IJPSR (2022), Volume 13, Issue 6 **(Research Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 23 August 2021; received in revised form, 25 September 2021; accepted, 09 November 2021; published 01 June 2022

EFFECTS OF GIMA LEAVES (*GLINUS OPPOSITIFOLIUS*) ON HAEMATOLOGICAL PARAMETERS OF ADULT HUMAN

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Keywords:

Glinus oppositifolius, Molluginaceae, Haematological parameters, Supplementation, Socio economically backward

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ABSTRACT: *Glinus oppositifolius* (Linn) is a branched herb containing linear to obovate, opposite leaves with greenish flowers, and it belongs to the molluginaceae family. This bitter leafy vegetable is known as gima shak in West Bengal, Assam & Bangladesh. This leaf contains various bioactive components which provide protection against diabetes, hyperlipidaemia, joint pain, inflammation, diarrhea, skin disorder, *etc*. Previous nutritional analysis in our laboratory found that the iron content of these gima leaves is high. A randomized study was conducted among poor adult subjects who are socio-economically backward and have no chronic diseases. 18-65yrs aged people were randomly selected from slum areas of Kolkata. Among them, Fifty-Five samples consumed 50 gm boiled gima paste as supplementation for 45 days. Data on their dietary habits, anthropometry, medication habits, and haematological parameters were analyzed. Supplementation of gima revealed that there is70%&64% increase in haemoglobin among men and women respectively, whereas females of 40-60 years showed more positive changes than men. After supplementation of gima, the iron storage *i.e.* ferritin level, showed a 76% and 66.6% increase in adult females and males, respectively. Supplementation of gima shak showed a positive effect on both haemoglobin and serum ferritin among the adults.

INTRODUCTION: *Glinus oppositifolius* (Linn) belongs to the family Molluginaceae is a branched herb growing all over India [1] and the leaves of this plant are consumed as leafy vegetables by local people [2]. It contains linear to obovate, opposite leaves, and greenish flowers. It is also known as *Mollugo oppositifolius* (Linn) [1]. This *Glinus oppositifolius* shak is used by healers for treatment of their joint pain, inflammation, diarrhea, Intestinal parasites, fever boils and skin disorders [3].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.13(6).2395-98

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.13(6).2395-98

The leaves contain different triterpenoids, triterpenoid saponins, glinusopposides which showed antifungal activity of *Glinus oppositifolius* [4]. A bioactive triterpenoid saponin named spergulin A isolated from *Glinus oppositifolius* showed immunomodulating property and other traditional uses [5]. *Glinus oppositifolius* shown to exhibit antioxidant [6], hepatoprotective [7], antidiabetic [8] and antihyperlipidemic [9] activity. It also possesses phytochemical and physicochemical properties [10].

Taxonomical Classification [11]:

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsid

Sub-class: Caryophyllideae

Order: Caryophyllales

Family: Molluginaceae

Scientific Name: *Glinus oppositifolius* (L.) Aug. DC.

Genus: Glinus

Species: Oppositifolius

Synonyms: *Mollugo spergula* L.

FIG. 1: PICTURE OF *GLINUS OPPOSITIFOLIUS* (LINN)

It was identified by the Botanical Survey of India, Kolkata, West Bengal.

Identification Number: CNH/ Tech. II/ 2019/ 38 dated 29/08/2019.

Aims & Objectives: According to National Family Health Survey (NFHS)–5data (2019-2020) percentage of underweight, anaemia, high blood sugar level, hypertension is 14.8% & 15.1%, 71.4% & 38.9%, 8.9% & 10.8% and 20.5% & 20.1% respectively for adult women and men in West Bengal [12].

Glinus oppositifolius, a widely grown plant, is mostly found in tropical regions. Due to its wide availability and very low price, the economically backward population consumes this leafy vegetable in their diet.

Conventional wisdom suggests that Gima shak helps to improve their haemoglobin level. Previous research works were done with ethanolic, methanolic and petroleum ether extracts. Evidence shows that all these extracts possess different antioxidants, physicochemical, physiological activities. But there is a gap in existing literature. Human beings generally consume leafy vegetables after cooking. Hence, extraction is not the normal procedure for daily consumption. That is why the study intends to work with the edible part of *Glinus oppositifolius* in which form human beings are typically consumed. Research work was done with both raw and cooked samples to assess the haematological parameters, including haemoglobin and serum ferritin level.

MATERIALS & METHODS:

Study Area: The study was conducted in the slum area of Sovabazar (Kolkata), West Bengal, India.

