

# Let Food be your Medicine and Medicine Be Your Food: A Step Forward for Celiac Disease Cases

## Short Communication

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## Introduction

The age old adage of iceberg phenomenon applies aptly to Celiac Disease (CD) which often remains under diagnosed in our OPDs. Recent studies on prevalence of this menace has documented that the burden is progressively on the rise. Epidemiologically, the disease follows a specific place distribution with higher burden in Northern parts of the country the so called “celiac belt” than southern part [1,2]. The disease has commonly been reported from states of Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, Bihar and Madhya Pradesh. This can be ascribed to both due to wheat consumption as staple in these states and the population possessing haplotypes necessary for celiac disease to develop. As far as the age distribution is concerned the disease was thought to affect more children than adults [3,4]. On the other hand some studies in US have highlighted increased prevalence of CD in elderly [5,6]. About 6-8 million Indians are estimated to have CD. Since, many cases of CD remain undetected in the country; it clearly indicates the number is still underestimated to some degree. Diagnosis of CD involves case identification through history taking, screening tests and confirmatory tests. Makharia et al. in their prevalence study in national capital region applied this three step clinical/serological screening procedure and reported the prevalence of CD to be 1.04% (1 in 96) and of positive anti-transglutaminase antibodies (anti-Ttg) to be 1.44% (1 in 69) [7]. In another study, a questionnaire based survey was carried where out of 4347 children (3-17 years) from Ludhiana; the prevalence was 1 in 310 [8]. However routinely in OPDs only those with typical clinical symptoms with or without family history get the required attention whereas those with milder symptoms failed to get screened [9]. Another dilemma with

screening tests is that the kits for these tests are not manufactured in India and are imported from Europe. The positive predictive value of these tests which is based on the prevalence of disease in Europe doesn't apply to India population [10].

## Understanding the basics: What is Gluten?

Hippocrates said ‘all disease begins in the gut’. This applies strongly to gluten in wheat, barley and rye which can gradually erode the villi of small intestine, prohibiting body from absorbing nutrients from food. Gluten is the collective term used to describe storage proteins in grains - wheat (gliadin), barley (hordein) and rye (secalin). The protein content of wheat varies between 8% and 17% depending on the genetic makeup and external factors associated with the crop. When wheat flour is mixed with water, the insoluble protein fraction forms a viscoelastic protein mass called the Gluten [11]. Actually, the name gluten is derived from these glue-like properties. Gluten which comprises 78 to 85% of the total wheat protein is a very large complex mainly composed of polymeric & monomeric proteins. Gluten is classified into two main fractions according to its solubility in aqueous alcohol, the soluble *Gliadin* and the insoluble Glutenins. The *Gliadins* have high protein and glutamine content. Some humans essentially lack endo peptidases to cleave bonds between proline & glutamines. This incomplete digestion of *Gliadin* by digestive tract enzyme leads to generation of many polypeptides which are immunogenic to patients genetically susceptible to CD. Some patients who don't develop CD do manifest gluten sensitivity called as non celiac gluten sensitivity or present as irritable bowel syndrome [12,13].

Gluten intake varies from population to population and depends upon dietary practices. Wheat is the staple cereal in the northern

parts of the country and flat bread (*chapati/ roti*) made from wheat flour is one of the most important constituents of almost every meal. A typical North Indian diet where flat bread is the usual meal contains about 25-30 gm of gluten/day.

### The Panacea: Gluten Free Diet

Presently, the only treatment for celiac disease is a strict exclusion of gluten sources including wheat, rye, barley and their hybridized forms from the diet [14,15]. The absence of Gluten in natural and processed foods represents a key aspect of the Gluten Free Diet (GFD). In 2000 the Codex Alimentarius and FAO described Gluten Free foods with Gluten level not exceeding 20 ppm and consisting of or made only from ingredients which do not contain any prolamines from wheat or any triticum species such as rye, barley and oats. The northern part of our country with wheat as the preferred cereal of consumption poses a challenge in terms of compliance. Cross contamination of food with gluten and without gluten can occur anywhere from farm to fork i.e during milling, at the grocery store if the same spatula is used to pick grains, at factories if the same production line and equipment are used or at home if the same utensils are used for storage and preparation of different cereals. Such processes pose a big challenge in our routine lives. To face this problem Food safety and Standards Authority of India (FSSAI) have brought a ray of hope for those prescribed with GFD as the treatment for all their problems. The new regulation proposed and passed has defined the parameters for "Gluten Free Foods" where the maximum limits for Gluten in Gluten free foods have been defined. These are as given below:-

