

# Association of Duodenal Ulcer with Levels of Serum T<sub>3</sub>, T<sub>4</sub> and TSH: A Case Control Study

Debkumar Ray<sup>1</sup>, Bholanath Maji<sup>2</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor,  
Biochemistry Department, Burdwan Medical College and Hospital, Burdwan, West Bengal, India

Corresponding Author: Bholanath Maji

## ABSTRACT

Various hormones have been associated with duodenal ulcer. In the present study Serum T<sub>3</sub>, T<sub>4</sub> and TSH estimation of 127 duodenal ulcer patients and 106 cases was done.

In the present study serum T<sub>3</sub> levels in cases were significantly lower than the corresponding values in controls, serum T<sub>4</sub> levels in controls were lower than the same levels in cases but not significantly and serum TSH values in cases were highly significantly raised with respect to the same in controls. Low levels of TSH and high levels of T<sub>3</sub> may be associated with DU, though this finding should be confirmed by further research with a larger population and with other markers.

**Keywords-** duodenal ulcer, serum T<sub>3</sub>, T<sub>4</sub>, TSH

## INTRODUCTION

Duodenal ulcer (DU) is an important cause for morbidity and mortality. DU is quite common worldwide. The lifetime risk for DU is about 1 in 14. <sup>(1)</sup> DU comprises about 80% of all peptic ulcers. <sup>(2)</sup> DU has been known for thousands of years. <sup>(3)</sup> Usual symptoms of DU include abdominal pain, nausea, eructation, among others, which might lead to complications like bleeding, perforation, obstruction, etc. DU is associated with increased acid production. <sup>(4)</sup> Various physiological abnormalities, alone or in combination, may lead to two final common pathways: abnormally large meal-stimulated acid secretion, and nocturnal acid hypersecretion. <sup>(5)</sup> Peptic ulcer disease and specifically DU had long been thought to have a multifactorial

pathogenesis without a common denominator. <sup>(6)</sup> There is strong evidence that cigarette smoking, regular use of aspirin, prolonged use of steroids, coffee, genetic predisposition and other factors are associated with the development of peptic ulcer. <sup>(7)</sup>

DU is associated with local hormones like gastrin, CCK. <sup>(8)</sup> Helicobacter pylori infection has been found to increase the release of the acid-stimulating hormone gastrin. <sup>(9)</sup> ACTH also has been associated with DU. <sup>(10,11)</sup> And again, a high incidence (46 per cent) of endocrinopathies (pituitary-gonad-thyroid mechanism) was found in thirty female ulcer patients. <sup>(12)</sup> These evidences prompted us to think about the possible involvement of TSH in DU. So, we undertook the present study where investigation of the levels of T<sub>3</sub>, T<sub>4</sub> and TSH in patients with DU was carried out.

## MATERIALS AND METHODS

This study was a hospital-based, case-control study conducted in the Department of Biochemistry of a medical college and hospital in West Bengal, India. The study was approved by the local ethical committee and all cases and controls gave their informed consent to take part in this investigation.

The duration of the present study was 9 months and included 127 DU patients (group 1) attending the outpatient department, duration ranging from 3 months to 8 months. In addition, 106 patients (group

2), who were age- and sex-matched with the DU subjects, served as controls. The controls had attended the OPD with minor ailments unrelated to DU. Complete history and physical examination of all cases and controls were undertaken. Exclusion criteria included patients taking steroids.

Blood was collected from each case and control after overnight fasting. All samples were coded and assayed in a blind fashion by an investigator who was unaware of the subjects' clinical status. T<sub>3</sub>, T<sub>4</sub> and TSH was determined by chemiluminescence assay (Siemens).

Statistical analysis of the data was performed by using Statistical Package for Social Sciences and inferences were drawn.  $p < 0.05$  was considered to be significant and  $p < 0.001$  highly significant.

## RESULTS

**Table 1. Serum T<sub>3</sub>, T<sub>4</sub> and TSH levels in cases and controls (in Mean+SD)**

Parameter	Cases	Controls
T <sub>3</sub>	58+7.9	61+9.8
T <sub>4</sub>	4.3+1.1	4.6+1.3
TSH	4.7+0.32	3.8+0.26

TSH values expressed in mU/l, T<sub>3</sub> in ng/dl and T<sub>4</sub> in mcg/dl.

