Research Journal of Animal, Veterinary and Fishery Sciences _____ ISSN 2320 – 6535
Vol. **1(6),** 15-17, July **(2013)** *Res. J. Animal, Veterinary and Fishery Sci.*

Short Communication

The Effect of Aqueous Extracts of Moringa Oleifera Leaves on the Hematological Parameters of Trypanosoma Brucei-Infected Rats

Edoga C.O[1]., Njoku O.O[2]. and Okeke J.J[3].
[1]University of Nigeria, Nsukka, Enugu State, NIGERIA
[2]Federal University of Technology, Owerri, Imo State, NIGERIA
[3]Nnamdi Azikiwe University, Awka, Anambra State, NIGERIA

Available online at: www.isca.in
Received 23rd January 2013, revised 4th June 2013, accepted 15th July 2013

Abstract

The effect of aqueous extract of Moringa oleifera leaves on the haematological parameters of Trypanosoma brucei-infected rats was investigated. Two groups of rats were intraperitoneally infected with Trypanosoma brucei. One group was administered with the aqueous extract in drinking water; the remaining infected group was left untreated. Data from these groups were compared with those of two healthy groups, one of which was similarly treated with aqueous extract. The experiment was terminated 16 days post-infection (pi). Observations showed that the extract has an effect on the haemopoietic system manifested by a positive increase in the levels of haemoglobin, packed cell volume and red blood cell. Aqueous extract of Moringa oleifera leaves also delayed the proliferation of the parasites.

Key words: Trypanosoma brucei, anaemia, moringa oleifera.

Introduction

Animal trypanosomiasis is still a major factor regarding the growth of the livestock industry in Africa[1]. This disease is characterized by tissue and organ degenerative changes. One factor implicated in the pathogenesis of the disease is oxidative stress imposed by trypanosome and macrophageal activities. Oxidative stress has been alleviated in experimental infections with various species of trypanosomes[2,3] by administration of exogenous anti-oxidants such as ascorbic acid and/or vitamin E, to infected rats and rabbits. This vitamin therapy considerably reduced the degree and rate of degeneration of the tissues and organs; and in some instances significantly reduced the parasitaemia and anaemia in the trypanosome- infected animals. The Moringa oleifera leaves are the most nutritiuous part of the plant, being a significantly source of vitamin B6, vitamin C, Provitamin A as beta-carotene, magnesium and protein among other nutrients[4]. Moringa is undergoing preliminary research to reveal potential properties to its nutrients and phytochemicals[5]. Some of which include antibacterial effect, in vitro[6], improved glucose tolerance in a rat model of diabetes[7], inhibition of Epstein-Barr virus activity in vitro[8] and reduction of skin papillomas in mice[9]. Moringa oleifera (MO) Lam belongs to Moringacea family which accounts fourteen species. MO has anti-cancer[10], anti-inflammatory[11] and thyroid status regulator[12] efficacies and some researchers reported its hypoglycemic potential[13]. This experiment was designed to determine the effect of the aqueous extract of Moringa oleifera leaves on the haematological parameters of Trypanosoma brucei-infect rats.

Material and Methods

Animals: Twenty adult albino rats were obtained from our Saviour Research Institute, Awka, Nigeria. The animals were acclimatized to the laboratory conditions and a commercial pellected poultry grower's mash diet was given to the animals for 2 weeks before commencement of the experiment for the animals to acclimatize. The animals were then divided into four groups of rats each and treated as follows:

Uninfected controls: The five rats in this group were neither infected nor treated with theextract.

Extract control: This group consisted of five uninfected rats that were given, ad libitum, Moringaoleifera extract as drinking water.

Infected controls: Five rats were each intraperitoneally infected with about 10^6 Trypanosoma brucei in 0.5ml of cold-saline diluted tail-blood from a donor rat.

Infected and Extract-treated group: The rats in this group were similarly infected with parasites and maintained, ad libitum on aqueous Moringa oleifera extract as drinking water. Each experimental set up was replicatedthree times.

The parasites: The Trypanosoma brucei used for the study was obtained from the Veterinary Medicine Faculty, University of Nigeria, Nsukka. Each of the recipient animals was inoculated with 10^6 T. brucei.

Determination of degree of parasitaemia: Film preparation: A drop of blood was taken from the tail vein of the infected rats and placed at distance of about an inch from one end of the microscopic slide and dispersed along the length of the slide with one another. The film formed was air-dried and then fixed with leishmann stain. After rinsing with distilled water and leaving it to air-dry, the slide was put under oil immersion and numbers of parasites per 1000 red blood cell were counted.

