Original Article

Platelet Raising Effect of *Ipomoea batatas* (Sweet Potato) Leaf Extract in Rats

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Abstract:
Sweet potato leaf extract is used as herbal remedy to arrest bleeding in some developing countries. A few studies in India, Nigeria & Ghana revealed platelet increasing effect of Sweet potato leaf extract in experimental animals. So, the purpose of the study was to investigate the effect of aqueous extract of Ipomoea batatas (sweet potato) leaf on platelet count. Aqueous extract of sweet potato leaf was prepared and tested for its effect on platelet count of rats. The rats were randomly divided into 4 groups of 8 in each group. Group A served as control. Aqueous extract of Sweet potato leaf was administered orally as for Group B: 100 mg/Kg BW/day, Group C: 300 mg/Kg BW/day & Group D: 500 mg/Kg BW/day for 14 days. At the end of 14 days, Blood samples were collected and then analyzed to assess the effect of extract on platelet count & other haematological parameters. Obtained Data was subjected to statistical analysis by ANOVA (F test) & Student's unpaired t test. Statistically significant p-value was considered at <0.05. After 14 days, Group B showed slight but non-significant (p-value >0.05) rise of Platelet count. After 14 days, Group C showed statistically significant (p-value <0.05) rise of and Group D showed marked & statistically highly significant (p-value <0.01) rise of Platelet count. This indicates that the extract has dose dependent platelet raising effect and so may be effective in managing thrombocytopenia.

Key words: Platelet count, Aqueous extract, *Ipomoea batatas* (Sweet potato)

Introduction:
Thrombocytopenia, a haematological pathologic condition may affect human health due to its consequence. Cytotoxic drugs & antimetabolites, Nutritional (Vitamin B_{12} and/ or Folic acid) deficiency, Blood loss, Chronic diseases, Autoimmune ITP, Marrow hypoplasia, Marrow infiltration by leukaemia/ multiple myeloma, Hypersplenism, DIC etc. are important causes of thrombocytopenia. Thrombocytopenia may be due to genetic defect of platelet membrane or enzyme[1]. Thrombocytopenic patients are in risk of bleeding manifestations like purpura, bruise, ecchymosis, haematoma & even internal haemorrhage. Specific treatment is required for specific cause in addition to supportive treatment. Sometimes thrombopoiesis is stimulated by using Oprelvekin (thrombopoietin), Romiplostim. But they are expensive, not easily available and has potential adverse effects[2]. So, alternative cheap, available drugs with less adverse effect are demanding. Regarding this issue, some medicinal and herbal plants have been studied.

Ipomoea batatas (Sweet potato) is a creeping plant with perennial vines and adventitious roots, some of which produce swollen tubers. It is an ancient food from tropical America and the Pacific Islands. It is rich in carbohydrates, proteins, vitamins & minerals that help to fulfill the nutritional gap. Sweet potato (*Ipomoea batatas*) leaf is a folk remedy for anaemia, asthma, bug bite, burn, fever, nausea, stomach distress and tumour. The leaf of Sweet potato is also used to arrest bleeding[3]. A few studies in Nigeria, Ghana & India revealed rise of Platelet count in experimental animals by Sweet potato leaf extract[1,3,4]. Though this plant is available in many districts of our country, study to detect its effect on platelet count has yet not done in Bangladesh. This is why sweet potato leaf extract has been chosen for this study to investigate its effect on platelet count of rats.

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Materials & Methods:

The study was carried out in the Department of Pharmacology, Dhaka Medical College, Dhaka on 32 albino rats with aqueous extract of Sweet potato leaf. The sweet potato plants were collected from sweet potato fields of a village cultivator. They were taxonomically identified & authenticated by Bangladesh National Herbarium, Mirpur, Dhaka (DACB Accession number - 39543). Aqueous extract of sweet potato leaf was prepared accordingly to administer in rats. Total 32 albino rats were collected from ICDDRB, Dhaka. They were of either sex, weighing about 150-200 gm. Rats were randomly divided into 4 groups of 8 in each group. Group A served as control group that received distilled water 1 ml orally daily for 14 days. Group B, Group C & Group D received the extract at the doses of 100 mg/Kg BW, 300 mg/Kg BW & 500 mg/Kg BW respectively orally daily for 14 days. At the end of 14 days, Blood Samples were collected from rats through cardiac puncture and sent for haematological analysis by automated haematology analyzer.

