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Original Research Article

Antianaemic potential of aqueous leaf extract of *Mucuna pruriens* on wister albino rats

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A B S T R A C T

Antianaemic potential of aqueous leaf extract of *Mucuna pruriens* (Agbala) was studied using wister Albino rats. Nine rats were used for this study; three of those rats each were placed on raw extract, heat-treated extract while the remaining three rats were used as control. The rats were fed for three weeks and then blood samples collected for haematological analyses. The results of this investigation for rats fed with raw extract, heat-treated extract and distilled water showed that haemoglobin (Hb) level was 10.68±0.010g/dl, 10.51±0.015g/dl and 10.30±0.010g/dl; packed cell volume (PCV) was 31.69±0.015%, 31.66+0.015% and 31.01+0.012% while total protein level was 77.35+0.05g/l, 78.28+0.028g/l and 66.00+0.05g/l respectively. The results show that there were significant increases ($P<0.05$) in Hb, PCV and total protein of the test group rats compared to the control group rats. Consequently, there was a significant decrease in the level of albumin with the corresponding values 37.70±0.015g/l, 37.26±0.14g/l and 39.55+0.051g/l for the raw extract, heat treated extract and control groups respectively. The results of this study showed that aqueous extract of Agbala leaf improved the total protein level of the treated rats thereby increasing the Hb and PCV levels of the rats. This is suggestive that aqueous leaf extract of *Mucuna pruriens* (Agbala) may be implored in the treatment of anaemia.

Keywords

Mucuna pruriens; Agbala Leaf; Anaemia; haematological parameters; Total protein

Introduction

The use of plants whether herbs, shrubs or trees on parts or in a whole in the treatment and management of diseases and disorders date back to prehistoric days (Akindele and Busavo, 2011). Plant extracts have been used in folk medicinal practices for the treatment of various ailments since antiquity. A medicinal plant as defined by the world health organization (WHO) is a plant which one or more parts of it contain substances that can be used for therapeutic purposes or which are precursors for the synthesis of useful drugs (Ogamba *et al*., 2011).

In the eastern part of Nigeria *Mucuna pruriens* popular known as agbala leaf in Igbo populace is used as a blood tonic traditionally (Katzenshlager *et al*., 2004; Akindele and Busavo, 2011 and Ogamba *et al*., 2011). Among the natives of eastern part, the use of *Mucuna pruriens* (agbala leaves) extract is a very common remedy for the treatment of anemia. The fresh leaves are collected from the farm, garden or bush manually, the leaves are washed with clean water and then squeeze to remove the liquid content of the leaves (Katzenshlager *et al*., 2004). This liquid extract is then boiled for about five minutes and is taken orally as blood tonic to boost blood production. *Mucuna pruriens* is thought to have originated from India. It is one of the popular medicinal plants of India and it constitutes more than 200 indigenous drug formulations. All parts of *Mucuna pruriens* posses valuable medicinal properties.

Anaemia is a condition where there is a lower than normal number of red blood cells in the blood, usually measured as a decrease in the amount of hemoglobin. Hemoglobin is the oxygen carrying part of red blood cells. It gives these blood cells their red colour (Williams 2006). Anaemia is a deficiency of hemoglobin in the blood due to lack of red blood cells and /or their hemoglobin content (Churchill 2000). World health organization (WHO) defined anaemia as a hemoglobin (Hb) concentration <130g/l in men and <120g/l in women. There has been debate about the use of these values in definitions, whether they should be used to define anemia in this sex group (Beutler, 2006).

Anaemia, one of the more common blood disorders occur when the level of healthy red blood cells (RBCs) in the body becomes too low. This can lead to health problems because RBCs contain haemoglobin, which carries oxygen to the body's tissues. Anaemia can cause a variety of complications including fatigue and stress on bodily organs. Anaemia can be caused by many things, but the three bodily mechanisms that produce it are: excess destruction of RBCs, blood loss and inadequate production of RBCs (penninx, 2004). Anaemia can result from inherited disorders, nutritional problems (such as an iron or vitamin deficiency), infections, some kinds of cancer, or exposure to a drug or toxin. Iron might be too low because of heavy periods, pregnancy ulcers, colon polyps, colon cancer, inherited disorders or a diet that does not have enough iron.

