VALUEADDEDMILLETIDLIINCORPORATEDWITH CURRYLEAF*(Murrayakoenigii)*

R.Subaratinam [1], Vigneashwari R A [2] , Keerthana P[3] ,PavithraJ[4]

[1] Assistant Professor, P.G.Department Of HomeScience - FoodScienceNutritionAndDietetics.,ShrimathiDevkunvar NanalalBhatt VaishnavCollege ForWomen, university of Madras ,Chennai ,TamilNadu ,india

[2] PG Student.,PG Department Of Home Science-Food Science Nutrition And Dietetics., ShrimathiDevkunvar Nanalal BhattVaishnav CollegeFor Women, University of Madras, Tamil Nadu India

[3] PG Student,PG Department Of Home Science-Food Science Nutrition And Dietetics., ShrimathiDevkunvar Nanalal BhattVaishnav CollegeFor Women , University of Madras, Tamil Nadu India

[4]

PG Student.,PG Department Of Home Science-Food Science Nutrition And Dietetics., ShrimathiDevkunvar Nanalal BhattVaishnavCollege ForWomen, University of Madras, Tamil Nadu India

ABSTRACT

Idliisanaturallyfermentedfood,whichwaspreparedusingdecorticatedblackgramdhalandparboiledrice.Thestudiesareconductedwiththereplacementofricewithsomeunderutilizedcerealslikemilletstoincreasethesourceofprotein,vitamins,minerals,dietaryfibreandessentialcarbohydrates.Themilletintroducedintheidliwasbarnyardmilletandfoxtailmilletandalsotheincorporationofcurryleaftoenhancethenutritionalstatus oftheidli.Twovariationsweredonebasedontheinclusionofbarnyardmillet(variation1)andfoxtailmillet(variation2).Usingninepointhedonicscalethesensoryevaluationwereperformedandthetreatments T2andT5werepreferredamong2variationsbythepanelistsanditwasnamed assampleAandB.Thephysicalcharacteristicsofthe grainwere estimated.Thephysicalparametersofbatter(pH)andidlisuchaswidth,diameter,thickness,inkprinttest,colourandtexturewereanalyzed.Thenutritionalcompositionforsample A-carbohydrate(16.7g),energy(167.1kcal),protein(23.2g),fat(0.76g), fiber(1.2g), calcium(1766mg), iron(34.53),vitaminA(455mcg),magnesium(2125mg),phosphorus(12.77mg)andsampleB-carbohydrate(11.7g),energy(180kcal),protein(29.97g),fat(1.3g),fiber(2.05g), calcium(1915mg), iron(58mg),vitaminA (445mcg),magnesium(1532mg),phosphorus(15.86mg)wereestimated.Inmicrobialanalysisthetotalbacteriaandtotalyeastandmouldcountwasseenforbothsample A(T2) andsampleB(T5).LowmicrobialvaluewasobservedinsampleBfollowedbysampleA.Theshelf-lifeoftheidliwasobservedforspecifichourintervalof0thhr,4thhr,8thhrand12thhr.Theincorporation of curry leaves powder in the idli batter increased the shelf-life at room temperature (30◦C) upto5 dayswithretentionof quality.Thusthevalueadded milletidliservesas anexcellentbreakfast.

Keywords:*Barnyardmillet,Foxtailmillet,Idli,Curryleaf,Fermented food*

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Correspondingauthoremail:subapgr@gmail.com

[1] INTRODUCTION

Fermented cereals, pulses, meat are consumed throughout the world as means of preservation byidentifying itstexture, flavor,aromain addition to their healthbenefits. Among all, idli isthe mostcommon traditional cereals-pulse base fermented breakfast product due to its characteristics like softtexture,mild pleasantflavor,aroma,easydigestible,andalso awell- knownhealthyandnutritionalbenefits ***(Monika Rani, 2019).*** The cereal replacement with nutritionally higher quality millets and otherfunctionalfoodscanprovideallessentialnutrients neededfor thebody***(VijayaVahini2018).***

This research pertaining to the study entitled **"VALUE ADDED MILLET IDLI INCORPORATEDWITHCURRYLEAF *(Murrayakoenigii)"***wasethicallyapproved(SDNBVC/HSC/IHEC/2019/01)and carried out to improve the nutrition and health profile of idli by both fermentation and the dehydrationprocessforthecurryleafincorporation toensure thenutritiveprofileaswellasahealthybreakfast.

