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RESEARCH ARTICLE

QUANTITATIVE ESTIMATION OF SOME ANTIOXIDANTS AND ANTI NUTRITIONAL CONTENT OF *GLINUS OPPOSITIFOLIUS*

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Abstract

Ovate, opposite leaves and greenish flowers. (1).This study was performed to measure the antioxidants and anti nutritional contents of the aqueous paste of *Glinus oppositifolius* (ediblepart). Some of these phytochemicals are heat labile, and reduced after cooking .So all parameters were also measured afterheat treatment.Result showed a difference between the raw sample and cooked sample of these all parameters. Study found that after boilingtherewas17.74%,8.36%,8.8%,0.44%,60%,11.11%,52.17%,1.90% 18.33%,4.34%and5.71% reduction of total phenol, flavonoid, DPPH(IC50), FRAPassay, totalalkaloid, oxalate, phytate, tannin, total saponin, steroidal saponin and cardiac glycosides respectively.

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Introduction:-

Glinus oppositifolius (L.)Aug.DC (Molluginaceae), known as gimashak and it contains linear to

Gimashak is consumed as leafy vegetables by local people of all tropical country (2).This bitter leafy vegetable is known as‘GimaShak’inWestBengal, Assam& Bangladesh (3).

Glinus oppositifolius are used for treating joint pain, inflammation, diarrhea ,Intestinalparasites,feverboils and skindisorders (4).Leaves of the *Glinus oppositifolius*(Linn)contain spergulagenic, spergulagenin A and a tri hydroxy ketone (5).A bioactive pecticpolysaccharide isolated from *G.oppositifolius* found to possess immunomodulationproperty (6*).Glinus oppositifolius* is shown to exhibit antioxidant (7), hepatoprotective (8) antidiabetic (9) and antihyperlipidemic (10) activity.

Taxonomical Classification :(11)

1. Kingdom–Plantae
2. Division–Magnoliophyta
3. Class–Magnoliopsid
4. Sub-class–Caryophyllideae
5. Order–Caryophyllales
6. Family–Molluginaceae
7. ScientificName–*Glinus oppositifolius* (L.)Aug.DC.
8. Genus-Glinus
9. Species-oppositifolius
10. Synonyms–MollugoSpergulal

It was identified and classified by Botanical Survey Of India, Kolkata,West Bengal Identification number:CNH/Tech.II/2019/38.

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Aims&Objectives:-

Glinus oppositifolius is a widely grown plant and available at a very low price. So poor people can consume this leafy vegetable in their diet. Micronutrient deficiencies are a major health problem in our country among low income groups due to lack of food availability and poor purchasing capacity.Previous research found that *Glinus oppositifolius* contains a good amount of vitamins and minerals (12)**.** Antioxidants, vitamins and minerals prevent potential damagecaused by reactive oxygen species to the cellular tissues and modulate immune function in ourbody. Whereas antinutrients are responsible for deleterious effects related to the absorption of micronutrients and macronutrients .So the objective of this study was to quantify of antioxidants and antinutritional factors of *Glinus oppositifolius* in the form normally human beings consume i.e the cooked form.

Materials and methods:-

- Collection of Sample*: Glinusoppositifolius* was collected from Sovabazar market, Kolkata, WestBengal, India.
- Preparationof Sample:

Preparation of rawsample: Fresh gimashak was collected fromSovabazar market, cleaned and washed. Then the usual standard procedure was followed for the estimation of antioxidants andanti-nutritionalfactors.

Preparation of cooked sample: Fresh harvested gimashak *(Glinusoppositifolius*) was collected, cleaned and washed. Estimated amount of gimashak was weighed then boiled with measured amount of fresh drinking water for 30 minutes. Extraction procedure was done according to the guideline of the methods. For estimation of all phytochemicals and anti-nutritional factors, both raw and cooked sample was used.

With this raw and cooked sample all parameters were observed by the following methods with few modifications:

1. Estimation of Totalphenolcontent(Barman K,2004method).(13)
2. Estimation of Flavonoidcontent(Changetal,2002method).(14)
3. Estimation of DPPHAntioxidantassay(Mensor et al,2001method).(15)
4. Estimation of FRAPassay(Benzieetal,1996method)(16)
5. Estimation of Totalalkaloid(Harbone.JB,1973method)(`17)
6. Estimation of oxalate(Onyemaetal,2016)(18)
7. Estimation of phytate(Ifemejeetal,2014method)(19)
8. Estimation of tannin(Saxenaetal,2013method)(20)
9. Estimation of totalsaponin(Pasaribu etal,2014 method)(21)
10. Estimation of steroidalsaponin(Singhetal,2015method)(22)
11. Estimation of cardiacglycosides(Onyemaetal,2016)(18)

Results:-

Table4.1:- Quantitative Estimation Result of Antioxidant andAntinutritional Parameters.

