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Evaluate the action of the aqueous extract of the medicinal plant Goji Berry (Lyciumbarbarum) on biochemical and hematological parameters in Wistar rats

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Abstract: *Medicinal plants were discovered by man through the food demand, and since then, are used empirically for the treatment of conditions, or in the form of infusion, decoction or another, with the purpose to cure or at least alleviate the suffering of the patient has great historical importance, and also at the present time for various population groups.The use of plants with therapeutic properties in treating diseases is called herbal medicine. The species Lyciumbarbarum, known as Goji Berry isa solanaceafamily plant found in China and Himalayan regions, positioned for millenniums at the top of the table of the 8000 Chinese herbs and healing food. In recent years, the hepatotoxic effects and interactions with anticoagulants have been reported as adverse Allergic reactions photodermatitis type and immediate type reactions have also been described. The objective of this study was to evaluate the action of the aqueous extract of the medicinal plant Goji Berry (Lyciumbarbarum) on biochemical and hematological parameters in rats. 30 Rattus norvegicus were divided into two groups, one with exposure Goji Berry (200mg / kg orally) and a negative control (distilled water. We assessed the hematological profile, complete blood count and biochemical determination of various plasma constituents in acute(48h) and chronic (72h) phases.Statistical analyzes were performed using GraphPad Prism version 5.0 software. For data analysis we used the Student t test, expressed as mean and standard deviation. For all tests was considered a 5% significance level.The results showed that there was no significant difference between the group exposed to the treatment when compared to the negative control group. The data suggest that the aqueous extract of Lyciumbarbarum (Gojji berry) used at the dose of 200 mg / kg shows no effect on hematological and biochemical parameter.*

Keywords: *Lycium barbaru, Goji Berry, Hematology, Biochemistry, Herbal medicines.*

I. Introduction

Medicinal plants were discovered by man through the demand for food, and since then they have been used empirically to treat pathologies [1].The use of plants preparedin the form of infusion, decoction and other,with the purpose to cure or at least alleviate the suffering of the patient, it has great historical importance, and also at the present time for various population groups. The use of plants with therapeutic properties in treating diseases is called herbal medicine [2].

Herbal medicine consists ofinternal or external use of plants *in natura* or under the form of medicines for treating diseases. Using the several parts of the plants,including roots, bark, leaves, fruits, seeds and even

by-products such as the case essential oils,defined as volatile complex substances, lipophilic, usually odoriferous and liquid, derived from the secondary metabolism of plants. These can be applied in various segments, such as antibacterial, antiviral, antifungal, insecticidal and anti-inflammatory drugs [3].

The species *Lyciumbarbarum*, known as Goji Berry is a *solanacea* plant family found in China and Himalayan regions, positioned for millenniums at the top of the table of the 8000 Chinese herbs and healing food [4]. Recently introduced in Western countries, their distribution and consumption are growing fast. Although Goji Berry is not strictly a new food, data about the consumption in previous Western countries to 1997 are scarce [5].

In recent years, the hepatotoxic effects and interactions with anticoagulants have been reported as adverse effects of Goji Berry. Allergic reactions photodermatitis type [6] and the type immediate reactions have also been described [7]. Asymptomatic sensitization, which is not unusual and not very well understood is often related to cross-reaction and may explain as to why allergic reactions can occur after exposure to foodstuffs [8].

This plant has a complex rich in vitamins and minerals that protect the central nervous system, reduces the risk of glaucoma and has antitumor activity, prevents chronic diseases such as hypercholesterolemia, diabetes, hepatitis, among others, also helps in reducing fatigue and greater resistance in exercise, being a strong ally in the prevention of aging [9].

The aim of this work was to evaluate the action of the aqueous extract of the medicinal plant Goji Berry (*Lyciumbarbarum*) on biochemical and hematological parameters in rats.

II. Materials And Methods

2.1 Ethical aspects

The study was approved by the Ethics Committee for Animal Experimentation of the University of Piauí State (CEUA / UESPI) protocol number:009/15.

2.2 Animals

Were used 30 *Rattus norvegicus*, aged 8 weeks and weighing 200g ± 20%, originating from the vivarium of the College of Medical Sciences, University of PiauíState.During the experiment, each animal was kept in polypropylene cages under controlled conditions(temperature between 22ºC to 24°C, 40-60% humidity, with light and dark cycles of 12/12h) with ad libitum access to food and drink.

2.3 Aqueous extract

The infusion was performed at a concentration of 1g/L in hot water (70 ° C) was poured into a bottle containing specimens of Goji Berry, previously crushed and heavy, leaving the mixture to stand for 15 minutes [10].

2.4 Study groups

The animals were divided into two groups of ten animals each. The exposed group (E) by treatment with aqueous extract of *Lyciumbarbarum* (Goji Berry) at a dose of 200 mg/kg/day orally by gavage and the negative control (NC), which received distilled water. The experiment was conducted at the Experimental Surgery Laboratory of the State University of Piauí-UESPI.

