

## EFFECT OF SMOKING ON THYROID STATUS IN DEPRESSION

Jalaj Saxena\*, P.N.Singh\*\*, Uma Srivastava\*\*\*, A.Q. Siddiqui\*\*\*\*.

### ABSTRACT:

**Research Problem:** What is the impact of smoking cigarettes on thyroid functions in depression patients.

**Objective:** To estimate  $T_3$ ,  $T_4$  and TSH in depressed smokers.

**Study Design:** Hospital based clinical study.

**Setting:** Psychiatry out - door patients.

**Participants:** Depression patients with or without history of smoking.

**Sample Size:** Twenty five patients of depression.

**Study Variables:** Smoking, Non - smoking,  $T_3$ ,  $T_4$ , TSH

**Statistical Analysis:** Student t- test.

**Result:** The patients of both the study group and control group had subnormal  $T_3$  but in smokers it was significantly lower than in non - smoker patients.  $T_4$  was within the normal range in both the groups, but it was significantly higher in smokers. TSH levels were normal in both the groups of patients and there was no significant difference between the two groups.

**Conclusion:** A low  $T_3$  state exists in depression with further worsening of the condition in depressed patients who smoke, which might have an impact on therapeutic outcome. Therefore, avoidance of smoking in depression patients is suggested.

**Key Words:** Cigarette smoking, Thyroid functions, Major depression.

### INTRODUCTION:

Smoking is one of the most serious hazards our society is facing today. Several studies in various communities and groups have been done to relate smoking with various illnesses particularly that of

smoking. Smoking tobacco has been reported to have effects on thyroid functions in normal population<sup>1</sup>, similar to thiocyanates, the detoxified end product of cyanides<sup>2</sup>.

Depression has also been found to be

associated with a wide range of abnormalities in thyroid functions. Cohen and Swigar<sup>3</sup> have reported transient increase in Thyroxin ( $T_4$ ), and Whybrow et. al.<sup>4</sup> have found a sustained elevation in Free Thyroxine Index ( $FT_4I$ ); on the other hand, lower levels of  $T_4$  and  $FT_4I$ <sup>5</sup> as well as Tri -iodothyronine ( $T_3$ ) and free  $T_3$ <sup>6</sup> have been reported in depressed patients.

Cigarette smoking has been reported to have a goitrogenic effect due to thiocyanates in tobacco<sup>7,8</sup>. As cigarette smoking is common in psychiatric patients, the effect of smoking on thyroid status in depressed patients was studied.

### MATERIAL AND METHOD:

Twenty five male patients of depression classified by history into smokers (n = 15, Age 24 - 55 years) and non smokers (n = 10, Age 17 - 52 years) attending the Psychiatry Out Patient Department of J.N.Medical College, who consented to participate in the study, were included. None of the patients had received any antidepressant prior to his visit to Psychiatry O.P.D. and there was no clinical evidence of thyroid dysfunction, hypertension, diabetes mellitus and tuberculosis. The diagnosis of major depression was made according to Diagnostic and Statistical Manual of Mental Disorders - IV edition (DSM: IV). The smokers included in the study smoked  $10.03 \pm 3.1$  cigarettes per day.

**Methodology:** The commercial kits with coated micro well plates were obtained from J. Mitra & Co., New Delhi.

Blood samples for  $T_3$ ,  $T_4$  and thyrotropin dependent assessment, and major depressive illness was made by a team of two psychiatrists, clinical psychologist and social workers. The  $T_3$  and  $T_4$  in serum were estimated by competitive solid phase enzyme immunoassay. TSH was estimated by sandwich enzyme linked immunosorbant assay (ELISA) employing

\* Senior Resident, \*\* Reader, \*\*\* Professor, Deptt. of Physiology

\*\*\*\* Professor, Deptt. of Psychiatry, J.N.Medical College, A.M.U., Aligarh - 202002



monoclonal anti-TSH antibodies. The absorbance was taken on ELISA reader by 450 nm. The statistical analysis of data was done by 'student t - test' to evaluate the difference in individual thyroid function tests between smokers and non smokers.

#### RESULT:

Out of 15 smokers, 2 had mild, 7 moderate and 6 severe grades of depression. While out of 10 non smokers, 3 had mild, 4 moderate and 3 severe grade of depression. The mean thyroid function tests are shown in Table -I.

The  $T_3$  was subnormal in all the subjects of both the group of patients but it was significantly lower in smokers than non - smoker control group of patients. Though the  $T_4$  levels were within normal range in all the patients of both the groups, it was significantly higher in smokers in comparison to control non - smokers. TSH levels in both the groups of this study were within normal limits but it did not significantly differ in smokers and non - smokers.

#### DISCUSSION:

Our data on  $T_3$  suggested low  $T_3$  state in control non smokers patients with further decrease in smokers. Sepkovic, et al.<sup>9</sup> have reported low  $T_3$  levels in normal heavy smokers. Joffe and Levitt<sup>10</sup>, in a similar study in depressed patients had found normal levels of  $T_3$  in both smokers and non smoker depression patients while an earlier study reported low  $T_3$  and free  $T_3$  in depression patients.

Previous reports on  $T_4$  levels in depression are conflicting. Both significant decline in  $T_4$  levels<sup>11</sup>, and significant increase of  $T_4$  levels<sup>12</sup> in depressed patients have been reported though the levels remained within normal limits. Further, severity of depression has been linked with levels of thyroid hormones. Roca et. al<sup>13</sup> showed significant positive correlation in hormone levels between psychiatric and schizophrenic patients. In our study, both smokers and non - smokers had  $T_4$  within normal limits, though smokers had significantly higher  $T_4$  levels than non smoker depression patients. Smokers had severe depression as compared to non smokers resulting into higher  $T_4$  levels in smokers. Patients have also been reported<sup>10</sup> with  $T_4$  within normal limits, in depression but the smokers of the study had significantly lower  $T_4$  levels.

Normal TSH values without any significant difference between smoker and non smoker depression patients have been observed<sup>10</sup>. Stewart<sup>14</sup> and Feva et. al<sup>15</sup> also were unable to find any difference in TSH levels in depression patients and normal individuals.

Our data suggested that the habit of smoking which is very common in depressed patients, has significant effect on thyroid functions.. Also, it could be an important factor in evaluation of thyroid functions and therapeutic response to antidepressants in depression patients.

**TABLE - I**

#### THYROID HORMONE LEVELS IN SMOKER AND NON - SMOKER DEPRESSION PATIENTS

Thyroid Hormone	Smokers (n = 15)	Non Smokers (n=10)
$T_3$ (N=80-160 ng/dl)	41.66 $\pm$ 5.8 * (30.8 - 50.5)	52.35 $\pm$ 8.88 (38.5 - 64.0)
$T_4$ (N = 3.9-10.6 $\mu$ g/dl)	6.7 $\pm$ 1.1* (5.1 - 8.5)	5.33 $\pm$ 0.89 (4.0 - 6.8)
TSH (N = 0.5-5.5 $\mu$ g/ml)	3.33 $\pm$ 1.5 (1.15 - 5.5)	2.89 $\pm$ 0.96 (1.75 - 4.95)

N = Normal range, values are mean  $\pm$  SD, \* =  $P < 0.01$

Figures in parentheses under  $M \pm SD$  values are range of observations.

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