Bleeding and analysis of the haematological parameters: At the end of the experiments, each animal was anaesthesized with chloroform and sacrificed by cutting through the jugular vein. The blood pooled from all the animals in each group was collected into bottles containing EDTA as anticoagulant. The red blood cells (RBC) were estimated using the improved Neubauer counting chamber? The haemoglobin (Hb) concentration was determined by the Cyanmeth-haemoglobin method and the packed cell volume (PCV) was determined by the micro method?

Statistical Analyses: The data were presented as means of SEM of three replicates values. The data were determined using 2-way ANOVA.

Results and Discussion

The results suggest that the administration of aqueous extract of Moringa oleifera positively improved the blood components of trypanosome-infected rats. This observation is reflected by raised haemoglobin, increase Red Blood cell count (RBC) and PCV trypanosome infected rats. The lowest level of haemoglobin (Hb) (7.2 g/l) was observed in the infected control (group III), followed by 14.0 g/l for the infected and extract-treated group (group IV). The uninfected controls (group 1) that were uninfected and untreated with aqueous extract had an Hb level of 17.0 g/l while those in group II that were uninfected and treated with the aqueous extract recorded an Hb level 17.5 g/l. The percentage (PCV) follows the same pattern as for the haemoglobin with rats infected and untreated having the lowest value of 21.5%, followed by 42.5% for infected and extract-treated group. The uninfected controls that were uninfected and untreated with the aqueous extract had 52.5% PCV, while those in group II that were uninfected and treated with the aqueous extract recorded a PCV of 55%. The value obtained for the RBC also agrees with the reported tred for PCV and Haemoglobin above. The lowest value was observed for the infected control ($2.45x10^6$ cells) followed by a level of $3.0x10^6$ cells for the infected and treated rats, then $3.1x10^6$ cell for the uninfected control and finally, $3.8x10^6$ cells for the uninfected and treated with the aqueous extract.

Discussion: The observed effect of the aqueous extract of M. oleifera leaves from our studies on the blood components of trypanosome-infected rats is attributed to its effect on the haemopoeitic system. This argument is supported by the increased red blood, haemoglobin and packed cell volume of rats treated with aqueous extract of M. oleifera leaves. This may implicate immunological pathways. Therefore, this study has provided evidence that aqueous extract of Moringa oleifera has a potential for influencing the state of anaemia in trypanosome-infected rats. Even if it cannot destroy the trypanosome, it can at least boost the capacity of the host to fight the invading parasites. The social implication of exploring the medical potential of the extract will be easy availability and cheap cost. This will go along way in alleviating the usual problems of healthcare delivery, particularly, in relation to financial resources, logistic of distribution, and at the same time, atone the cultural yearnings of the people.

Conclusion

The therapeutic effect of aqueous extracts of *Moringa oleifera* leaves on the blood parameters was elucidated in Wistar rats fed mashed stock diet. From this research, it is advisable to use *Moringa oleifera* leaves as both drug and supplements, hence its efficacious actions has been established on the blood system of animals. Also in the treatment of trypanosomiasis, it is advisable to give *Moringa oleifera* extracts to infected animals for both prophylactic and curative therapy.

Table-1
Haemoglobin (g/l) of the experimental rats with the length of post-infection (Pi)

Length of Post-infection	Group I (Infected and Extract treated)	Group II (Extract control)	Group III (Infected control)	Group IV Infected and Extract treated group)
4	17.00	17.00	14.00	16.00
8	16.50	17.50	6.20	15.00
12	17.50	18.00	5.00	13.00
16	17.00	17.50	3.60	12.00
Total	68.00	70.00	28.80	56.00
Mean	**17.00**	**17.50**	**7.20**	**14.00**

Table-2
Packed Cell Volum (%) of the experiment rats wit the length of Post-infection (Pi)

Length of Post-infection	Group I (Infected and Extract treated)	Group II (Extract control)	Group III (Infected control)	Group IV Infected and Extract treated group)
4	62.00	60.00	40.00	50.00
8	58.00	58.00	20.00	43.50
12	41.50	58.00	18.50	34.50
16	48.50	44.00	7.50	42.00
Total	**210.00**	**220.00**	**86.00**	**170.00**
Mean	**52.20**	**55.00**	**21.00**	**42.50**