Thecurrentresearchstudyhasbeenundertakenwiththefollowingobjectives:

- Toformulateavalueadded milletidliincorporatedwithcurry leaf***(Murrayakoenigii)***.
- Toassessthenutrientcomposition,microbialevaluationandshelflife oftheformulatedidli.

[2] Tostudytheorganolepticpropertiesofthecurryleafincorporatedmillet idliforsensoryevaluation.

METHODOLOGY

[2.1]PHYSICAL PROPERTIES OF

GRAINS[2.1.1]THOUSANDGRAI

NWEIGHTANDVOLUME

The method for estimating thousand grain weight and volume were adopted from the work done by***sharmaet.al, 2017***. One thousand gains are randomly selected and weighed using electronic balance withleast count 0.001g ***(Singh, 2010).*** The grains were cleaned, counted manually and weighted in grams usingan electric compact scale (SF-TS200). The volume of the thousand grains were selected and determined bywater displacementmethodwas noted inmilliliterusing measuringcylinder.

[2.1.2]BULKDENSITY

Bulk density of the sample is the mass of the sample which relates to the volume including the airincorporationpresentin it ***(Amidon,et.al,2017)***

[2.1.3]HYDRATIONCAPACITYANDINDEX

Hydration capacity is used to measure the amount of water absorbed by the selected grains. Theselectedgrainismeasuredthroughthousandgrainsandsoakedin100mlofwaterfor24hoursduration.After24hours thewaterisdrainedfromthegrainsandfoldedwithablottingpapertoremovetheexcesswaterpresentinit.Thenthe weightofthesoakedgrainwasmeasuredingramsusinganelectronicbalance

The term Hydration index this refers to the percentage of absorbed water by the soaked grains inwater ***(Reddy Madhavi, et al., 2019).*** Hydration index is calculated using the formula a given by ***(Kantha etal.,1986)***isfollowed;

$$\text{Hydrationindex} = \frac{\text{Hydrationcapacityper1000seeds}}{\text{Originaldryweight of1000 grain}} \times 100$$

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[2.1.4]SWELLINGCAPACITYANDINDEX

Theincreaseinvolumeofthesoakedthousandgrainsiscalledtheswellingcapacity*(ReddyMadhaviet al., 2019).*
Thetermswellingindexisusedtodeterminethewaterholdingandwaterabsorptioncapacityoftheselectedgrains.Swelling indexofgrainswas calculatedasdescribedby***Kanthaetal.,1986***usingtheformula.

$$\text{Swelling index} = \frac{\text{Swelling capacity per 1000 seeds}}{\text{Seed volume per 1000 seeds}} \times 100$$

[2.1.5]SIZE

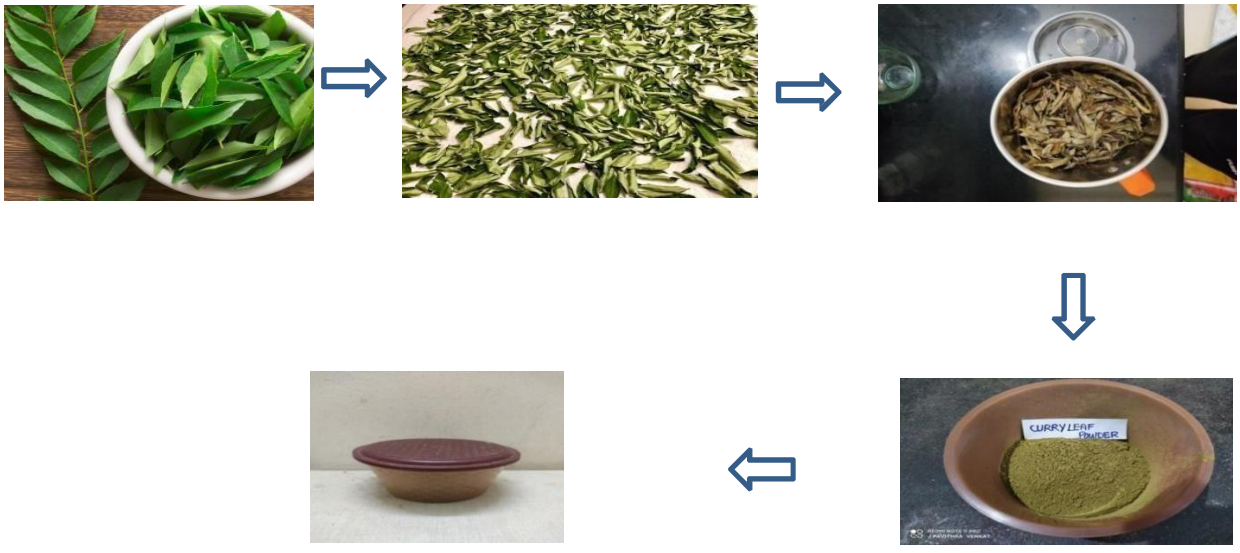
Theselectedingredientslength,widthandthicknesseremeasuredusingVerniercallipers.Thefiverandomlyselectedgrain wereexpressedhas meanvalue.