Sln o	**Parameters**	**Results**		**Percentage of Reduction After Cooking (%)**
		RawSample(value ±SE)	**CookedSample(value ±SE)**	
1.	Totalphenol content	102±0.4mgGAE/100gm	83.9±0.88mgGAE/100gm	**17.74**
2.	Flavonoid	98±1.1mgQuercetin equivalent/100gm	89.8±0.83mgQuercetin equivalent/100gm	**8.36**
3.	DPPH Antioxidant(IC50)	10.2±0.26µg/ml	9.03±0.03µg/ml	**8.8**
4.	FRAPassay	2.26±0.1µM	2.25±0.04µM	**0.44**
5.	Totalalkaloid	2±0.03gm/100gm	0.8±0.01gm/100gm	**60**
6.	Oxalate	0.8±0.03gm/100gm	0.72±0.01gm/100gm	**11.11**
7.	Phytate	23±0.53mg/100gm	11±0.27mg/100gm	**52.17**
8.	Tannin	42±0.58mg/100gm	41.2±0.63/100gm	**1.90**
9.	Totalsaponin	1.2±0.31gm/100gm	0.98±0.02/100gm	**18.33**
10.	Steroidal saponin	0.23±0.003gm/100gm	0.22±0.01/100gm	**4.34**

11.	Cardiac glycosides	1.4±0.04gm/100gm	1.32±0.28gm/100gm	**5.71**

GAE:Gallicacidequivalent
Statistical Analysis:
Correlationcoefficient was calculated as per Pearson'sCoefficient.

Table 4. 2:- Correlation Coefficient of Antioxidant Activities of Total Phenolic Content(TPC),Flavonoid,DPPH radical scavenging activityand FRAPAssay (cookedsample)

Correlation coefficient	TPC (TotalPhenolContent)	Flavonoid	DPPH radicalscavenging activity	FRAPAssay
TPC		-0.70(very weak)	-0.87(very weak)	**0.56(moderate)**
Flavonoid			0.27(weak)	-0.98(veryweak)
DPPH radicalscavenging activity				-0.09(veryweak)

Table 4.3:- Correlation Coefficient of Antioxidant Parameters and Anti nutritional Parameters of Cooked Sample.

Correlationco efficient	TotalPhenol	Flavonoid	DPPH	FRAPAssay
Totalalkaloid	-0.94(very weak)	**0.43(moderate)**	**0.98(very strong)**	-0.26(very weak)
Oxalate	**0.86(very strong)**	**0.96(very strong)**	-0.51(veryweak)	**0.9(very strong)**
Phytate	-0.87(very weak)	**0.96(very strong)**	**0.53(moderate)**	-0.88(very weak)
Tannin	**0.69(strong)**	-0.99(veryweak)	-0.25(veryweak)	**0.98(very strong)**
Totalsaponin	0.09(veryweak)	-0.76(veryweak)	0.4(moderate)	**0.87(very strong)**
Steroidalsaponin	**0.89(verystrong)**	-0.95(veryweak)	-0.56(veryweak)	**0.87(verystrong)**
Cardiac Glycosides	-0.33(very weak)	**0.9(verystrong)**	0.15(veryweak)	-0.96(very weak)

Standard range: 0.00-0.19= very weak, 0.20-0.39=weak, 0.40-0.59= moderate, 0.60-0.79= strong,0.80-1= verystrong.

