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Safe use of Wheat Flour by Knowing Gluten Content

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Abstract: *There is greater demand for fast food in the form of noodles, pasta, pizza, bread, etc. in younger generation. Wheat is a staple food of many Indians. Wheat flour is the main ingredient of fast food products. The main contents of wheat are proteins and carbohydrates. Gluten is the protein part of wheat flour which gives elasticity and strength to dough. Wheat with high gluten content is preferred by many food industries however gluten is responsible for digestive discomfort and also found to be allergic, under such circumstances it is necessary for us to select wheat with less percentage of gluten for consumption. Hence in present study wheat flour gluten was analysed and the quantification of gluten was done by calculating wet gluten, dry gluten. The gluten index is also studied by using biochemical test (Folin-Lowry method). In all six local varieties of wheat were analyzed for gluten content, and out of them many showed high gluten content. Present study gives an idea to select the variety of wheat to be used for consumption.*

Keywords: Gluten, Wheat flour, Folin-Lawry's Method, Celiac disease.

I. INTRODUCTION

Worldwide wheat is commonly consumed cereal grains. It belongs to a type of grass (*Triticum*) that is grown in many varieties globally. Wheat is widely disputed due to its protein contents. Gluten is a major protein present in wheat. The word gluten is gluey substance it is a high-molecular-weight seed storage protein. Gluten is composed of two types of proteins, called gliadin and glutenin. Glutenin proteins are long chains. It is responsible for the elasticity of dough. Gliadin proteins are short and globular. It is responsible for the dough's extensibility. Due to these properties of proteins wheat flour forms viscoelastic dough when mixed with water (1). The rubbery mass that remains when wheat dough is washed to remove starch and water soluble elements. Therefore, high gluten wheat is ideal for many food manufacturing industries. Gluten is responsible for many harmful impacts such as, mild (fatigue, bloating, alternating constipation and diarrhoea) to severe (unintentional weight loss, malnutrition, intestinal damage) as seen in the autoimmune disorder celiac disease(CD)(2). Gluten-free diet is the only treatment for CD detected patients. Ingestion of gluten in these genetically susceptible patients results in a T-cell-mediated immune reaction, which affects the loss of villi and shows clinical symptoms. Excluding gluten inhibits this response (4). After eating a meal many people can feel fatigue is a sign of gluten intolerance becausegluten can prevent the proper absorption of nutrients. Due to this, different body organs of the body do not get nourishment as per their requirement. (5)

II. MATERIAL AND METHOD

Total eight samples were used out of which six wheat varieties are popularly used in Maharashtra viz. Ajit, 2189,Shivor,Sharbati,MP Shivor, MP Shivor Gold, Flour of these wheat varieties were used to make dough.

2.1 Dough Process

100 g wheat flour was combined with 68 ml of water in a porcelain dish to make stiff dough, ensuring no material adheres to the porcelain dish. The dough was then left to stand in water at room temperature for 1 Hour. While holding the dough under a gentle flow of tap water, it was softly kneaded so that any starch and soluble matter available in the dough could filter through a muslin cloth. Any gluten which may be removed during this process could be collected on the blotting cloth and recombined into the dough (6).

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2.2 Gluten Extraction

The gluten extraction was carried out adopting the procedure as described in (7). Dough was prepared by using 2 % sodium chloride solution. Prepared dough was kept immersed in water for 40 minutes. The dough was washed under a stream of running water until most of the starch was washed out and the wash water was clear. The viscoelastic mass obtained was wet gluten. Added salt tightens up the gluten.

2.3 Wet Gluten Yield and Gluten Index

Wet gluten yield was determined from the gluten retained after washing the dough, glutenwas collected and weighed. The wet gluten yield was calculated by using the formula

Wet gluten yield = weight of wet gluten obtained *100 / weight of flour

2.4 Dry Gluten Yield

The dry gluten yield was determined by drying wet gluten in the oven dryer for 24 h and dry yield was calculated.

Dry gluten yield = weight of dry gluten obtained *100 / weight of flour

2.5 Gluten Drying

Extracted gluten was dried using an oven drying method The gluten was oven dried at 105 °C for 2 hrs. Dried gluten samples were powdered mortar and pestle (8).

20mg of gluten powder and 10ml phosphate buffer were mixed well. The mixture was Centrifuged at 4000rpm for 10min. The same procedure was repeated to get the clear supernatant. Thus, 20ml of supernatant liquid was collected.

2.6 Gluten Estimation by Folin- Lowry's Method

Sr. No	Volume of working solution (ml)	Conc.in µg	Volume of distilled water (ml)	Alkaline Copper Solution		FCR	
1	0	0	1	5		0.5	
2	0.2	40	0.8	5		0.5	
3	0.4	80	0.6	5		0.5	
4	0.6	120	0.4	5		0.5	
5	0.8	160	0.2	5		0.5	Incubated for 30 minutes at room temperature in dark and Measure OD at 660nm
6	1.0	200	0	5		0.5	
7	Ajit	139	0.5	5	Allowed it to stand for 10 minutes	0.5	
8	2189	89	0.5	5		0.5	
9	Shivor	164	0.5	5		0.5	
10	Sharbati	50	0.5	5		0.5	
11	MP shivor	40	0.5	5		0.5	
12	MP shivor Gold	90	0.5	5		0.5	

Table 1 Estimation of protein concentration

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Estimation of moisture: Moisture was calculated by using following formula (8)