[2.2]PROCESSINGOFRAWMATERIALS ANDIDLI[2.2.1]RAWMATERIALS

The raw materials selected for this study were (a) polished rice (Oryza sativa-IR20), (b) decorticatedBlackGram(Vignamungo),(c)barnyardmillet,(d)foxtailmilletwereprocuredfromlocalmarket,Tambaram, Chennai. Curry leaf is procured from the own organic farmland, and it was dehydrated by sundrying and made into powder. All the materials were cleaned and free from crushed seeds, dust, and otherforeignmaterials beforeprocessing.

[2.2.2]PREPARATIONOFCURRYLEAFPOWDERBYDEHYDRATIONPROCESS

Figure1.PreparationOfCurryLeafPowderByDehydrationProcess



[2.2.3]PROCESSINGOFCONTROLIDLI

Themeasured70gofpolishedriceand30gofdecorticatedblackgramdhaliswashed2-3timesandit is allowed to soak for 4 hours. Ground the soaked rice and black gram in mixi by adding required quantityof residual water. Grinding time for rice is 8 minutes and for black gram dhal is 6 minutes. The control andcompositebatterareallowedtofermentfor14hours(overnight)anditwasincubatortemperaturemaintainedat30◦ C.Fermentedbatterwerethepouredintotheidlimouldofidlistandandsteamtheidlifor20minutesto getthefinal productas followedin ***Hemavathietal.,2017***isadopted.

[2.2.4]PREPARATIONOFVALUEADDEDMILLETIDLIINCORPORATEDWITHCURRYLEAF *(murrayakoenigii)*

Theprocuredrawmaterialsaremeasuredaccordingtotheratioforgiving6variationsofvalueadded millet idli incorporated with curry leaf. The measured ratios of raw materials are thoroughly washed3-4times and hence it is allowed soaking for 4-6 hrs. ***(Muragod et al., 2019).*** After that the soaked grains arewet grinded by adding adequate amount of waterand then it was kept for fermentation process (12 hrs.-overnight) ***(Sonawane et al., 2019)*** which is incubated at temperature maintained at 30◦c. The raise in thevolumeduetotheproductionoflacticacid,activefunctioningofnaturalfermentationcausingmicroorganism and the formation of carbon dioxide which will improves the texture and quality of the endproduct. The addition of curry leaf to the fermented Barnyard and foxtail millet batters in the following ratioas 5%, 10% and 15% ***(Uma et al., 2013)***. The steaming time for idli is about 15-20 minutes ***(Hemavathi etal.,2017).***

Table1.ProportionsofdifferentvariationsofValueaddedmilletidliincorporatedwithcurryleaf

INGREDIENTS	**VARIATIONI**			**VARIATIONII**		
	T1	**T2**	**T3**	**T4**	**T5**	**T6**
Barnyardmillet	70	70	70	-	-	-
Foxtailmillet	-	-	-	70	70	70
Blackgram dhal	30	30	30	30	30	30
Dehydrated curry leaf	5	10	15	5	10	15

The millet idli was formulated at two variations and of 3 different ratios each, totally 6 millet idli sampleswasprepared.VariationIisthecombinationofbarnyardmillet,decorticatedblackgramdhalanddehydrated curryleafpowderandvariationIIisFoxtailmillet,decorticatedblackgramdhalanddehydrated curryleafpowder.Thethreedifferentratiosare70:30:5,70:30:10and70:30:15areemployedinthepreparationofmill et idlisamples arestandardized