Discussion:-

Ali et al. claimed that natural antioxidants mainly present in the form of phenolic compounds such asflavonoids and phenolic acids from the plants.(23) *Glinus oppositifolius* contains a better amount of antioxidants than other Indian vegetables. It contains 102 mg GAE /100gm total phenol and 98mgquercetin/100gm whereas amaranth contains 24.76mg GAE/gm and 8.13 mg CAE/gm respectively. (24)The antioxidant activity was also determined as radical scavenging activity as DPPH assay and ability to reduce Fe^{3+}-Fe^{2+}·(FRAP). Total phenol content of cooked sample and FRAPshowed a good correlation..It was found that after boiling there was 17.74%, 8.36%, 8.8%, 0.44% reduction of total phenol, flavonoid, DPPH(IC50),FRAP. Heat may disrupt the hydroxyl group structure of total phenol which is mainly responsible for phenolic antioxidant properties. (25) Increased surface area of tissues in contact withcooking water as well as high temperature was likely to have caused disruption of cell walls and breakdown of phenolic compounds.(26)Flavonoids are commonly present in edible fruits andvegetables.It is a heat labile compound,so the heat exposure duringcooking can influence their content in vegetables. Thermal treatment can affect both the extractability and bio accessibility of phytochemicals because of the destruction of the cell wall in plant material. (27) Study found the highest correlation between (0.98) tannin and FRAP assay and total alkaloid and DPPH (0.98) assay. Oxalate showed verystrong correlation with TPC, Flavonoid and FRAP assay. A very strong relationship was found betweentannin and FRAP assay, total saponin and FRAP assay. Steroidal saponin revealed a very strongrelationship with total phenol and FRAP assay whereas cardiac glycosides showed a very strongrelationshipwithflavonoid.The correlation discrepancies found in literature are explained on thebasis of differences in the interpretation of the results by individual methods.

Antioxidant activity of a substance can vary from method to method depending on factors such as oxidation state, antioxidant solubility, and medium of pH...(28). Studyshowed, 60%,11.11%,52.17%,1.90%18.33%,4.34%and5.71%reductionoftotalalkaloid,oxalate,phytate,tannin,totalsaponin,steroidalsaponin andcardiac glycosides respectively after cooking. Total alkaloid and phytate content showed a significant reduction where as oxalate and total saponin showed moderate reduction.Tannin, steroidal saponin, cardiac glycosidesshowed a minimal reduction. From this experiment it may be concluded that this sample contains heat sensitive alkaloid and phytate. From this study it may be concluded that consumptionof cooked *Glinus oppositifolius* is good for us because of these high antioxidant content.Though heat treatment reduces the antioxidant content but simultaneously heat can also reduce the antinutritional factors. Reductions of these antinutritional factors are necessary as these factors can cause deleterious effects on health.

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Conflicts of interest:
There are no conflicts of interest.

References:-

1. N. Hoque, M.Zafar Imam, S. Akter, Md. E.H. Mazumder, S.M. Raquibul Hasan, J. Ahmed and Md. S. Rana.Antioxidant and Anti hyperglycaemic Activity of MethanolicExtracts of *Glinus oppositifolius* leaves. Journal of Applied Pharmaceutical Science. 2011;01 (07):50-53.
2. C. Panda, U. Mishra, S.Mahapatra and G. Panigrahi. Free Radical Scavenging Activity andPhenolic Content Estimation of *Glinus oppositifolius* & *Sesleaniagrandiflora.*International Journal Of Pharmacy. 2013;4:722-727
3. S.K.Sahu,D.Das ,N.K.Tripathy .S.C.Dinda and.H.K.Sundeep .Evaluation of Hypoglycaemic Activity of *Mollugo pentaphylla* and *Glinus oppositifolius*.Rasayan.J.Chem. 2012;5(1):57-62
4. D.Diallo, B.Hveem MA. Mahmoud ,G.Berge ,BS.Paulsen and A.Maiga. An EthnobotanicalSurvey of Herbal Drugs of Gourma District ,Mali. Pharmaceutical Biology. 1999;37(1): 80-91.
5. A. Ghani,2nd Edn,Medicinal Plants Of Bangladesh with chemical constitutents and uses. The Asiatic Society of Bangladesh, 2003.
6. K.T .Inngjerdingen,S.C. Debes, M.Inngjerdingen, S.Hokpusta, S.E.Hardling and B.Rolsted . Bioactive Pectic Polysaccharide From *Glinus oppositifolius(L)* Aug .DC., aMalian Medicinal Plant Isolation and Partial Characterization. J.Ethnopharmacol. 2005;101:204-214
7. K.Asokkumar,M .Umamaheswari, A.T. Sivashanmugam, V. Subhadra Devi, N.Subhashiniand T.K. Ravi. Free Radical Scavenging *Glinus oppositifolius* (carpet weed) Using Different In Vitro Systems.Pharmaceutical Biology, 2009;47(6):474-482.
8. M. Mazumder,U.K. Halder ,P.K. Manikandan L, Senthilkumar GPand Kandar .C.G .Hepatoprotective Activity Of Methanol Extracts of *Glinus oppositifolius* & *Trianthemadecandra* Against Paracetamol Induced Liver Damage.Advances In Traditional Medicine. 2007 ;7(1):74-78.

