Un-infected and untreated animals (neat rats) as control
Group B: The animals in this group were not infected with *T. brucei brucei*, but were fed the extract of AHF.
Group C: This group consisted of animals which were infected with *T. brucei* cells and administered with AHF.
Group D: The animals were infected and given Chemiron®
Group E: Consisted of animals infected and given fagon®
Group F: The animals were infected but were not given any of the haematinics

Administration of extracts

The rats in groups B and C were each given 1 ml of the AHF extract daily throughout the experimental period. Chemiron®; 1 ml of the liquid blood tonic was administered to the rats in group D daily. Fagon®; 1 ml of properly mixed suspension was administered to the rats in group E daily. Administration was done orally in all cases.

Source of trypanosome and induction of anaemia

The *T. brucei brucei* used in this study was obtained from the Nigerian Institute for Trypanosomiasis Research, Vom, Jos, Nigeria.

Anaemia was induced in the animals by infecting them with $3.6x10^{3}$ *T. brucei brucei* cells and they were fed with only water and the commercial pellets for six days, that is, from the zero day to the fifth day. Assessment of the hematological parameters started from day zero, before challenging the experimental animals with the parasites, and continued 24 h after the infection, till fifth day. Treatment of the animals with Chemiron, Fagon and AHF started on the fifth day and continued till the tenth day. Then final assessment of the PCV and the Hb levels was done on the 11th day, that is, 24 h after termination of treatment with the haematinics.

Analysis of the haematological parameters

The haemoglobin (Hb) concentration was determined by the cyanometh-haemaglobin method and the packed cell volume (PVC) was determined by the micro method according to Dacie and Lewis, 1991.

RESULTS

The changes observed in the level of the packed cell volume and haemoglobin of *T. brucei brucei* infected rats, for the zero day and the fifth day, after infection are reported in Tables 1a-b and 2a-b. Table 1a shows that the level of PCV (%) decreased in all the infected groups within five days, a period preceding the administration of the haematinincs, the percentage decrease being 35, 28, 22 and 16% for AHF, chemiron, fagon, and the infected, but untreated groups, respectively.

After the administration of the haematinics on the 5^{th} day, increases were observed in PCV (%) levels in the test groups (AHF, Chemiron and Fagon) while PCV (%) in the control group (infected but untreated) continued to decline (Table 1b). A similar pattern of changes as reported for Tables 1a and b were observed in the haemoglobin levels before and after administration of the AHF and the commercial heamatinics (Tables 2a-b).

Figures 1 and 2 are plots of the data obtained when changes in the levels of PCV and Hb were analyzed daily for the duration of the experiments. Both figures show that the levels of PCV and Hb in group B (uninfected but

Table 1a. Change in PCV (%), comparison of test groups and control after infection with parasites.

Day	Group C AHF	Group D Chemiron	Group E Fagon	Group F Control
0	48.0	49.5	48.5	49.0
5	31.0	35.7	38.5	41.0
% Change	35	28	22	16

Table 1b. Change in PCV (%), comparison of Test Groups and control after administration of the heamatinics.

Day	Group C AHF	Group D Chemiron	Group E Fagon	Group F Control
0	31.0	35.7	38.0	41.0
11	42.0	45.1	45.0	21.5
% Change	+35	+26	+18	48

Table 2a. Change in Hb (g/L) level, comparison of the test groups before the administration of AHF, Chemrion and Fagon.

Day	Group C AHF	Group D Chemiron	Group E Fagon	Group F Control
0	16	16.5	16.2	16.3
5	10.3	11.9	12.7	13.7
% Change	36	28	22	16

Table 2b. Change in Hb(g/L) Level, comparsion of the test group after administration of the haematinics.

Day	Group C AHF	Group D Chemiron	Group E Fagon	Group F Control
5	10.3	11.9	12.7	13.7
11	14.0	15.0	15.0	7.2
% Change	+36	+26	+18	47

Each value presented here is the average of three determinations after the blood from each of the four rats per group has been pooled together.

treated with AHF) remained consistently higher than those of group A which was also uninfected, but was not treated with AHF. There is also a clear demonstration that the values of both Hb and PCV declined continuously for the first 5 days before the administration of the haematinics (Figures 3 and 4). Thereafter, the levels of both parameters increased progressively, nevertheless they did not get back to the starting values in both cases. Even though the pattern of changes is similar, quantitatively, the level of changes was highest in the group treated with AHF (Tables 1a, b and 2a, b).

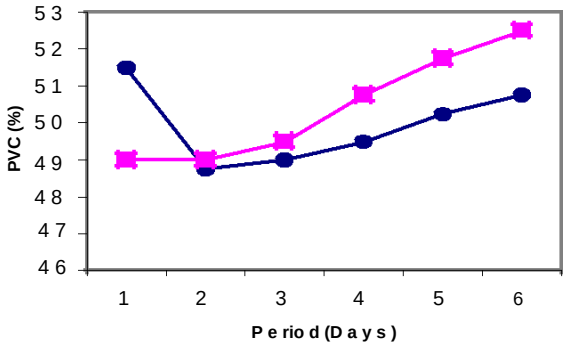

Figure 1. Daily PCV (%) levels of rats in group A compared with rats in group B. (●) Uninfected and untreated rats, and (■) uninfected and treated with AHF.