Figure2.Proportions ofdifferentvariationsofValueaddedmilletidliincorporatedwithcurry leafCONTROLIDLI

[2.3]PHYSICAL CHARECTERISTICS OF FERMENTED BATTER AND IDLI[2.3.1]BATTER

Thephysicalcharacteristicsofthebatterweredetermined undereach heading:

pH

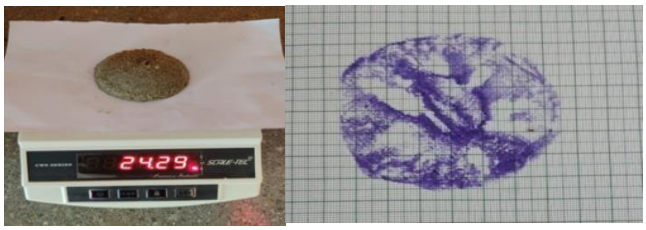
ThepHoftherawfermentedbatterwasdeterminedtoensuretheacidicvalueofthepreparedbatter. ThepHwasanalyzedusingthedigitalpHmeter***(NehaShrivastavaetal,2014)***availableinthedepartmentanalyticalla b.Theprocedurefortheanalysis ofpHis providedinthe appendix.

Figure3.DigitalpHMeter

[2.3.2]IDLI

Weight,width/diameter,volume,inkprinttest,colouranalysis(huntercolorimeter)andtextureanalysis(TextureAnalyzerTAXT2)wasdone.

Figure4.ElectricCompactScaleSF-TS200,InkPrintTest



[2.4]SENSORYANALYSIS

Sensory Analysis was carried out where5 non-trainedpanelists werea partof the study.Thepanelists belonged to the family of the researcher due to prevelance of the COVID-19 pandemic at the timeof the research. After the sensory evaluation the idli were ranked upon the acceptability and the likability ofthepanallist.Thedesirableparameterssuchascolour,appearance,texture,flavor,tasteandoverallacceptability are analyzed using 9 point hedonic scale ***(Mau et at., 2016).***Water was provided for rinsingbetween samples sensory analysis ***(Itthivadhanapong, 2015)***. The highly acceptable idli were further usedfordifferentqualityaspects.

Figure5.sensory evaluationofdifferenttreatmentsofidli

[2.5]PROXIMATEANALYSIS

The best acceptable idli was selected and determined the following aspects such as energy (AOAC2000), carbohydrates [Anthrone method (***Sadasivam and manikam,1996)***], [protein Microkjeldhal method***(Raghuramulu. Kalyanasundharam. Nair. 2003)***], fat ***(AOAC: Official method of analysis, 1965.***), fiber[Enzyme-gravimetricmethod(AOAC,1985)],iron,calcium[AtomicAbsorptionspectrometry***(Haswell.,1991)***]and Phosphorus ***(King,E.J., Biochemistry1932)***.

[2.6]SHELFLIFEANALYSIS

Storage quality is an important parameter influencing the utilization potential of any food commodityso the assessment of shelf life helps to provide suitable storage environment ***(Muragod et al., 2019).*** Thisanalysis is applied to the food, beverages, pharmaceutical drugs, chemicals or other perishable items. It isadvisory that the best before, mandatory use by (or) freshness date is required on the food packages.Shelf lifeis the period of time after the processing and packaging during which the food product maintains a minimumlevel of quality tolerable for the human consumption. In order to check the shelf-life of

the value added curryleafincorporatedmilletidli,thepreparedidliwerepackedinseparatecontainersandstoredatroomtemperaturefo raperiodof0th -2 day.

[2.7]MICROBIALANALYSIS

[2.7.1]Totalplatecount(TPC)

The total bacterial count (TBC) was done determined by the spread plate test technique ***(Hitching etal.,1995)***.