9. S.Pattanayak and K.Padmalatha.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(1):29-34.
10. GM. Behera, S. Kumar, B.N.Malay Baidya and G.Panigrahi. Anti Hyperlipidaemic andAntioxidant Activity of *Glinus oppositifolius(*L.)Aug, DC.Pharmacologyonline. 2010;20:915-936.
11. Cronquist A,2nd Edn,The Evaluation and Classification Of Flowering Plants .Boston, 1988 .
12. S.P.Choudhury and .K.L.Khaled.Quantitative Estimation of Some Essential Vitamins andMinerals of *Glinus oppositifoilus*. International Journal of Research and Analytical Reviews .2021;8(2):458-461.
13. K.Barman.Biodegradation Of Tanniniferous Feeds And Their Influence On NutrientUtilization and Productivity Of The Dairy Animals. Ph.D thesis, Submitted to NDRI,Karnal.
14. C. Chang ,M.Yang , H.Wen and JJ. Chern . Estimation Of Total Flavonoid Content ByTwo Complementary Colorimetric Methods. Food Drug Analysis. 2002;10:178-182.
15. Mensor LL, M. FS,Leitao GG, Reis AS,Santos TC, Coube CS and Leitao SG,. Screening Of Brazilian Plant Extracts For Anti- oxidant Activity By The Use Of DPPHFree Radical Method. Phytother Research .2001;15:127-130.
16. Benzei,F.F & Strain,J.J, Methods Of Biochemical Analysis, A book by (NIN,Hyderabad.1999),pp-31-34.
17. Harborne JB. Phytochemical Methods: A Guide to Modern Techniques of PlantAnalysis,Edn3.(Chapman And Hall London ,1998)p. 302.
18. C.T.Oneyma, C.E.Ofor,V.C.Okudo and Ogubuaga.Phtyochemical and Antimicrobial Analysis of Banana Pseudo Stem(*Musa acuminate*) .British Journal Of PhamaceuticalResearch. 2016;10(1):1-9.
19. J.C.Igemeje,C.Egbuna, J.O.Eziokwudiaso and F.C.Ezebuo .Determination of The Antinutrient Composition of *Ocium gratissimum* ,*Corchorus olitorius, Murraya koenigii*and *Cucurbita maxima* . International Journal of Innovation and Scientific Research 2014;3(2) :127-133.
20. V.Saxena, G. Mishra, A. Saxena, Kamlesh KR. Vishwakarma..A Comparative Study OnQuantitative Estimation of Tannins in *Terminalia chebula, Terminalia belerica, Terminalia arjuna, Saraca indica* using spectrophotometer. Asian Journal Of Pharmaceutical and Clinical Research. 2013;6(3):148-149.
21. T.Pasaribu, D.A.Astuti,E.Wina,Sumiati and A.Setiyono .Saponin Content of *Sapindus rarak* Pericarp Affected by Particle Size and Type of Solvent, Its Biological Activity onElimeria tenella oocytes. International Journal of Poultry Science. 2014;13(6):347-352.

22. R.Singh and V.d.Mendhulkar: *Abutilon indicum* (Linn) sweet leaves, A Natural Source of Saponin: A Spectrophotometric Assay. International Journal of Pharm Tech Research.2015, 8(4):725-729.
23. G.Ali and G.Neda.Flavanoids and Phenolic Acids : Role and Biochemical Activity InPlants and Human .Journal of Medicinal Plants Research .2011;5(31):6697-6703.
24. J.XK.P. Sanchez, C.R.Moreno, M.A.G.Favela, JM .Carrillo ,EOC.Rodriguez, AV.Ortizand R.G Darado. Increasing The Antioxidant Activity, Total Phenolic Acid, FlavonoidsContents By Optimizing The Germination Conditions of Amaranth Seeds. Plant Foods for Human Nutrition .2014;69(3):196-202.
25. Lo Scalzo R,Genna A, Branca F,Chedin M and Chassaigne H.Anthocyanin Compositionof Cauliflower (*Brassica oleracea L.var.botrytis*)and Cabbage(*Brassica oleracea L.var.capitata)* and Its Stability In Relation To Thermal Treatments. FoodChem.2008; 107:136-144.
26. M.Palermo, N.Pellegrini and V.Fogliano. The Effect Of Cooking On The PhytochemicalsContent of Vegetables.J Sci Food Agriculture. 2014;94: 1057-1070.
27. M.Hilemori ,Koh E and AE.Mitchell . Influence of Cooking on Anthocyanins In BlackRice (Oryza sativa L.japonica var.SBR).J Agric Food Chem. 2009; 57:1908-1914.
28. HA .Moharram and MM Yousef: Methods of Determining the Antioxidant Activity- A Review . Alexandria Journal of Food Science and Technology 2014.11(1):31-42.