RESEARCH ARTICLE

GI ANALYSIS OF BISCUIT.

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Manuscript Info	*Abstract*
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Manuscript History	The current food habits with junk foods & unhealthy snacks looks very much suitable for dynamic business life but on other side it possess a critical danger to the health by being an cause of multiple disease like Obesity, Diabetics, Heart disease,etc ,the better way to control & take of our health is to focus on Healthy foods which has Low GI rating
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The objective of this research is to design a low GI biscuit suitable for all age group.

The GI analysis demonstrates that the high fibers added to biscuits had benefits to its consumers. It increase dietary fiber intake and reduce the glycemic index value of the biscuit, moreover it act as prebiotic to the gut microflora.

The GI analysis shows the biscuit with more fibers rather than only wheat flour has very low GI of 40.96 when compare to 63.25 for the control

Hence low GI biscuits can be suitable for all age groups and can be seen as a Healthy alternative for junk foods especially to school going kids.

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Introduction:-
The glycaemic index (GI) is defined as "the incremental area under the blood glucose curve following ingestion of a test food, expressed as a percentage of the corresponding area following an equivalent load of a reference carbohydrate, either glucose or white-wheat bread".

The glycemic index (GI) is the value which will help us to classify the foods according to their glycemic response. It measures the blood-glucose-raising ability of the available carbohydrate in foods. The principle is that the slower the rate of carbohydrate absorption, the lower the rise of blood glucose level and the lower the GI value. As per WHO guidelines GI value of ≥ 70 is considered high, a GI value 56-69 inclusive is medium and a GI value ≤ 55 is low, where glucose = 100.

The biscuit formulation is done by selecting the fine ingredient which will contribute to the low Glycemic Index of the biscuit, the low GI biscuit recipe includes Inulin, Polydextrose, Ragi, Oats fiber, even though Ragi is the food ingredient which comes under High GI rating it is used for its fiber content which will help to slowly release the glucose into blood stream.

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Objective And Scope
The Major outcome will be achieving obtaining the low GI product by critical selection of raw materials or ingredient ,proper formulation and through continues trial, The Low GI biscuit will release the glucose into the blood stream in a very control as well as in a slow and study way so that there won't be any spike in the glucose in the blood stream once the biscuit is consumed, This will help us to prevent any health issue or Diabetic kind of any hereditary disease and it help us to create a healthy society.

Objective:
To analysis GI of Biscuit

Scope:
Low GI Biscuit will be helpful to maintain healthier life and will be very much beneficial for Diabetic population

Materials And Methods:-
3.1 Experimental Location:
Mumbai Andheri East **-** Bakery Unit

3.2 Materials Required For Making Low GI Biscuit:
Wheat flour, Polydextrose, Sucralose, Wheat bran, Oats fibre , Inulin, Palm oil, Salt, Sodium Bicarbonate ,Ammonium Bicarbonate,Water

3.3 Materials Required For Analyzing GI:
Electromagnetic sieve shaker, Water bath,   Fibertech flasks, Standard flasks-100ml, Pipettes1ml,2ml,5ml,10ml , Measuring Cylinder, Centrifuge tubes.

3.4 Particle Size Separation:
The biscuit powder was broken into 3 different sizes, namely 500μm, 355 μm, 250 μm respectively with the help of Electromagnetic Sieve Shaker.

3.5 Chemicals and Reagents:
- 0.05N Hydrochloric Acid
- 0.5 M Sodium Acetate
- 66% Ethyl Alcohol

Sample Preparation:
The Food Test sample should be of uniform size for Glycemic Index analysis. The sample can also be sieved to get even particle size.

3.6 Enzymes and their preparation:
Enzymes Used:
- Pepsin from porcine gastric mucosa
- Pancreatin from porcine gastric mucosa
- Invertase from Saccharomyces cerevisiae
- Amyloglucosidase from Aspergillus Niger.

Enzyme Preparation:
Pepsin:
0.25g of Pepsin in 25ml of 0.05N Hydrochloric acid.
Pancreatin:
1gm of Pancreatin in 6.5ml of distilled water
Invertase and Amyloglucosidase:
Readily available

Methodology:
3.7 Estimation of Glycemic Index by Invitro Englyst et al method.

Procedure:
1. The sample of uniform size is measured such that the content contains 0.5gms of Carbohydrate.
2. The sample is initially digested with Pepsin in Fibertech flasks for 30 minutes at temperature of 37 °C
3. The pH is brought to 5.2 by adding 5ml of 0.5M of Sodium Acetate
4. The sample is then subjected to the digestion of Pancreatin and Amuloglucosidase, followed by Invertase
5.Immediately after adding the enzyme, 1 ml of aliquot from the Fibertech flasks are transferred to 2ml of 66% ethanol containing 100ml standard Flasks. The sample is made upto 100ml with distilled water . This will be "G0 sample" i.e , the sample withdrawn at 0th minute.
6.The same procedure was repeated at 20th, 60th, 100th and 140th minute respectively.
Where, G20 is RAG i.e Rapidly Available Glucose
G140 is SAG i.e Slowly Available Glucose
7. The released glucose will be analyzed by the DNSA Reagent method and the Glycemic Index values at the 0th , 20th, 60th, 100th and 140th minute were calculated as standardized.

Results and Discussion:-
Table 4.1: Glycemic Index of biscuit powder at different particle sizes
G0 – Sample collected immediately after adding enzymes
G20- RAG (Rapidly Available Glucose) - sample Collected after 20 minutes
G60- Sample Collected after 60 minutes
G100- Sample Collected after 100 minutes
G140- SAG (Slowly Available Glucose) - sample Collected after 140 minutes (The above data applicable for all the following tables

Table 4.1:- GI analysis of

S.no	G0	G20	G60	G100	G140
500 μm	20.25	28.12	40.25	52.24	63.25
355μm	26.39	37.45	44.87	57.87	67.21
250 μm	35.41	43.14	49.35	62.01	75.24

Table 4.2:- GI analysis of Low GI Biscuit

S.no	G0	G20	G60	G100	G140
500 μm	6.69	11.51	21.65	36.62	40.96
355μm	9.54	13.19	26.79	44.32	42.62
250 μm	10.06	19.14	39.35	44.01	51.99

Discussion:-
Baking has a detrimental influence on the starch digestibility which might be due to the transglycosidation reactions. These chemical alterations of starch takes place under conditions like baking at temperature at 240C leading to formation of atypical glycosidic bonds and the concomitant reduction in amyloytic susceptibility resulting in formation of Resistant Starch.

Cooking increases the degree of Starch gelatinization and its susceptibility to enzymatic digestion.

The influence of food processing and cooking on glycaemic response is well documented. Treatments incorporating the generation of forces such as shearing, compression and extreme heat treatment increase gelatinization, which results in the breakdown of the starch granule. Thus, many processing conditions lead to an increased susceptibility of the starch

The fibre contribute to a low GI than control samples, this may be due to the presence of Inlulin, Polydextrose, Maltitol & Wheat bran which is present in the Low GI biscuit

Conclusion:-

Thus addition of easily available fibres like Wheat bran, Oats fibre to the recipe of Biscuits contribute to the slow release of glucose into the blood stream ,apart from the fibres the addition of pre biotic foods like Inulin, Maltitol & Polydextrose make the product rich in Nutrition as a not only Low GI product but also a prebiotic foods

The GI analysis shows the biscuit with more fibers rather than only wheat flour has very low GI of 40.96 when compare to 63.25 for the control

Hence low GI biscuits can be suitable for all age groups and can be seen as an Healthy snack for the school going kids rather than the Junk food

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