[2.7.2]Yeastandmoldscount

Total Yeast and Mold Counts (TYMC) are used to detect and quantify the amount of fungal growthandallowforidentificationofviableyeastandmoldspeciespresent.***(Hitchinget al.,1995).***

[2.8]COSTANALYSIS

The cost for each product is separately calculated. The food cost, labour cost, overhead cost andhidden costs are included under this analysis category. The cost analysis for the value added millet idli wasalso done to check its affordability to the common people. Per kilogram of millet idli was estimated throughthefollowing formula***(Vishal Kumar Jainet al.,2018)*****:**

Costofproduction (perkilogram) =CostA+CostB

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[1] RESULTSANDDISCUSSION

Proportionofdifferentvariationofvalueaddedmillet idliincorporatedwithcurry leaf

Table2.Proportionofdifferentvariationofvalueaddedmilletidliincorporatedwithcurryleaf

Ingredients	**VariationI**			**VariationII**		
	T1	**T2**	**T3**	**T4**	**T5**	**T6**
Barnyardmillet(g)	70	70	70	-	-	-
Foxtailmillet(g)	-	-	-	70	70	70
Blackgram dhal(g)	30	30	30	30	30	30
Dehydratedcurryleaf powder(g)	5	10	15	5	10	15
Total	105	110	115	105	110	115

Thetwosamples(T2and T5) wereselectedon thebasis ofoverall acceptabilityscore.The sample**T2** and**T5**wererenamed as**SampleA**and**B**.They weretakenforfurtheranalysis.

Table3.PhysicalPropertiesOf MilletsAndBlackGramDhal

Sl.No	Physicalproperties		Barnyard Millet	Foxtail Millet	Blackgram dhal
1	Thousandgrain weight(g)		4.16±0.20	4.22±0.30	33.55±0.41
2	Thousandgrainvolume(ml)		4.14±0.02	6.22±0.01	38.71±0.02
3	Bulkdensity(g/ml)		0.99±0.04	0.67±0.04	0.86±0.01
4	Hydrationcapacity(g)		0.49±0.02	0.68±0.04	0.89±0.09
5	Hydrationindex		20.02±0.01	17.76±0.58	24.09±1.04.
6	Swellingcapacity(ml)		0.71±0.05	0.2±0.04	1.23±0.10.
7	Swellingindex		35±0.03	3.33±0.45	55±0.62
8	Size	Length	0.34±0.16	0.46±0.05	0.78±0.17
		Thickness	0.22±0.08	0.38±0.08	0.52±0.44

Thevaluesareobtainedinthetriplicateandrepresentedas Mean±Standarddeviation

Table4.pHofthebatteratdifferentintervalsduringfermentation

Hour	pHofthebatter	
	SampleA	SampleB
0^{th}hr.	7.3	6.59
4^{th}hr.	6.43	5.98
8^{th}hr	5.36	5.32
12^{th}hr.	4.81	4.74

The pH of the raw fermented batter was determined to ensure the acidic value of the preparedbatter and it was analyzed using the digital pH meter ***(Neha Shrivastava et al, 2014)***. ***Nazni, P (2010)***,evaluated the pH of the idli made with pearl millet was 5.35 which is similar to the present study of pHat8^{th}hourofbatterfermention.

Table5.PhysicalpropertiesofIdli

Sample	Weight	Width/diameter	Volume	Thickness
SampleA	26.13±0.25	2.7±0.26	25.62±0.47	5.6±0.06
SampleB	25.28±0.02	2.8±0.05	25.54±0.01	5.8±0.23

The weight of the both sample A (26.13±0.25) and B (25.28±0.02) millet idli is similar withslight differences.**Hadimani etal. 2016** showsthe weightof theidli rangesfrom22-27g whichseems to be average size. Hence it is clear that the weight of the value added millet idli of the presentstudyis nearly betweenthereferenceranges.

Table6.InkPrintTestFortheIdli

Inkprinttest	Sample1	Sample2
Numberofporesper squarecentimeter	17.6±0.05	19.3±0.21

The ink print test value given in the study of formulation of pearl millet idli by ***M. H. Badau et al.,2002*** is slightly lower than the present study value ranges differs from 12- 17 number of pores per squarecentimeter in graph sheets.