Moisture percent=(W1-W2) X 100/W1

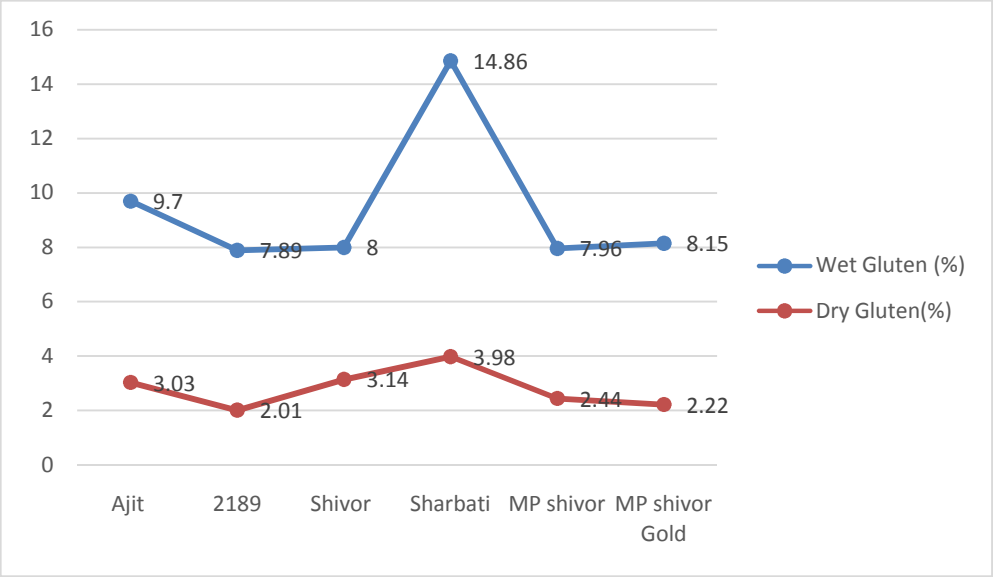
W1: Weight of Wet Gluten

W2: Weight of Dry Gluten

III. RESULTS

3.1 Wet and Dry Gluten Yield

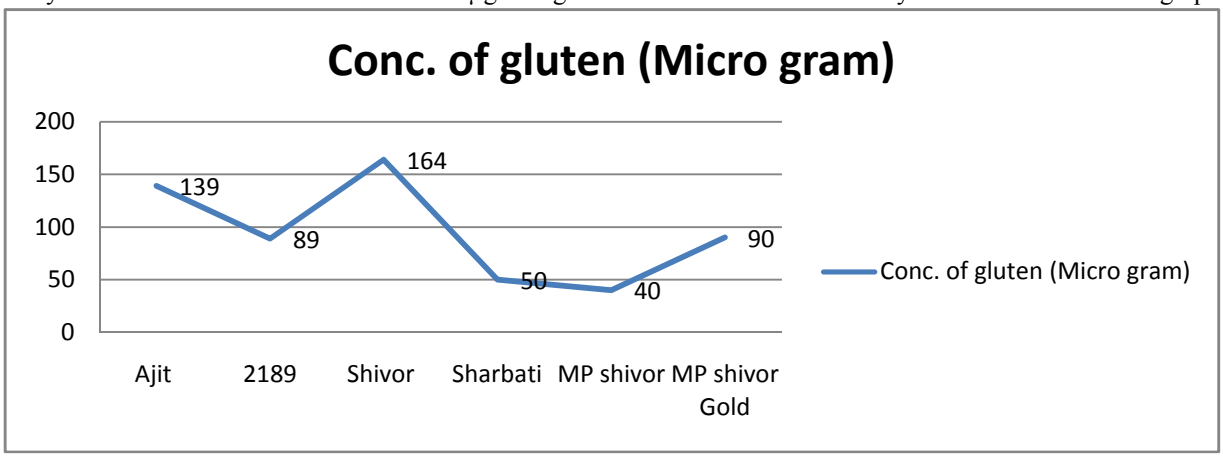
The wet and dry gluten yield of different wheat varieties ranged between 14.86% to 7.89 % and to 3.98 % to 2.01 % respectively. The variety of wheat Sharbati and variety Ajit showed highest wet and dry gluten content whereas variety 2189 and MP Shivorshowed lowest wet and dry gluten content (graph 1).



Graph 1: Comparison between Wet and Dry Gluten content

3.2 Gluten Estimation

Gluten was estimated by Faulin Lowry Protein Estimation Method. The highest gluten content 164 µgm was found in variety Sharbati and lowest concentration 40 µgm of gluten in MP Shivor local variety of wheat as showed in graph 2



Graph 2: Estimation of gluten concentration

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3.3 Estimation of Moisture

The result shows that variety 2189 was having highest moisture content 74.52% while MP Shivor shows 39.34 % low moisture content.

Sr. No.	Variety	Percent Moisture (%)
1	**Ajit**	**68.76**
2	**2189**	**74.52**
3	**Shivor**	**60.75**
4	**Sharbati**	**73.21**
5	**MP Shivor**	**39.34**
6	**MP shivor Gold**	**72.76**

Table 2: Estimation of moisture content

IV. CONCLUSION

The present study focuses on the gluten content present in various varieties of wheat which are regularly used in daily diet in the form of wheat flour. People don't know the amount of gluten they ingest. The study will alarm us in the consumption of gluten content, otherwise excess and daily consumption of gluten may cause digestive disorders. The results of our study may guide the society to select the wheat variety with less gluten content.

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