For T<sub>3</sub>

p value and statistical significance:

The two-tailed p value equals 0.0103

By conventional criteria, this difference is considered to be statistically significant.

Confidence interval:

The mean of cases minus controls equals -3.000

95% confidence interval of this difference: From -5.285 to -0.715

Intermediate values used in calculations:

$t = 2.5870$

$df = 231$

standard error of difference = 1.160

SEM are 0.701 and 0.952 respectively

For T<sub>4</sub>

p value and statistical significance:

The two-tailed p value equals 0.0576

By conventional criteria, this difference is considered to be not quite statistically significant.

Confidence interval:

The mean of cases minus controls equals -0.300

95% confidence interval of this difference: From -0.610 to 0.010

Intermediate values used in calculations:

$t = 1.9081$

$df = 231$

standard error of difference = 0.157

SEM are 0.098 and 0.126 respectively

For TSH

p value and statistical significance:

The two-tailed p value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of cases minus controls equals 0.9000

95% confidence interval of this difference: From 0.8237 to 0.9763

Intermediate values used in calculations:

$t = 23.2491$

$df = 231$

standard error of difference = 0.039

SEM are 0.0284 and 0.0253 respectively

## DISCUSSION

The thyroid hormones have action on almost all systems and organs of our body, for example they increase metabolism, heart rate, respiratory rate, secretions of many endocrine glands, etc. In the gastrointestinal system, they lead to increased appetite and food intake, and they increase both the rates of secretion of the digestive juices and the motility of the gastrointestinal tract. <sup>(13)</sup> Deficient thyroid secretion has been cited as an etiologic factor in duodenal ulcers. <sup>(14, 15)</sup> In the present study also, serum T<sub>3</sub> levels in cases were significantly lower than the

corresponding values in controls, though serum T<sub>4</sub> levels in controls were lower than the same levels in cases but not significantly. On the other hand, serum TSH values in cases were highly significantly raised with respect to the same in controls (table 1). So, the present study findings are in accordance with previous research data.

An active chronic well developed peptic ulcer has the layers: a surface coat of purulent exudate and necrotic debris, fibrinoid necrosis, granulation tissue, and fibrosis replacing the muscle wall. In the healing process of an ulcer, regenerating epithelium grows over the surface and where the muscularis mucosae is interrupted. <sup>(16)</sup>

Earlier studies indicate that thyroid hormones exert (as in most tissues) an anabolic effect on GI mucosal cells. Some of these effects include increases in RNA and protein content. <sup>(17)</sup> Thus, T<sub>3</sub> might help in ulcer healing and the reverse should occur in hypothyroidism, where T<sub>3</sub> levels are decreased. This may be the probable explanation for low T<sub>3</sub> levels in DU cases, which occur in conjunction with raised TSH levels in hypothyroidism.

This study has limitations that must be considered. To assess thyroid profile, chemiluminescence method was used. Thyroid profile can be estimated by various methods, but the present method was employed as it is the most commonly used, time tested and standard method.

Patients were taking a number of medications to control DU. However, these treatments are characteristic of patients with DU and do not affect thyroid profile. Furthermore, the number of patients in the study group was not large. Thus, care should be taken while extrapolating the present findings to other populations. We conducted the present study in a tertiary care hospital. However, in our country, most people visit district, subdivisional, and lower-tier hospitals for treatment. Hence, results of our study might not reflect the true picture of the population as a whole. Probably, a multicentric study on a larger

population would be better in revealing the actual statistics.

Despite these limitations, we believe that our study points towards using thyroid profile as an important, promising parameter in DU cases. As our findings point to an alteration in thyroid profile, the problem of DU should also be further investigated in a larger number of patients, and other markers of the pathophysiology of DU should be assessed.

## CONCLUSIONS

Low levels of TSH and high levels of T<sub>3</sub> may be associated with DU, though this finding should be confirmed by further research with a larger population and with other markers to assess the pathophysiology of DU, so that prevention and treatment of DU can be addressed better.

**Conflict of interest-nil**

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