Table7.TPAofControlandMurrayakoenigiileavesincorporatedidli

Parameters	Control	SampleA	SampleB	p-value
Hardness(N)	18.54±1.10	21.10±1.25	21.34±1.53	0.053*
Adhesiveness (mg/sec)	-41.45±1.62	-1.10±0.19	-0.46±0.16	0.435NS
Springiness	0.57±2.54	1.36±0.31	1.18±0.31	0.428NS
Cohesiveness	0.76±0.12	0.90±0.03	0.89±0.04	0.191NS
Chewiness	1185.87±51.16	1996.15±653.52	2336.71±914.44	0.002*
Resilience	0.37±0.01	0.63±0.03	0.52±0.02	0.133*

Valuesarethemean±standarddeviation.*Significantlydifferent(p<0.05), NS-notsignificant.

The alterations in texture among the samples during the fermentation may be due to the production ofacids and CO2 by the microorganisms as well as particle size variation of the ingredients ***(Chelliah etal.,2016).***

Table8.ColourAnalysisFor Idli

Sample	L*	a*	b*
Controlidli,T0	48.91±0.04	0.20±0.15	11.36±0.07
SampleT2	54.99±0.21	0.43±0.04	14.90±0.24
SampleT5	53.7±0.06	0.36±0.14	13.76±0.07

L*-Lightness,a*-Redness, b*-Blueness

The control and commercial idli showed similar colour characteristics with slight differencewhile curry leaves idli showed variation in L*, a*, and b* values due to the addition of curry leafpowder. The lightness value increased from 48.91 to 54.99 and 53.7 indicating a darker coloured batterwithlight greenish tinge.

Table9. SensoryAnalysisOfIdli

Treatments	Colour	Flavour	Texture	Appearance	Taste	OverallAcceptability
T0	9.5±0.78	8.08±0.78	8±0.60	8.65±0.68	9.1±0.62	8.55±0.35
T1	8.5±0.51	7.05±0.68	7.45±0.60	8.65±0.48	7.1±0.78	7.55±0.25
T2	8.4±0.59	8.35±0.67	8.5±0.51	8.45±0.51	8.7±0.47	8.48±0.28
T3	8±0.56	7.05±0.75	7.65±0.81	7.5±0.60	7.05±0.75	7.25±0.21
T4	8.35±0.74	7.05±1.14	8.2±0.95	7.15±0.67	6.25±0.44	7±0.34
T5	8.25±0.55	8.36±0.60	8.25±0.63	8.15±0.67	8.1±0.64	8.26±0.27
T6	8.5±0.60	8.36±0.72	7.2±1.10	7.3±0.57	6.7±0.80	7.34±0.41

Sensory Analysis was carried out where 5 non-trained panelists were a part of the study. The panelistsbelonged to the family of the researcher due to prevelance of the COVID-19 pandemic at the time of theresearch. After the sensory evaluation the idli were ranked upon the acceptability and the likability of thepanellist. The freshly prepared idli assessed for sensory attributes such as appearance, colour, flavour,texture, aroma and over all acceptability using 9 – point hedonic scale. Sensory score of control idli washighly followed by samples T2 and T5. The best acceptable idli samples were analysed further andcomparedwith control idli.

