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RESEARCH ARTICLE

QUANTITATIVE ESTIMATION OF SOME ANTIOXIDANTS AND ANTI NUTRITIONAL CONTENT OF *GLINUSOPPOSITIFOLIUS*

Soumi Pal Choudhury[1] and Kazi Layla Khaled[2]

1. Research Scholar, Department of Home Science, University of Calcutta, Kolkata, West Bengal.
2. Associate Professor, Department of Home Science, University of Calcutta, Kolkata, West Bengal.

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Abstract

Glinusoppositifolius(L.)Aug.DC (Molluginaceae), known as gimashak and it contains linear toovate,opposite leaves and greenish flowers. (1).This study was performed to measure theantioxidants and anti nutritional contents of the aqueous paste of *Glinusoppositifolius*(ediblepart). Some of these phytochemicals are heat labile, and reduced after cooking .So all parameterswerealsomeasuredafterheattreatment.Resultshowedadifferencebetweentherawsampleandcookedsampleofthese allparameters.Studyfoundthatafterboilingtherewas17.74%,8.36%,8.8%,0.44%,60%,11.11%,52.17%,1.90%18.33%,4.34%and5.71%reductionoftotalphenol,flavonoid,DPPH(IC50),FRAPassay,totalalkaloid,oxalate,phytate,tannin,totalsaponin,steroidalsaponinandcardiac glycosidesrespectively.

Introduction:-

Gimashakisconsumed asleafyvegetablesby localpeopleofalltropicalcountry (2).Thisbitterleafyvegetableisknownas‘GimaShak’inWestBengal, Assam&Bangladesh(3).
*Glinusoppositifolius*areused for treatingjoint pain, inflammation, diarrhea ,Intestinalparasites,feverboils andskindisorders (4).Leaves of the *Glinusoppositifolius*(Linn)contain spergulagenic, spergulagenin A and a tri hydroxy ketone (5).A bioactive pecticpolysaccharideisolatedfrom*G.oppositifolius*is foundtopossessimmunomodulationproperty (6*).Glinusoppositifolius*isshowntoexhibitantioxidant(7),hepatoprotective(8)antidiabetic(9) andantihyperlipidemic(10)activity.
TaxonomicalClassification:(11)

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

Corresponding Author:- Soumi Pal Choudhury
Address**:-** Research Scholar, Department of Home Science, University of Calcutta, Kolkata, West Bengal.

It was identified and classified by Botanical Survey Of India, Kolkata,West Bengal
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Aims&Objectives:-

*Glinusoppositifolius*is a widely grown plant and available at a very low price. So poor peoplecan consume this leafy vegetable in their diet. Micronutrient deficiencies are a major healthproblem in our country among low income groups due to lack of food availability and poorpurchasing capacity.Previous research found that *Glinusoppositifolius*contains a good amountof 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 ofmicronutrientsandmacronutrients.Sotheobjective ofthisstudywastoquantifyofantioxidantsand antinutritionalfactorsof*Glinusoppositifolius*intheformnormallyhuman beingsconsumei.ethecookedform..

Materialsandmethods:-

- CollectionofSample*: Glinusoppositifolius*wascollectedfromSovabazarmarket,Kolkata,WestBengal,India.
- PreparationofSample:

Preparationofrawsample:FreshgimashakwascollectedfromSovabazarmarket,cleanedandwashed. 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 measuredamount of fresh drinking water for 30 minutes. Extraction procedure was done according to theguideline of the methods. For estimation of all phytochemicals and anti-nutritional factors, bothraw andcookedsamplewasused.

Withthisrawandcookedsampleallparameterswereobservedbythefollowingmethodswithfewmodifications:

1. EstimationofTotalphenolcontent(Barman K,2004method).(13)
2. EstimationofFlavonoidcontent(Changetal,2002method).(14)
3. EstimationofDPPHAntioxidantassay(Mensor et al,2001method).(15)
4. EstimationofFRAPassay(Benzieetal,1996method)(16)
5. EstimationofTotalalkaloid(Harbone.JB,1973method)(`17)
6. Estimationofoxalate(Onyemaetal,2016)(18)
7. Estimationofphytate(Ifemejeetal,2014method)(19)
8. Estimationoftannin(Saxenaetal,2013method)(20)
9. Estimationoftotalsaponin(Pasaribu etal,2014 method)(21)
10. Estimationofsteroidalsaponin(Singhetal,2015method)(22)
11. Estimationofcardiacglycosides(Onyemaetal,2016)(18)

Results:-

Table4.1:- Quantitative Estimation Result of Antioxidant andAntinutritionalParameters.

Sln o	**Parameters**	**Results**		**PercentageofReductionAfterCooking (%)**
		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.	Steroidalsaponin	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
StatisticalAnalysis:
CorrelationcoefficientwascalculatedasperPearson'sCoefficient.

Table 4. 2:- Correlation Coefficient of Antioxidant Activities of Total Phenolic Content(TPC),Flavonoid,DPPHradicalscavengingactivityandFRAPAssay(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 nutritionalParametersofCookedSample.

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) *Glinusoppositifolius*containsa better amount ofantioxidants 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 toreduceFe^{3+}-Fe^{2+}·(FRAP).TotalphenolcontentofcookedsampleandFRAPshowedagoodcorrelation..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 mainlyresponsible 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 andbreakdownofphenoliccompounds.(26)Flavonoidsarecommonly presentin ediblefruitsandvegetables.Itisaheatlabilecompound,sothe heatexposure duringcookingcaninfluencetheircontentin vegetables. Thermal treatment can affect both the extractability and bio accessibility of phytochemicalsbecause of the destruction of the cell wall in plant material. (27) Study found the highest correlationbetween (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.Thecorrelationdiscrepancies foundin literatureareexplainedonthebasisofdifferences in the interpretation of the results by individual methods. Antioxidant activity of a substancecan vary from method to method depending on factors such as oxidation state, antioxidant solubility, andmediumofpH..(28)Studyshowed, 60%,11.11%,52.17%,1.90%18.33%,4.34%and5.71% reduction oftotalalkaloid,oxalate,phytate,tannin,totalsaponin,steroidalsaponinandcardiac glycosidesrespectively after cooking. Total alkaloid and phytate content showed a significant reduction whereasoxalate 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 sensitivealkaloidandphytate.Fromthisstudyitmaybeconcludedthatconsumptionofcooked*Glinusoppositifolius*is goodforusbecauseofthesehighantioxidantcontent.Though heattreatmentreducestheantioxidant content but simultaneously heat can also reduce the antinutritional factors. Reductions oftheseantinutritionalfactorsarenecessaryasthesefactorscancausedeleteriouseffectsonhealth.

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Conflictsofinterest:
Therearenoconflictsofinterest.

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