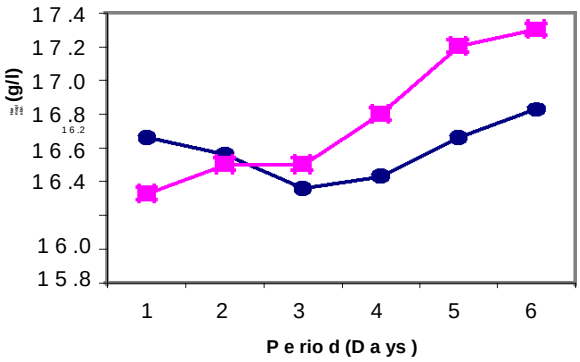

Figure 2. Daily Hb(g/L) levels of rats in group A compared with rats in group B. (●) Uninfected and untreated rats, and (■) uninfected and treated with AHF.

DISCUSSION

The haematinic potential of AHF was assessed by comparing it with known chemically defined haematinics, chemiron and fagon. Results from our experiments show that AHF is as effective as Chemiron and Fagon in restoring the depressed levels of PCV and Hb in experimental rats infected with *T. brucei brucei*. Further evidence that AHF mimmicks the blood tonics in function is provided when the results in groups A and B are compared. Both groups were not infected with *T. brucei brucei* but group B was given AHF while group A was not given the formula and it was observed that the values of both PCV and Hb in both cases are reasonably

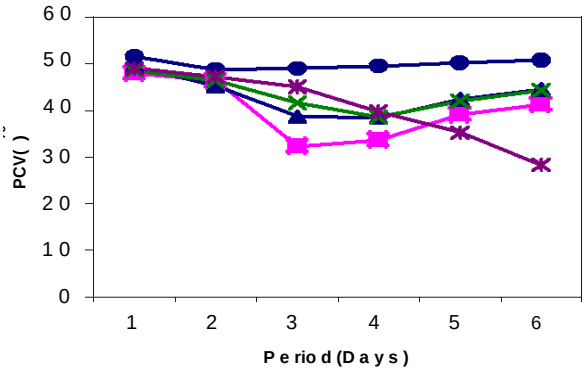

Figure 3. Daily PCV (%) levels of rats in group A compared with rats in groups C, D, E, and F. (●) Uninfected and untreated rats, (■) infected and treated with AHF, (▲) infected and treated with Chemiron, (x) infected and treated with Fagon, and (ж) infected and untreated rats.

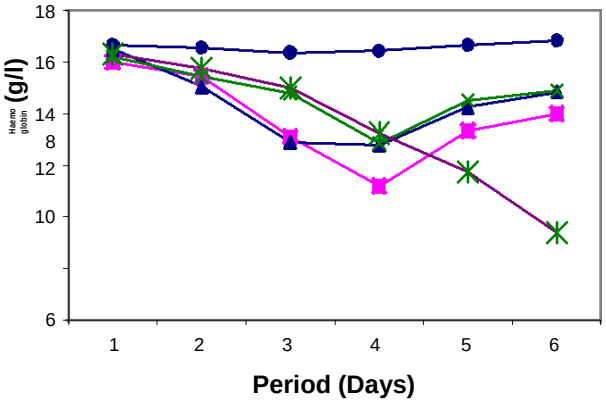

Figure 4. Daily Hb(g/L) levels of rats treated with AHF compared with Chemiron and Fagon. (●) Uninfected and untreated rats, (■) infected and treated with AHF, (▲) infected and treated with Chemiron, (x) infected and treated with Fagon, and (ж) infected and untreated rats.

comparable. This suggests that when taken under normal circumstances, AHF can ensure maintenance of physiologically balanced haematological values. The findings in this study remain consistent with our observations in an earlier preliminary work in which AHF, among other positive effects, increased the haemoglobin, packed cell volume and white blood cell levels.

The fact that AHF was able to mitigate the anaemic condition of the parasite-infected animals by enhancing PCV and Hb levels, affirms its haematinic property. It is therefore not surprising that the end users of AHF reported positively about its beneficial effects on their well-being. This observation suggests that under unhealthy condition, particularly in cases where anaemia prevails, AHF can boost the level of the haematological parameters, thereby protecting the organs and tissues from possible adverse effects that might have resulted from anaemia. We are yet to analyze the composition of its micronutrients, therefore, we cannot state whether AHF contains any constituents that may add to its beneficial effect on sickle cell patients, but we can mention that Akinsulie (1999) had examined the red cell and serum folate levels in sickle cell patients and suggested that folic acid should be used as a daily supplement for sicklers especially in cases of anaemic crisis. This formula has also been used in the treatment of sickle cell patients by members of the family of the traditional healer who formulated it.

From the findings therefore, we recommend this AHF for more detailed investigation and subsequent standardization, because it is a natural product that has not been associated with any side effects. Besides, it is cheap and within the reach of the local populace. Its haematinic potential is very promising and need to be subjected to further studies in conjunction with other local medicinal plant preparations which have also been found to be potentially trypanocidal, as well as those that have been found effective against parasitic diseases like malaria and schistosomiasis.

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