Study Design: Sixty adults (males and females) were selected randomly from the slum area, free from any chronic diseases, and do not have any type of iron tablets as medication. They are set as my experimental samples and supplemented with gima shak laddu. Two gima shak laddu per person per day was supplemented for 45 days. Fresh gima shak was collected, cleaned, and washed. A measured amount of fresh leaves of gima shak and water was boiled for 30 min to reduce the volume to 30 gms. Then mung dal and sugar was mixed with it to make gima shak laddu. Gima shak pakora, gima shak roti, and potato curry with gima shak were also prepared. All recipes were prepared fresh and pilot study for sensory evaluation was conducted. Finally gima shak laddu was accepted by the people for the study. Pre haematological examinations *i.e* haemoglobin, serum ferritin was done for these adults. However, due to five dropouts the final data is presented for fifty-five adults. Post examinations for haematological indices were done after 45 days of supplementation. For this study, human ethical clearance was done, and the reference no is 06/ST/18-19/1734 Dated 02/01/2019.

Biochemical Estimation: Before and after supplementation, haematological indices, i.e., haemoglobin and serum ferritin analysis, were done to assess supplementation's impact. Horiba Pentra ES 60 analyzer and Beckman Coulter fully automated analyzer were used for *in-vitro* analysis of haemoglobin and serum ferritin, respectively.

Statistical Analysis: The data was collected, and mean, standard error were calculated. Student‘t’ test was performed to test the level of significance.

RESULTS:

TABLE 1: RESULT OF PRE SUPPLEMENTATION AND POST SUPPLEMENTATION OF AQUEOUS GIMA PASTE AMONG ADULTS

Age Group (Yrs)	Number of Samples	Haemoglobin Level (gm/dl)		Serum Ferritin (ng/ml)	
		Pre (mean ±SE)	Post (mean ±SE)	Pre (mean ±SE)	Post (mean ±SE)
20-≥60	55	12.72±0.22	13.04±0.19	71.63±10.23	72.70±9.55
Male(20-≥60)	30	13.63±0.24	13.88±0.20	104.38±16.03	103.75±14.54
Female(20-≥60)	25	11.64±0.25	12.04±0.21	32.33±5.19	35.45±6.25
Male(20-40)	9	14.2±0.50	14.2±0.47	101.25±30.96	92.17±23.97
Male(41-≥60)	21	13.39±0.26	13.74±0.22	105.72±19.18	108.71±18.32
Female(20-40)	10	11.76±0.31	12.06±0.37	20.45±5.77	21.74±6.27
Female(41-≥60)	15	11.56±0.37	12.02±0.26	40.25±7.19	44.6±8.94

TABLE 2: PERCENTAGE CALCULATION OF HAEMOGLOBIN LEVEL AND FERRITIN LEVEL AFTER SUPPLEMENTATION OF AQUEOUS GIMA PASTE AMONG ADULTS

Age Group (Yrs)	Number of Samples	Haemoglobin Level (%)			Serum Ferritin Level (%)		
		Increase	Decrease	No change	Increase	Decrease	No change
20-≥60	55	67.2	16.3	16.3	70.9	29	0
Male(20-≥60)	30	70	20	10	66.6	33.3	0
Female(20-≥60)	25	64	12	24	76	24	0
Male(20-40)	9	66.66	22.2	11.11	55.55	44.44	0
Male(41-≥60)	21	71.4	19.04	9.52	71.4	28.5	0
Female(20-40)	10	50	10	40	60	40	0
Female(41-≥60)	15	73.3	13.3	13.3	86.6	13.3	0

DISCUSSION: This study revealed that 45 days of gima shak supplementation increased 67.2% and 70.9% haemoglobin and serum ferritin levels for adults respectively. This supplementation showed a positive relationship between haemoglobin and serum ferritin level. Moreover the food analysis consumption questionnaire indicated that first-class protein consumption was very low in the study population, which may reduce their heme iron supplementation in food. Analysis of the nutritive value of *Glinus oppositifolius* proved that it contained good amount of polyphenols, tannins, oxalates which are known to have an inhibitory effect on iron bioavailability. Gallogly and catechol groups associated with phenol structures form a chelate with irons and make them non – bioavailable [13]. It is also a considerable fact that the ingredient pulse of supplemented food product contains enough inhibitory phytic acid which has a strong association with iron absorption. Although physiological iron requirements do not differ between elderly men and postmenopausal women but for elderly women, iron metabolism is affected by the aging process [14]. In this study 40-≥60 years female and postmenopausal women showed a more positive increase in both haemoglobin and serum ferritin than men.

Previous literature have evaluated that serum hepcidin level are lower in premenopausal and postmenopausal women are highly correlated with serum ferritin levels [15]. Hepcidin hormone, homeostatically regulated by iron and excess iron, stimulates hepcidin production, and increased concentration has negative feedback and reduces dietary iron absorption, thus preventing iron loading [16]. The living standard and hygiene of the study population were unhygienic, which may cause chronic inflammation among them. Chronic low-grade inflammation leads to less efficient absorption through hepcidin regulation [14]. Further study related to iron absorption level and metabolism is required to determine the proper causal association between iron intake and improvement of haematological indices among adults.

