

# Frequency of Hypothyroidism in Children of Celiac Disease

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## ABSTRACT

**Background:** Hypothyroidism is a rare finding in children having celiac disease but it has severe effects on mental & physical health of children.

**Objective:** To assess the frequency of hypothyroidism in children diagnosed with celiac disease.

**Methods:** This cross sectional study was conducted at Department of Pediatrics, Military Hospital and Dr. Akbar Niazi Teaching hospital, Bhara Kahu. 60 consecutive children having celiac disease (positive anti-TTG and endoscopy) were included in the study. Thyroid function tests were done to assess thyroid function. TSH  $\geq 5$  mIU/L with T4  $< 7.5$   $\mu$ g/L as hypothyroidism. Data was recorded on proforma and analyzed through SPSS v. 21.0.

**Results:** The mean age of children was  $6.57 \pm 2.18$  years. There were 20 (33.3%) males and 40 (66.7%) females. Out of 60, hypothyroidism was detected in 2 (3.3%) cases.

**Conclusion:** Hypothyroidism is present in only very few children with celiac diseases. But children with celiac disease should be screened for hypothyroidism, as they may be asymptomatic and can have hazardous consequences.

**Keywords:** Celiac disease, hypothyroidism, thyroid stimulating hormone, children

## Introduction

Celiac disease is one of the most prevalent autoimmune disease effecting digestive system. Diagnosis requires that strict criteria are used so that a life-long gluten-free diet may be correctly prescribed.<sup>1</sup> Although genetic susceptibility has been known for a long time, there have been elusive environmental factors that lead to the occurrence of clinical disease.<sup>2</sup>

The prevalence of celiac disease is 1 to 3% in the general population and approximately 10% among first-degree family members of patients with celiac disease. Celiac disease is treated with a gluten-free diet. More than 95% of patients have the HLA-DQ2 heterodimer, either in the *cis* or *trans* configuration.<sup>3</sup> Many cases are now detected during investigation of problems as diverse as anemia, osteoporosis, autoimmune disorders, unexplained neurological syndromes, infertility and chronic hypertransaminasemia of uncertain cause.<sup>4</sup>

Many cases are now detected during investigation of problems as diverse as anemia, osteoporosis, autoimmune disorders, unexplained neurological syndromes, infertility and chronic hypertransaminasemia of uncertain cause.<sup>4</sup> The prevalence of thyroid disease is likely increased among individuals with celiac disease. In addition, exposure to gluten-free treatment may be associated with a risk of thyroid disease, but this association remains controversial.<sup>5</sup>

Existing literature is quite deficient in this topic and there was no Pakistani study found in literature which could help to determine extent of problem in local population. This prompted us to do this study to determine the frequency of hypothyroidism in children with celiac disease.

## Methods

This cross-sectional study was done from 1<sup>st</sup> June 2018 to 30<sup>th</sup> November 2018 at Department of Pediatrics, Military Hospital and Dr. Akbar Niazi Teaching hospital, Bhara Kahu. Sample size of 60 children was calculated with 95% confidence interval and 8% margin of error and obtaining frequency of hypothyroidism i.e. 10.3%<sup>6</sup> in children with celiac

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disease. Children with celiac disease were diagnosed on the basis of positive anti-TTG (>10.0 U/mL) and positive endoscopy. Children with other comorbid conditions including cardiac disease, electrolyte disturbances, diabetes and children taking treatment for thyroid disorder before or after diagnosis of celiac disease were excluded from the study. Non probability consecutive sampling technique was used to enroll the children. Written informed consent was taken from parents. Blood sample was taken by using a disposable syringe under aseptic measures. All samples were stored in sterile vials and were sent to the laboratory of the hospital for assessment of TSH and T4. Thyroid function was evaluated through levels of T4 & TSH by using ELISA method. TSH level  $\geq 5$  mIU/L and T4  $< 7.5$   $\mu$ g/L was considered as hypothyroidism. All the collected data was then analyzed through SPSS version 21.0. Mean  $\pm$  SD were computed for quantitative variables like age, weight and duration of celiac disease, temperature, heart rate, pulse, respiratory rate, TSH and T4. Qualitative variables like gender, treatment taking for celiac disease and hypothyroidism were presented as frequency and percentage.

### Results

The Mean age was 6.58  $\pm$  2.18 years with children. There were 20 (33.3%) males and 40 (66.7%) were females. Mean weight of children was 16.35  $\pm$  5.91 kg. The mean duration of celiac disease was 3.97  $\pm$  1.89 months and 42 (70%) children were taking treatment of celiac disease. Mean body temperature was 98.05  $\pm$  0.39  $^{\circ}$ F, mean heart rate was 88.43  $\pm$  14.52 bpm, mean pulse was 88.08  $\pm$  14.19 bpm and mean respiratory rate was 20.27  $\pm$  2.76 bpm. No child had symptoms of thyroid disorder (Table 1). The mean TSH was 2.56  $\pm$  1.43 mIU/l and mean T4 was 11.96  $\pm$  2.56  $\mu$ g/L (Table 2). Hypothyroidism was present in 2 (3.3%) of children with celiac disease (Fig 1).