Anaemia may also arise as a result of not getting enough folic acid or vitamin B12. Blood disorders such as sickle cell anemia and thalassemia, or cancer may also lead to anaemia (http:llwww.Biomcentral. com/1471-2318/8/1/prepub).

Aims and objectives of the research

The aim of this research was to determine the anti-anaemic properties of leaf extract of *Mucuna pruriens* (Agbala) and its effect on selected biochemical indices such as Hb, PCV, total protein in order to determine the efficiency of this extract in treatment of anaemia in man.

Materials and Methods

Preparation of the aqueous plant extract

The leaves of *Mucuna pruriens* were washed and weighed. 100g of the leaves were extracted with 100ml of distilled water with the aid of a manual (cheese

cloth) sieve. 60 ml of *Mucuna pruriens* was measured and heated for 5mins. The heated extract was allowed to cool at room temperature while the remaining 60ml (raw extract) was used like that. 60mls of raw and heated extracts were measured and given to the rats daily.

Plant materials

The leaves of *Mucuna pruriens* were collected from Umuoma and were authenticated by Mr. C.J Onyirioha of the Department of Biochemistry Anambra State University, Uli.

Experimental animals

The animals used for this study were both male and female wister albino rats with average weight of 45-66g. They were purchased from animal house of the Faculty of Pharmaceutical Sciences, University of Nigeria Nsukka. The animals were housed in locally fabricated cage in the animal house of Department of Biochemistry, Anambra State University, Uli for 4 weeks. They were allowed to acclimatize to the new environment for seven days before the commencement of the experiment. They were fed with animal feed water *ad labitum*.

Experimental design

Nine wister albino rats were used in this study. The rats were randomly divided into three groups made of three animals each as shown below. The animals were fed for three weeks. They were given extract to drink at their own will which served as their water.

Group A: served as the control and received only water and normal guinea feed.

Group B: 60ml of raw extracts

Group C: 60ml of heated extracts

Body weights

Initial and final body weights of the animals were recorded at the end of the treatments period (3 weeks), the animals were sacrificed and blood sample collected.

Sample collection

Blood sample was collected from the rats fed with aqueous extracts using orbital technique. Blood sample was collected from the retro –bulbar plexus of the medial canthus of the eye to puncture the retro-bulbar plexus out flow of blood into bottle containing ethylene-diamine-tetra-acetic acid (EDTA). The sample was stored at 4°C before analysis.

Determination of hematological parameters

Hematological Parameters of Hemoglobin (Hb) and Packed Cell Volume (PCV) were determined using Dacie and Lewis (2000) methods.

Determination of total protein and albumin

Total protein and Albumin were assayed using Lumeij *et al*., 1990 methods.

Results and Discussion

The data above showed an increase in the level of heamoglobin and PCV of rats fed with raw extracts, followed by rats fed with heated extracts and lastly control rats fed with water and normal feed. There was a progressive increase in total protein level of rats fed with heated extracts followed by rats fed with raw extracts and lastly control rats. Meanwhile, there was a

Table.1 The results of some selected heamatological and biochemical parameters of rats fed with *Mucuna pruriens*

Sample	Hb (g/dl)	PCV (%)	Total protein (g/l)	Albumin (g/l)
Raw extract	10.68±0.010	31.69±0.015	77.35±0.015	37.70+0.150
Heated extract	10.51±0.015	31.66±0.015	78.28±0.028	37.26±0.14
Control	10.30±0.010	31.01±0.012	66.00±0.005	39.55+0.051

decrease in albumin of rats fed with heated extracts followed by raw extracts while the albumin level of the control rats increased significantly when compared with that of the raw and heated extracts.