#### Gluten Free Foods: The FSSAI definition

a. These foods consist of or are made of one or more ingredients, which may contain rice, rye, barley, oats & millets or ragi, pulses and legumes, where the inherent gluten has been reduced and the gluten level does not exceed 20 mg/kg in total based on the food as sold or distributed to the consumer.

b. The product does not contain wheat or any of its ingredients and shall bear the label declaration. The labelling of food products containing Gluten or being Gluten Free will also be reflected in the FSS (Packaging & labelling) regulations 2011. All Gluten free products will have a printed term "Gluten Free" in the immediate proximity.

c. A food by its nature is suitable for use as part of Gluten-free diet shall not be named as "special dietary" or "special dietetic" or any other equivalent term. However, such food may bear a statement on the label that "this food is by its nature gluten-free".

Foods specially processed to reduce gluten content to a level above 20 up to 100 mg/kg.

These foods consist of one or more ingredients from rice, rye, barley, oats, millets or ragi, pulses and legumes which have been specially processed to reduce the inherent gluten present in them to a level above 20 up to 100 mg/kg in total based on the food as sold or distributed to the consumer and shall bear the label declaration as provided in the sub regulation 2.4.5(53) of the Food safety and Standards (Packaging & labelling) Regulation, 2011.

The limits of less than 20ppm of gluten set by FSSAI in India are in accordance with those by The Australia New Zealand Food Standards Code. However they have a risk management strategy alongside which says in case gluten levels are equal to or greater than 20 and less than 100 then product withdrawals is requested together with a review of procedures and/or labelling and an investigation into the origin of the gluten. In extreme cases with gluten levels of more than 100 ppm product recall is done immediately. U.S. Food and Drug Administration (FDA) issued a similar regulation in 2013 that defined the term "gluten-free" for food labelling. A number of other western countries also have ruled on this matter, and have implemented the 20 ppm level indicated in the Codex Alimentarius standard. This measure has been effective since January 2012 in the European Union (and was announced in August 2013 by the US-Food and Drug Administration. Table 1 describes comparison of gluten free claims in Canada, US and India.

The availability of GF foods is a factor which will allow for a far better compliance to GFD. However, the economic aspect in terms of affordability of GF food may act as a major deterrent keeping them out of reach for the masses.

Various studies have documented that the time of first exposure to wheat influences the development of celiac disease [16]. In countries such as Finland, Estonia, and Denmark, characterized by low gluten consumption in infancy, celiac disease prevalence is much lower than in Sweden where gluten consumption is high in infancy. The Committee on Nutrition of the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) recommends that it is prudent to avoid both early (less than 4 months) and late (7 or more months) introduction of gluten and to introduce gluten while the infant is receiving breast milk and not formula or bovine products [17]. The current National Guidelines on Infant and Young Child Feeding (IYCF) by Ministry of Human Resource Development; department of Women and Child Development, government of India 2004 are in consonance with above said recommendations. According to IYCF Porridge made with suji, broken wheat, wheat flour, ground rice should be introduced at 6 months of age. This not only ensures healthy feeding of the infant but also serves as primary prevention for celiac disease. Public health specialists can play their part in prevention of CD through implementation of infant feeding recommendations and take this opportunity to avert the impending epidemic of CD.

### Conclusion

CD is a public health problem in the country, while there is a large pool of patients only a fraction of them are diagnosed. With increasing awareness about CD among health care providers and the general population a massive increase is expected in the present & subsequent decade. While the number of patients will increase the country's needs to prepare itself to meet this challenge. The first step in this direction has come from FSSAI with standardization of Gluten levels in GF foods. This will not only ensure compliance from the manufacturers in terms of quality requirements but will also help patients and consumers to make informed decisions about the safety of food items that they purchase to what they eat. This will not

only generate awareness about the disease in the Public but also will constitute first comprehensive step taken towards management of the disease.

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