Figure6.sensoryscoreoftheidli's

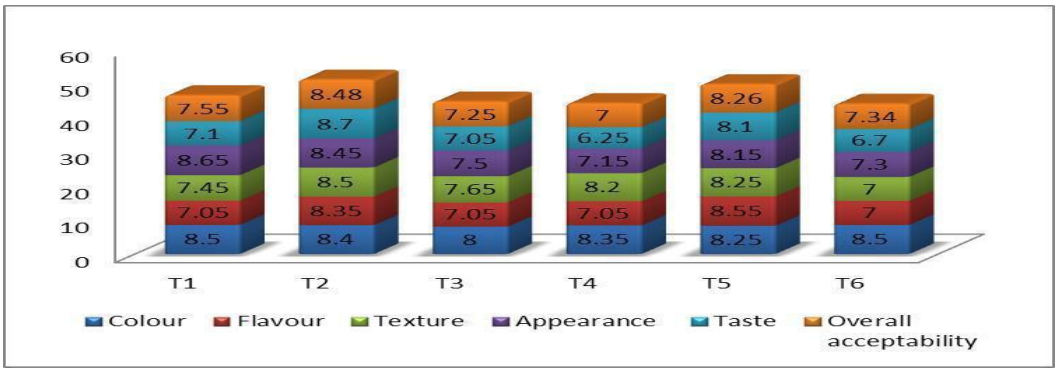


Table10.Nutrient Analysis(Content per100g) ofidli

S.NO	Properties	Control	SampleA	SampleB
1	Energy(kcal)	280.6±5.13	167.1±0.57	180±0.05
2	Carbohydrates(g)	17.13±0.1	16.77±0.01	11.77±0.01
3	Protein(g)	12.07±0.54	23.22±0.01	29.97±0.005
4	Fat(g)	1.26±0.51	0.765±0.7	1.33±0.003
5	Fibre(g)	1.42±0.01	1.22±0.05	2.05±0.005
6	Ash(%)	0.21±0.09	1.36±0.03	1.46±0.005
7	Moisture(%)	66±0.3	54.54±0.05	54.99±0.005
8	Calcium(mg)	26.5±0.07	1766.6±0.05	1915.76±0.05
9	Iron(mg)	6.12±0.2	34.53±0.05	58.34±0.005
10	VitaminA(mcg)	-	455.7±0.05	445.83±0.05
11	Magnesium(mg)	-	2125.7±0.1	1532±0.05
12	Phosphorous(mg)	-	12.77±0.01	15.86±0.12

The developed product assessed for nutritive value such as energy, protein, fat, carbohydrates, ash,dietary fibre, moisture, iron and calcium, vitamin A, magnesium and phosphorous. The energycontent of idli T0, T2 and T5 was 250.6 kcal, 167.1 kcal and 180 kcal respectively. ***Kannan et al.,(2015*)** reported that the carbohydrate content of the curry leaf incorporated rice and dhal idli was20.32gwhichisslightlyhigherthanthecontrolandcurryleafpowderaddedbarnyardmilletidliofthepresentstudy.

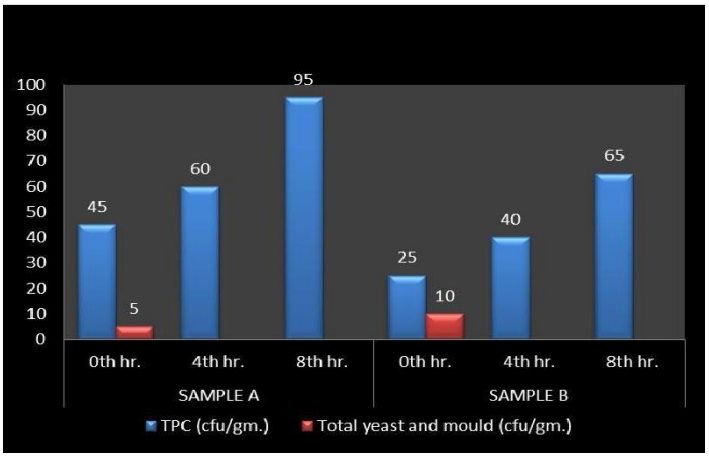
The value addedmillet idli contain sufficientamount of proteinrangesfrom 23 grams to30 grams. Idli T5 (sample B) contain high grams of protein when compare to other samples.Thecontrol value is similar to ***Uma Maheswari et al., 2013*.** Higher content of moisture was observedincontrolsamplewhencomparedtoexperimentalidli.Themoisturecontentofcontrolidliwas66 %w/w.Ashcontent washighinexperimentalsampleT5(sampleB).

Thecarbohydratecontentofthedevelopedproductwaslowwhencomparetoidlideveloped in other studies with slight difference. The carbohydrate content of the developedproductwas16.77grams(T2),11.77grams(T5).Thecarbohydratecontentofcontrolidliwas 17.13 grams. The calcium content of the developed product was 1766.6 milli grams (T2), 1915.76milligrams(T5)and26.5milligrams(T0).

Iron content of the developed product was 34.53 milli grams (T2) and 58.34 milli grams(T5). The iron content of the control idli T0 contain 6.12 milli grams. Over all nutritive value washigh in sample T5 (70:30:10). The nutritive value of experimental idli was high when compare tocontrolidli.