2.5Biochemical parameters evaluated

Blood tests of animals were carried outthe in the Clinical Laboratory of Integral School Differential FACID/DeVry. The animals were subjected to puncture the bleeding of the brachial plexus. Biochemical analyzes were performed using serum samples using automatic analyzer equipment (BIO PLUS 2000). Serum was obtained by blood centrifugation in microcentrifuge tubes without anticoagulant at 3500 rpm for 5 minutes. We used standard diagnostic kits (Labtest®)for spectrometricvaluationof the following biochemical parameters: creatinine, urea, alkaline phosphatase (ALP), glutamic oxalacetic transaminase (AST / GOT), glutamic pyruvic transaminase (ALT / GPT), alpha-amylase, total protein, albumin, globulin and lipase. The hematological analysis were performed on whole blood collected in EDTAontaining tubes, carefully obeying the relationship between the volume of blood and the anticoagulant concentration to avoid hemodilution or hemoconcentration. After collection, the tube containing the blood was slowly homogenized by inversion and then retired small aliquotfor blood smear preparation.The blood smear was composed of three parts: dense, medial and thin. The staining was performed with dyes that has in its composition methylene blue, eosin and methanol. After drying of the slide, we used an optical microscope, according to a standard of transverse and longitudinal sliding, covering the entire smear. Were evaluated for hematologic counter the following parameters: total erythrocyte count (RBC), hemoglobin (HB), hematocrit,mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), rate variation of the size of red blood cells (RDW), total leukocyte count (WBC) and platelet count (PLQ).

2.6 Statistical analysis

Statistical analysis was performed using GraphPad Prism version 5.0 (GraphPad Software, La Jolla, CA, USA). For data analysis we used the Student t test, expressed as mean and standard deviation. For all tests was considered a 5% significance level.

III. Results And Discussion

The detection and classification changes in organic systems by biochemical and / or physiological cellular signals can be used for biomonitoring. Biochemical changes are considered as a potential source of biological indicators of effect.These can be defined as measurable biochemical or physiological changes,in any biological system,in which, depending on the intensity can be considered as a potential signaling a health problem, or even an already established disease [11].

Enzymes are proteins having catalytic properties over the reactions that occur in biological systems. They have a high degree of specificityover their substrates accelerating specific reactions without being altered or consumed during the process.The diagnostic usefulness of measuring of plasma enzymesconsists in the fact thatchanges in their activities provide sensitive indicators of injury or cell proliferation. Although enzymes transaminases ALT (GTP) and AST (GOT) are equally abundant in the liver, AST (GOT)shows concentration 20 times higher than the ALT (GTP) in heart muscle.The simultaneous determination of the two enzymes provides a clear indication of the likely location of tissue injury [12].

Assessment of renal function is one of the oldest challenges of laboratory medicine. In general, laboratory tests evaluating renal function attempt to estimate glomerular filtration rate (GFR), defined as plasma volume of a substance that can be completely filtered by the kidneys in a given unit of time. The GFR is one of the most important tools in the analysis of renal function and is also an indicator of the number of functional nephrons. As physiological measure, it has proven to be the most sensitive and specific marker of changes in renal function [13].

The results of the biochemical tests indicated no change or variation when each parameter was assessed alone between the groups of animals treated with the negative control animals. This finding remained unchanged in two phases, acute (48h)and chronic (72h), indicating no damage, so the substance cannot be classified as such. Table 01 and 02 refers to the biochemical parameters of acute phase and chronic phase respectively.

Table 01: Values obtained in biochemical tests of animals subjected to acute treatment (48h) with the medicinal plant Goji Berry and negative control animals

Parameters	Negative Controle (NC)	TreatmentGroup
	MEAN ± SD	**MEAN ± SD**
Creatinina mg/dL	0,71±0,13	0,76±0,18
Ureia mg/dL	43,58±3,11	39,85±4,66
Fosfatase Alcalina U/mL	104,75± 26,2	166,75±30,22
TGO U/L	189,75±23,74	246,00±53,83
TGP U/L	89,00± 5,58	127,75±42,61
Amilase U/L	398,25 ±19,35	331,25±70,34
Proteínas totais g/dL	7,63 ± 0,67	6,73±0,08
Albumina g/dL	3,40 ± 0,33	3,28±0,09
Globulina g/dL	4,55 ± 0,39	3,55±0,06
Lipase U/L	6,00± 0,71	7,50±0,96

SD: standard deviation; GOT: glutamic oxaloacetic transaminase; GTP: glutamic pyruvic transaminase

Table 02: Description of the values obtained in the biochemical testing of animals subject to chronic treatment (72h) with the medicinal plant Goji Berry and negative control animals