Results:

Obtained data on Platelet count (lac/ccmm) were recorded & compiled. Data were expressed as Mean±SD and tabulated & presented accordingly in tables & diagrams. Each bar diagram represented the Mean±SD of a variable of specific group. Statistical analysis of recorded quantitative data was done by ANOVA (F test) & Student's unpaired t-test. Test result was considered as statistically significant at p-value <0.05.

Difference among 4 groups was analyzed by ANOVA (F test). Student's unpaired t-test was performed to compare between Group A & Group B, between Group A & Group C and between Group A & Group D. Difference between Group A & Group B was not significant (p-value >0.05). Statistically significant difference (p-value <0.05) was found between Group A & Group C and between Group A & Group D.

Comparison between Group A (control) & Group B (received extract 100 mg/Kg BW /day) showed slight rise of Platelet count that was not significant (p-value >0.05). Comparison between Group A (control) & Group C (received extract 300 mg/Kg BW /day) showed rise of Platelet count that was statistically significant (p-value <0.05). Comparison between Group A (control) & Group D (received extract 500 mg/Kg BW /day) showed marked rise of Platelet count that was statistically highly significant (p-value <0.01).

Table 1: Platelet count (presented as Mean±SD) of 4 Groups at the end of experiment:

Variable	Group A	Group B	Group C	Group D
Platelet count (lac/ccmm)	2.25 ± 0.93	2.55 ± 0.75	4.6 ± 0.88	7.6 ± 1.13

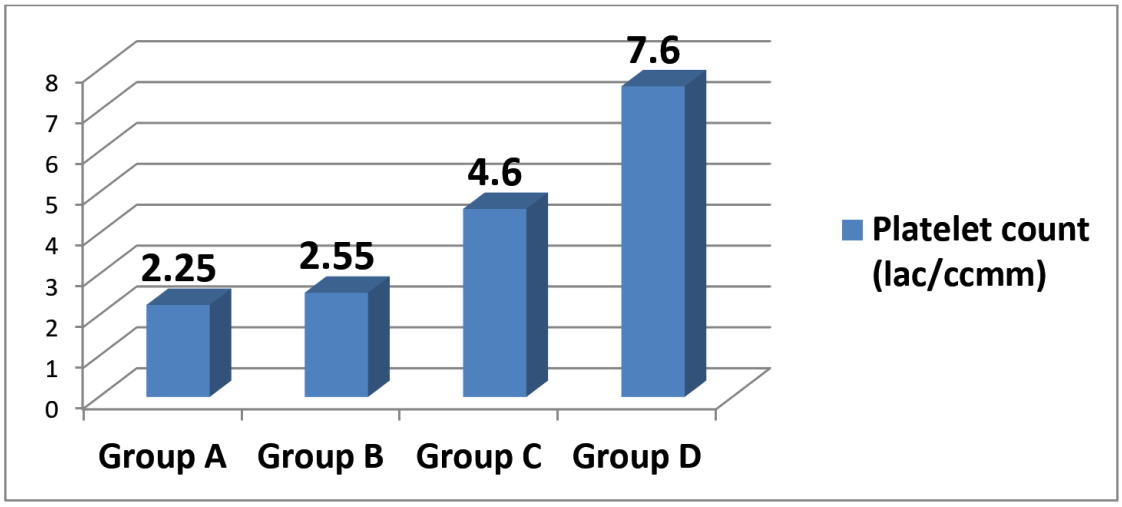

Figure 1: Bar diagrams showing dose dependent increment of Platelet count following administration of extract of Sweet potato leaf.