Figure7.microbialanalysisoftheidli's

Treatment / Microbes	SAMPLE A (cfu/gm.)			SAMPLE B (cfu/gm.)		
	0^{th} hr.	4^{th} hr.	8^{th} hr.	0^{th} hr.	4^{th} hr.	8^{th} hr.
Total bacterial count (cfu/gm.)	45 cfu/gm.	60 cfu/gm.	95 cfu/gm.	25 cfu/gm.	40 cfu/gm.	65 Cfu/gm.
Total yeast and mould count (cfu /gm.)	5 cfu/gm.	-	-	10 Cfu/gm	-	-



Microbial analysis such as TBC (total bacterial count) and YMC (yeast and mould count) wascarried out for the following samples T2 and T5. Low microbial value was observed in sample T5followedby sampleT2.

SHELFLIFEANALYSIS

Theshelf-lifeoftheidliwasobservedforspecifichourintervalof0^{th}hr,4^{th}hr,8^{th}hrand12^{th}hr. The incorporation of curry leaves powder in the idli batter increased the shelf-life at roomtemperature (30◦C)up to5 dayswith retentionofquality.

But the curry leaves powder added idli didn't extend its shelf-life unless it is refrigerated. Storage ofidlibatters wasdoneat two temperatures30 and 40◦C***(R. Chelliahetal., 2016)***.

0th Hour - All the three variations are good including control idli, based on the few aspects likecolour,texture,flavourandappearance.

4^{th} Hour - During 1st hour of evaluation, colour, flavour, texture and appearance of the idli was goodin condition and was in desirable state. Sample A has much more desirable aspects of the idli whencomparedtocontroland SampleB.

8^{th}Hour – At 8^{th}hour, all three treatments (control, Sample A, Sample B) shows slight changes incolour,flavour,textureandappearanceandfungal growth wasvisible.

12^{th} Hour – At 12^{th} hour, all three samples showed deterioration in their texture, flavor, appearanceand taste. The colour of the idli became slightly faded from the desirable condition and the flavour ofthe idli as fully altered. Fungal growth was seen visibly. On examining the sample under electronmicroscope,Blackmouldwasseen.TheBlack mould wasobservedat 10x.

Kannan et al. (2015) employed a new method by adding Murraya koeniggii (curry leaves) to idlibatter for increasing its shelf life. The curry leaf added idli shelf life only extends up 6 hours. But itsbatter has extended shelf life. The researchers said that the curry leaf powder increased the shelf lifeand also increased the texture, flavor, and appearance of the idli. Thus the calcium content was 10timesmorethan thatofnormal idli,eventhedietaryfiberincreased upto 18%.Table11.CostAnalysis

ITEMS	COST
SAMPLEA	Rs.5/idli
SAMPLEB	Rs.5/idli

The cost of the value added millet idli was low when compared to idli available in food serviceestablishments. The cost of the idli was Rs. 5 which weighs 26 grams approximately. The cost obtainedincludeslabourchargesas well as electricity cost.

[2] CONCLUSION

The developed value added millet idli with the incorporation of dehydrated curry leaf powder hashigh acceptancy score. It also contains sufficient amount of nutrient when compare to control idli. Thedevelopedproductcontainslowenergyandcarbohydratessoitcanbesuggestedtotheobeseindividualswhot endtofollowlowcaloriediet.Thedevelopedproductonlycontainsnaturalandorganic greenish colour due to the addition of dehydrated curry leaf powder but it doesn‘t contain anyartificial food colour or artificial preservative. Idli T2 has 167.1 kcal, 23.22g of protein, 0.765g of fat,1.22g of dietary fibre, 16.77g of carbohydrates, 1.36% of ash, 54.54 % w/w of moisture, 1766.6 mg ofcalcium, 34.53g of iron, 455mcg of vitamin A, 2125.7 mg of magnesium and 12.77 mg of phosphorous.Whereas idli T5 contain 180 kcal, 29.97g of protein, 1.33g of fat, 12.05g of dietary fibre, 11.77g ofcarbohydrates, 1.46% of ash, 54.99 % w/w of moisture, 1915.76 mg of calcium, 58.34g of iron, 445.83mcg of vitamin A, 1532 mg of magnesium and 15.86 mg of phosphorous. The cost of the developedproductwasRs.5whichislowwhencomparetotheidliwhichareavailableinfoodserviceestablishme nts.Itcanbeconcluded thatthevalueaddition ofmilletidliservesas anexcellentbreakfast.

ORCHID ID : SUBARATINAM R

0000-0001-6870-933X

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