Table-3
Red Blood cell counts of the experimental rats with the length of Post-infection (Pi)

Length of Post-infection	Group I (Infected and Extract treated)	Group II (Extract control)	Group III (Infected control)	Group IV Infected and Extract treated group)
4	$3.3x10^6$	$3.9x10^6$	$2.2x10^6$	$3.2x10^6$
8	$3.0x10^6$	$3.8x10^6$	$2.3x10^6$	$3.0x10^6$
12	$2.9x10^6$	$3.6x10^6$	$2.5x10^6$	$2.9x10^6$
16	$3.2x10^6$	$3.9x10^6$	$2.6x10^6$	$2.9x10^6$
Total	$12.4x10^6$	$15.2x10^6$	$9.6x10^6$	$12.x10^6$
Mean	$\mathbf{3.1x10^6}$	$\mathbf{3.8x10^6}$	$\mathbf{2.4x10^6}$	$\mathbf{3.0x10^6}$

References

1. Vray B., Debaetseiler P., Ouaisis A. and Carlier Y., Trypanosome cruzi but not T. brucei a chemiluminescent signal in a macrophage hybridoma cell line, *Infect immune*, **59**, 3303-3308 **(1991)**

2. Umar I.A., Wurochekke A.U., Gdado A. and Igbokwe I.O., Effects of combine parental vitamins C and administration on the severity of anaemia, hepatic and renal das. mage in T. brucei infected rabbit, *Vet Parasitol*, **85**, 43-47 **(1999)**

3. Umar I.A., Toh Z.A., Igbalajobi F.I., Igbokwe I.O. and Gidado A., The effect of orally administered vitamins C and E on the severity of anemia in T, brucei-infected rats, Trop Vet, **18**, 71-77 **(1999)**

4. Peter K.V., Under exploited Horticultural crops; volume 4, New India Publishing, 112 **(2008)**

5. Jed W. Fahey, Moringa oleifera: A Review of the Medical Evidence for its Nutritional, Therapeutic, Prophylactic Properties, Part 1 **(2005)**

6. Peixoto J.R., Silver G.C., Costa R.A., de Sousa Fontenelle J.R., Vieira G.H., Filho A.A., dos Fernandes Vieira R.H. (March 2011), In vitro antibacterial effect of aqueous and ethanolic Moringa leaf extracts, *Asian Pac J Trop Med*, **4(3)**, 201-204 **(2005)**

7. Moussa Ndong, Mariko Uchara, Shin-ichi Katsumata and Kazuhara Suzuki, Effects of Oral Administration of Moringa oleifera lam on glucose tolerance in Goto-Kakizaki and Wistar Rats, *J Clin Biochem Nutr*, **40(3),** 229-233 **(2007)**

8. Murakami A., Kitazono Y., Jiwajinda S., Koshimizu K. and Ohigashi H., Niaziminin, a thiocarbomate from the leaves of Moringa oleifera, holds a strict structural requirement for inhibition of tumor- promoter-induced EpsteinBarr virus activation, *Planta Med*., **64 (4),** 319-323 **(1998)**

9. Bharali R., Tabassum J., Azad M.R.H., Chemomodulatory effect of Moringa oleifera, Lam, on hepatic carcinogen metabolizing enzymes, antioxidant parameters and skin papillomagenesis in mice, *Asian Pac J cancer Prev*., **4(2)**, 131-139 **(2003)**

10. Guevara A.D., Vargas C., Sakurai H., Fujiwara Y., Hashimoto K., Maoka T., Kuzuka M. Ito Y., Tokuda H. and Hishino H., An antitumor promoter from Moringa oleifera Lam, *Mutat. Res*, **440**, 181-188 **(1999)**

11. Kurma S.R. and Mishra S.H., Anti-inflammatory and hepatoprotective activities of fruits of Moringa plerygosperma, *Gaerth Ind. J. Nut. Prod*., **14**, 3-10 **(1998)**

12. Tahiliani P. and Kar A., Role of Moringa oleifera leaf extract in the regulation of thyroid hormone status in adult male and female rats, *Pharmacol. Res*, **41**, 319-323 **(2000)**

13. Kar A., Choudhary B.K. and Bandyopadhyay N.G., Comparative evaluation of Hypoglycemic activity of some Indian medicinal plants in alloxan diabetic rats, *J.Ethnopharmacol* **84**, 105-108 **(2003)**