Table II: Comparison between Group A (Control) & Group B (received Sweet potato leaf extract 100 mg/Kg body weight daily)

Variable	Group A	Group B	p-value
Platelet count (Mean ±SD)	2.25± 0.93	2.55± 0.75	> 0.05

Table III: Comparison between Group A (Control) & Group C (received Sweet potato leaf extract 300 mg/Kg body weight daily):

Variables	Group A	Group C	p-value
Platelet count (Mean ±SD)	2.25 ± 0.93	4.60 ± 0.88	< 0.05

Table IV: Comparison between Group A (Control) & Group D (received Sweet potato leaf extract 500mg/Kg body weight daily)

Variable	Group A	Group D	p-value
Platelet count (Mean ±SD)	2.25 ± 0.93	7.60 ± 1.13	< 0.001

Discussion:

Effect of aqueous extract of *Ipomoea batatas* (Sweet potato) leaf on platelet count of rats has been investigated in this study. It has been defined on some extent the platelet raising effect of the extract in rats. Study was carried out on 32 albino rats in the Department of Pharmacology, DMC, Dhaka. They were divided randomly into 4 groups of each of 8 rats. Out of 32 rats, Group A (n_1=8) received distilled water serving as control; Group B (n_2=8) received sweet potato leaf extract 100 mg/Kg BW, Group C (n_3=8) 300 mg/Kg BW & Group D (n_4=8) 500 mg/Kg BW all orally daily for 14 days. Dose of extract including route of administration used in the study was selected according to dose & route used in the studies done by Koffuor & Dadzeasah (2012) and Osime & Ediale (2008)[1,3]. Duration of the study was selected on the basis of duration of the study done by Osime & Ediale (2008)[3]. Before giving intervention, measured parameters of both control group & test groups were within reference range. After 14 days administration of the extract at the dose of 100 mg/ Kg BW, Group B showed slightly increased Platelet count, but not statistically significant as p-value >0.05. So, the extract at the dose of 100 mg/ Kg BW was not able to exert any significant effect on blood cell count of rats. Group C after receiving the extract at the dose of 300 mg/ Kg BW for 14 days showed increased Platelet count. Statistical analysis revealed p-value <0.05. So, the difference was statistically significant. Group D that received the extract at the dose of 500 mg/ Kg BW for 14 days showed marked rise of Platelet count. Statistical analysis revealed p-value <0.01. So, the difference was statistically highly significant. It was observed that extract induced increment of Platelet count was dose dependent (Table 1, Figure 1). In this study, the Platelet increasing activity was observed with administration of the sweet potato leaf extract at the doses of 300 mg/Kg & 500 mg/Kg BW daily for 14 days. The increment of Platelet count observed in this study is in well agreement with the work in 2008 by Osime & Ediale[3]. Although the precise mechanism was not exactly documented, rise of Platelet count might be due to some nutritional & phytochemical components of sweet potato leaf extract. Nutritional components of sweet potato leaves such as Folate, Vitamin B_{12}, Protein/ Amino acids, Iron, Copper, Zinc, Manganese, etc. might enhance thrombopoiesis in this study[1,3]. Glycosides, Saponins & Alkaloid present in the extract might stimulate directly or indirectly (by stimulating synthesis & release of hematopoietic growth factors or cytokines) hematopoietic stem cells of bone marrow to proliferate & differentiate into megakaryocytes & subsequently platelets. Tannins component of the extract by antioxidant property might protect stem cells & platelets from free radical induced injury[1,5].

Conclusion:

Aqueous extact of *Ipomoea batatas* (Sweet potato) leaf has dose dependent platelet raising effect in rats. Further study is needed in large sample comparing with established platelet increasing agents. However, sweet potato leaf or leaf extract may be used as remedy for thrombocytopenia after ascertaining its safety.

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