The results of this analysis carried out on the rats fed with aqueous extracts of *Mucuna pruriens* revealed that the extracts boosted blood production. The raw and heated extracts increased the haemoglobin level of the experimental rats which is responsible for the respiratory pigment in the red blood corpuscles. Haemoglobin is composed of an iron–containing substance called haem (Ezeanyika, 2004). The significant increases in the PCV and Hb levels of the heated and raw extracts showed that the extracts could be used as an anti-anaemic drug in the treatment of anaemia. The hematological values of animal could be influenced by age, breed, nutritional status, current status of the individual and environmental factors (Butler and Waleen, 2006). The rats fed with heated extracts drank it more than those fed with raw extracts because the heated extract was lighter and watery while raw extract was found to be thicker and the rats find it difficult to drink. This was determined by measuring the extract before and after feeding daily. The importance of heating was to kill micro-organism and reduce anti–nutrient contents of the extracts. Total protein analysis revealed that the extract contains good amount of proteins. Proteins are hydrolyzed in the body to produce amino acids which are then used to build up new body proteins (Churchill, 2000). Rats fed with heated and raw extracts increased the protein levels of the experimental rats. Therefore, the extracts could be a rich source of protein and heat did not affect its protein availability. Analysis of albumin revealed a decrease in albumin levels (hypoalbuiminaemia) of the rats fed with the heated and raw extracts. This could be due to the binding action of the vitamin and mineral on the walls of the body organ (liver) (Mayne 2006).

In conclusion, the results of this study suggest that the raw and heated extracts of *Mucuna pruriens* could be used in the synthesis of blood when consumed because of its high protein and haemoglobin boosting properties.

References

Akindele A.J. and Busavo F.L. 2011. Effects of the hydroethanolic extract of Mucuna pruriens on haematological profile in normal and haloperidol treated rats. Nigeria Quarterly Journal of Hospital Medicine, 212: 8-93.

Amin, K.M.Y; Khan, M.N and Ziller – Rehmans, S. 1996. Sexual function improving effect of .*Mucuna pruriens* in sexually normal male rats .3rd ed. Fitoterapia publication. Pp53-58.

Butler, E. and Waalen, J. 2006. The definition of anAemia :Blood

heamoglobin . 107:1747-1750.

Bolarin, D.M. 2006. Hemoglobin: clinical chemistry 2nd edition. Spectrum books limited Ibadan. Pp62-80

Corey , C. 2007 . Hemolytic Anemia : Sidney kimmed comprehensive cancer center Hopkinds, Baltomore 15:441-449.

Churchill , E, Echeobi , O. and Nnelii , R. 2007 . Implication of nutrition. Journal of medical sciences 5:242-244.

Crook , M.A. 2006 Biochemical test for liver disease : Clinical chemistry and metabolic medicine . 7th ed. Edward Arnold publishers ltd . London .

Elmer, H.C1997. Better living through agricultural sciences: Agricultural science fundamental and application. 2nd ed. Delmera, a division of Thoson learning , inc , united states of America Pp.30, 116.

Essig ,M.G. and Poore , R. 2008http:1 www.health link : bc .caik base|Topic\ modest\Iw 2033\describe .Htm Retrived on 25|05|09|.

Ezeanyika , L.U.s 2004 . Biochemistry for Beginners . Basic :Aspect of Nutritional Biochemistry 1st ed. Published by Great AP express Publishers limited .Pp 113 -131.

Ezeokonkwo, C.A. 2004 Biochemistry for Beginners : Elements Relevant in Biology 1st ed. Publishers limited .Pp30-45.

Dacie, J.V. and Lewis, S.M. 2000. Practical Haematology. 9th Edition Churchill Livingstone.

Gasket , H. Derry , S . More , R.A2008. Prevalance of aneamia in older persons : Journal of BMC Geriatrics 8 2318-36,8-21.

Giuliano F . Allard , J Dopamine and male sexual function . 2001.Eur urol 40:601-608.

Grund, S.2007. Permicious anaemia : journal of new Britain General hospital .15:98-110.