CONCLUSION: Finally, it can be concluded that *Glinus oppositifolius* can be recommended in our healthy diet as gima shak supplementation showed a positive effect on haemoglobin and serum ferritin levels.

ACKNOWLEDGEMENT: We are thankful to the Serum Institute of Kolkata for providing the

facilities and access to the instruments used to analyze the haematological parameters of the adult human. We are also thankful to the Liberian Department of Home Science for providing access to online resources for our literature survey.

CONFLICTS OF INTEREST: There are no conflicts of interest.

REFERENCES:

1. Hoque N, Zafar Imam M, Akter S, Md EH Mazumder, Raquibul Hasan SM, Ahmed J and Md. Rana S: Antioxidant and anti hyperglycaemic activity of methanolic extracts of *Glinus oppositifolius* leaves. Journal of Applied Pharmaceutical Science 2011; 01: 50-53.
2. Panda C, Mishra U, MahapatraS and Panigrahi G: Free radical scavenging activity and phenolic content estimation of Glinus *oppositifolius* & *Sesleania grandiflora*. International Journal of Pharmacy 2013; 4: 722-727.
3. Diallo D, Hveem B, Mahmoud MA, Berge G, Paulsen BS and Maiga A: An ethnobotanical survey of herbal drugs of gourma district, Mali. Pharmaceutical Biology 1999; 37: 80-91.
4. Zhang D, Fu Y, Yang J, Nian Li X, San MM, Naing OO T, Wang Y and Yang X: Triterpenoids and their glycosides from *Glinus oppositifolius* with antifungal activities against *Microsporum gypseum* and *Trichophyton rubrum*. Molecules 2019; 24: 1-23.
5. Banerjee S, Mukherjee N, Gajbhiye RL, Mishra S, Jaisankar P, Dutta S and Saha KD: Intracellular anti-leishmanial effect of Spergulin-A, a triterpenoid saponin of *Glinus oppositifolius*. Infect Drug Resist 2019; 12: 2933–2942.
6. Asokkumar K, Umamaheswari M, Sivashanmugam AT, Subhadra Devi V, Subhashini N and Ravi TK: Free radical scavenging activity of *Glinus oppositifolius* (Carpet weed) using different *In-vitro* systems. Pharmaceutical Biology 2009; 47: 474-482.
7. Mazumder M, Halder UK, Manikandan PKL, Senthilkumar GP and Kandar CG: Hepatoprotective activity of methanol extracts of *Glinus oppositifolius* & *Trianthema decandra* against paracetamol induced liver damage. Advances in Traditional Medicine 2007; 7: 74-78.
8. Pattanayak S and Padmalatha K: Anti- diabetic activity of parts of *Glinus oppositifolius* L against glucose overloaded and streptozotocin induced diabetes in albino rats. International Journal of Natural Products and Marine Biology 2015; 1: 29-34.
9. Behera GM, Kumar S, Malay Baidya BN and Panigrahi G: Anti hyperlipidaemic and antioxidant activity of *Glinus oppositifolius* (L.) Aug, DC. Pharmacologyonline 2010; 915-936.
10. Ramaschand ST, Pitchaiah P, Reddy P and Reddy M: Pharmacognostical, phytochemical and nutritional evaluation of *Glinus oppositifolius* (L.) Aug, DC. Pharmacognosy Journal 2016; 8: 31-36.
11. Cronquist A: The evaluation and classification of flowering plants. Boston Second Edition 1988.
12. National Family Heatlh Survey (NFHS)-5, Ministry of Heatlh and Family Welfare 2019-2020.
13. Brune M, Rossendar L and Hallberg L: Iron absorption and phenolic compounds: importance of different phenolic structures. European J of Clinical Nutrit 1989; 43: 547-57.
14. Susan J, Fairweather-Tait, Anna A and Wawer R: Gillings, Amy Jennings, Phyo K. Minyt: Iron status in elderly, mechanism of ageing and development. National Library of Medicine 2014; 136-137: 22-28.
15. Ilkovska B, Kotevska B, Trifunov G and Kanazirev B: Serum hepcidin reference range, gender differences, menopausal dependence and biochemical correlates in healthy subjects. Journal of IMAB - Annual Proceeding (Scientific Papers) 2016; 22(2): 1127-1131.
16. Thomas Ganz and Elizabeta Nemeth: Hepcidin and iron homeostatis. Biochem Biophys Acta 2012; 1823: 1434-1443.

How to cite this article:
Choudhury SP and Khaled KL: Effects of Gima leaves (*Glinus oppositifolius*) on haematological parameters of adult human. Int J Pharm Sci & Res 2022; 13(6): 2395-98. doi: 10.13040/IJPSR.0975-8232.13(6).2395-98.