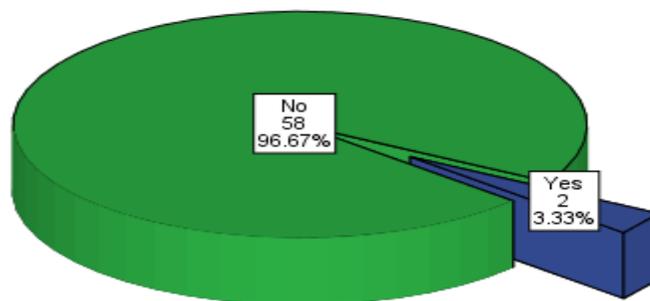
**Table 1: Demographic information of patients (n=60)**

Characteristics	Mean $\pm$ SD
Age (years)	6.58 $\pm$ 2.18
Weight (kg)	16.35 $\pm$ 5.91
Duration of celiac disease (months)	3.97 $\pm$ 1.89
Body temperature $^{\circ}$ F	98.05 $\pm$ 0.39
Heart rate	88.43 $\pm$ 14.52
Pulse	88.08 $\pm$ 14.19
Respiratory rate	20.27 $\pm$ 2.76
Characteristics	n (%)

Gender (m : f)	20 (33.3%) : 40 (66.7%)
Treatment taking for celiac disease	42 (70%)
Symptoms of thyroid disease	0 (0%)

**Table 2: Laboratory investigations for thyroid function test (n=60)**

TSH (mIU/L)	2.56 $\pm$ 1.43
T4 ( $\mu$ g/L)	11.96 $\pm$ 2.56



**Fig 1: Distribution of hypothyroidism (n=60)**

### Discussion

Celiac disease is an autoimmune disorder that is induced by dietary gluten in genetically predisposed individuals. It has a prevalence of approximately 1% in many populations worldwide. New diagnoses have increased substantially, owing to increased awareness, better diagnostic tools, and probable real increases in incidence.<sup>7</sup> Celiac disease is closely associated with other autoimmune endocrine disorders, particularly autoimmune thyroid disease.<sup>8</sup> The pathogenesis of coexistent autoimmune thyroid disease and celiac disease is not known.<sup>9</sup>

In our study, the Mean age was 6.58  $\pm$  2.18 years with children. There were 20 (33.3%) males and 40 (66.7%) were females. Mean weight of children was 16.35  $\pm$  5.91 kg. The mean duration of celiac disease was 3.97  $\pm$  1.89 months and 42 (70%) children were taking treatment of celiac disease. In our study, the mean TSH was 2.56  $\pm$  1.43 mIU/l and mean T4 was 11.96  $\pm$  2.56  $\mu$ g/L. Hypothyroidism was present in 2 (3.3%) of children with celiac disease.

Thyroid disease may be related to celiac disease as well. The prevalence of thyroid disease among celiac disease patients was 10.8% in Sweden.<sup>10</sup> Similarly, Hadithiet *al.* found that out of 184 patients with celiac disease, 39 (21%) were positive for thyroid antibodies in a Dutch population which is quite high as compared to our study.<sup>11</sup> Saleemet *al.* also investigated 106 patients with celiac disease in Ireland between 1988

and 2004. The prevalence of thyroid disease was 7%, which was higher than that of other autoimmune diseases (rheumatoid disease 3%, inflammatory bowel disease 4%, and type 1 diabetes mellitus 2%) in celiac disease patients.<sup>12</sup> This is slightly higher than our study.

Roy et al., reported that a pooled analysis, based on 6024 thyroid disorder patients, found a prevalence of biopsy-confirmed celiac disease of 1.6% [confidence interval (CI) 1.3-1.9%]. Heterogeneity was large ( $I(2) = 70.7\%$ ). The prevalence was higher in children with thyroid disorder (6.2% [CI 4.0-8.4%]) than it was in adults (2.7%) or in studies examining both adults and children (1.0%). Celiac disease was also more prevalent in hyperthyroidism (2.6% [CI 0.7-4.4%]) than it was in hypothyroidism (1.4% [CI 1.0-1.9%]). About 1/62 patients with thyroid disorder have biopsy-verified celiac disease. It is argued that patients with autoimmune thyroid disease should be screened for celiac disease, given this increased prevalence.<sup>13</sup> Several studies failed to identify a significant relationship between celiac disease and thyroid disease.<sup>14, 15</sup> However, most of these studies were cross-sectional surveys and lacked controls. In addition, exposure to gluten-free treatment may be associated with a risk of thyroid disease, but this association remains uncertain.<sup>16, 17</sup>

## Conclusion

Hypothyroidism is present in only very few number of children with celiac diseases. But children with celiac should be screened for hypothyroidism, as they may be asymptomatic and can have hazardous consequences on physical & mental health. But we will recommend further studies on larger sample size. So that more authentic result can be achieved.

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