Parameters	Negative Controle (NC)	TreatmentGroup
	Mean ± SD	**Mean ± SD**
Creatinina mg/dL	0,72±0,09	0,60±0,04
Ureia mg/dL	68,75±12,27	45,50±5,36
Fosfatase alcalina U/mL	153,25±47,81	174,50±54,44
TGO U/L	240,25±52,90	245,30±94,81
TGP U/L	195,00±68,95	115,80±39,43
Amilase U/L	367,00±49,29	370,00±54,59
Proteína totais g/dL	7,125±0,27	6,40±0,24
Albumina g/dL	3,50±0,14	2,80±0,33
Globulina g/dL	3,62±0,38	3,50±0,13
Lipase U/L	10,25±0,63	7,50±1,71

SD: standard deviation; GOT: glutamic oxaloacetic transaminase; GTP: glutamic pyruvic transaminase

In Tables 03 and 04 are expressed the average values of the hematological parameters measured in the blood of animals submitted to acute and chronic treatment, respectively, compared with the negative control animals.

Table 03: Description of the values obtained from the hematological tests in animals subject to acute treatment for 48h with the medicinal plant Goji Berry and negative control animals

Parameters	Negative Controle (NC)	TreatmentGroup
RBC milhões/ mm3	6,93 ±0,48	5,84±0,55
Hematócrito %	44,90 ±1,78	34,17±3,80
Hemoglobina g/dL	14,32 ±0,31	11,79±1,10
VCM fL	54,50 ±1,55	58,32±2,80
HCM pg	18,45 ±0,17	20,25±0,91
CHCM g/dL	33,85 ±0,83	34,72±0,85
RDW %	14,62 ±0,86	16,80±0,33

Neutrófilos %	**28,00 ±4,34**	**3,07±0,95 ***
Basófilos %	0,25 ±0,25	4,67±2,61
Eosinófilos %	1,00 ±0,41	14,93±6,90
Linfócitos %	67,00 ±3,87	75,38±8,00
Monócitos %	2,75 ± 0,63	1,95±1,81
Plaquetas mm3	655,25 ±50,83	446,00±50,97

RBC total count of erythrocytes; MCV - mean cell volume; MCH - Mean Corpuscular Hemoglobin; MCHC - Mean Corpuscular Hemoglobin Concentration

Table 04: Description of the values obtained from the hematologic evidence of animals subjected to chronic treatment 72h with medicinal plant Goji Berry and negative control animals acute phase

Parameters	Negative Controle (NC)	TreatmentGroup
RBC milhões/ mm^3	6,87±0,28	6,33±0,28
Hematócrito %	41,02±1,09	37,92±1,31
Hemoglobina g/dL	13,57±,370	12,27±0,26
VCM fL	59,72±1,28	59,92±1,48
HCM pg	19,80±0,38	19,47±0,53
CHCM g/dL	33,10±0,10	32,50±0,50
RDW %	11,17±,44	16,12±0,53
Neutrófilos %	12,01±7,99	7,28±1,94
Basófilos %	6,43±3,30	7,68±2,95
Eosinófilos %	30,57±21,12	8,57±1,79
Linfócitos %	62,92±9,05	72,17±2,00
Monócitos %	1,95±0,71	4,28±2,30
Plaquetas mm^3	472,75±73,19	430,75±82,80

RBC - total count of erythrocytes; MCV - mean cell volume; MCH - Mean Corpuscular Hemoglobin; MCHC - Mean Corpuscular Hemoglobin Concentration

The basic hematology involves analyzing the concentration, structure and functions of the components of blood and blood products. Among the three major blood components are red blood cells (erythrocytes, RBCs), white cells (leukocytes) and platelets (thrombocytes) [14]. Blood evaluation is an important indicator of physiology and pathology in humans and animals and their values may be changed by ingestion of toxic plants [15]. The values presented in Tables 3 and 4 relate to elements of the hemogram in treated groups of acute and chronic form, respectively. The results showed no significant changes between the group of animals exposed to treatment negative control.

The hemogram is the most requested blood test in the laboratory routine, due to its convenience, low cost and usefulness in clinical practice and fundamentally comprises erythrogram, leucograms and thrombogram[16]. This test provides a snapshot of the hematopoietic system at a specific time and provides an overview of the patient's condition, since the peripheral blood serves as a very efficient means of transport for the whole organic economy [17].

The results obtained are compared only between the treated groups and negative control in this study, is not applicable to compare with others in the literature,

because rats and mice may differ in biochemical and hematological parameters. This is due to variations in gender, race, genotype and may be influenced by age, diet, handling, environment, among other factors [18-19].

IV. Conclusion

Based on the results, it is concluded that theuse of Goji Berry extractorally is safe,because there were no changesin the parametersbiochemical and hematological evaluated.

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