Health stout, N. 2009. Definition of anaemia . http: www. Health stout :Com|ency|68|112|main-html.Retrieved on 25|05|09.

Hund, K. 2008. Prevention of anemia htt:ll www.Cureresearch.com|a|anaemia| prevalence.Htm.Retrieved on 24|08|09.

Human serum albunin .2008. Wikipedis.org :|wiki|human serum albunin . Retrieved on09|09|09

Human albumin. 2007. Hutchison encyclopedias :www.Right health .com||pediaetrics Retrieved 09|09|09

Ifon ,E.T.1997. The nutrient composition of some Nigerian leafy green vegetables and physiological availability of their iron contents :Ph.d. Thesis ,Department of Biochemistry, University of Ibadan Nigeria . Pp 335-445.

Islam ,M.S. Lucky ,N.S and Siddi ,M.S.I.2004 variation hematological Parameter :International journal of Poultry Science 2:144-147.

Juhn , G.Eltz, D.R. 2006.Iron deficiency anaemia :journal of varimed Health care Network Baltimore 15:98-110.

Katzenschlager ,R. Evans, A and Manson , A 2004. Mucuna Pruriens in parkinsons disease .A double blind clinical and Pharmacological study :Journal of neural Neurosury psychiatry. 75:6672-1677.

Kavach, S .2001.htt//.www.Herbal provider .com /mucuna htm htt:Wikipedia org |wiki| mucuna - pruriens.

Kimberly, 12|03|09.serum total protein :en. Wikipedia-org |wiki | serum –total protein Retrieved on 20|09|09.

Kingsley , R,S Shelly. J and James, E.B. 2003. Flowering plants and civilization :Introduction to plant biology .9th ed.marger ,J kemp. Mc Grew-Hill companies. Pp 138-140,470-472.

Lumeij J.T., de Bruijne J.J., Kwant, M.M. 1990. Comparism of different methods of measuring protein and albumin in Pigeon Sera. Avian Pathol 192: 61-255.

Matsui, W.2006. B12 deficiency anaemia : Journal of verimed Health care Network Baltimore .10:216-220.

Nancy,J.N. 2008.Mucuna pruriens information from :NPGS/GRN:www. ars- grin .gov| http:www.arsgrin gov| cgibin|npgs |htm|taxon.PI? 24652. Retrieved on 18|6|09.

Ogamba J.O., Eze N.A., Ogamba S.E., and Chilaka K.C.2010. Tropical Journal of Medical Research. 142: Pp1-6.

Oxford Advanced learners Dictionary. 2001.6th edition Oxford University press Pp 672 and 887.

Oxford Concise Medical Dictionary .2003.6th edition. Oxford Publishers New York. Pp475 and476

Pearson, D.A. 1969. Chemical analysis of food ,7th ed. Churchill living stone New York .Pp27-32.

Penninx, B.W. Pahor, M. 2004. Anaemia is associated disability :Journal of Jam Geriater Soc.52.719-724.

Purves, W.K. David, S. Gordon, H.O 2004. Life: The Science of Biology. 7th edition Sunderland. Mass:sinader Association Pp954.

Roper, N 2000.Pocket medical Dictionary :Churchill Living Stone 14th edition . Icn New York.Pp42,56,78,107,281.

Solomon,B.M.V.2002 Reproduction in flowering plants: Biology. 3rd .Martins brother publisher Ltd. Pp 747-748.

Tessmer, K.2009. Total protein : www.Healthopedia.com/total protien. Retrieved on 20|90|09.

Wikipedia,2009. Alanine Transamines : http:llen : Wikikpedia. Org/Wik/ Alanine transaminase.Retrieved on June 2009.

William, B.Van.V. 2007. Aspartate transaminase: http: llwww.medindia. net blood test BiochemistryAspartate transamines.Retrieved on 06|20|2009.

William, M. 2006. Idiopathic autoimmune hemolytic Anaemia: Journal of verimed Health care Network Baltimore. 15:741-449.