SUMMARY

Endocrine disorders are increasing worldwide. Diseases of thyroid gland are amongst the most abundant endocrine disorders in the world second only to diabetes mellitus (Heuck et al., 2000). It has been estimated that about 45 million people in India suffer from thyroid diseases (Unnikrishnan and Menon, 2011). The prevalence and pattern of thyroid disorders depend upon many factors viz., geographical factors, environmental conditions, socioeconomic status, nutritional status and unhealthy life style (James and Kumar, 2012).

Thyroid is one of the endocrine glands. The principal hormones of thyroid gland are triiodothyronin (T3) and thyroxine (T4). Thyroid diseases are primarily conditions that affect the amount of thyroid hormones being produced. Excess production of thyroid hormone leads to hyperthyroidism while diminished production leads to hypothyroidism. In other words, hypothyroidism occurs when the thyroid gland doesn't produce sufficient amount of thyroid hormones. If these hormones are not produced adequately, the clinical signs and symptoms of hypothyroidism, like cold intolerance, constipation, fatigue, weight gain, dry skin, weakness, bradykinesia, periorbital puffiness, paresthesias, lethargy, alopecia, skin pallor, muscle cramps, goiter, infertility, memory loss, and even depression can occur (Guimaraes et al., 2009). On the basis of various studies it has been found that the central features of all thyroid conditions are affected by emotional, motivational, cognitive and somatic manifestations and these serious psycho-somatic symptoms affect the patient’s quality of life. So, there is a need to study the psychological aspects of hypothyroidism.

A critical perusal of related research literature revealed that though a number of researches have been done and are on going to study the cause and effect of the thyroid disorders. But the studies relating to psychological aspects viz. life style, stress, personality traits, and
brain dysfunction contributing to thyroidism are conspicuous by rarity. No research work has been done on the analysis and management of psychological aspects of hypothyroid condition. The present research is designed to study the psychological determinants of hypothyroidism and their management. With effective treatment plan and techniques of behavior modification, hypothyroid patients can achieve healthy levels of psychosocial functioning.

The study is conducted in two parts: Part-I and II. Part-I of the study deals with the relative contribution of variables viz. life style, stress, personality traits, and brain dysfunction in determining hypothyroidism among female patients. And the comparison between hypothyroid patients and normal subjects on the psychological aforesaid aspects (or variables) of hypothyroidism. Part-II of the research deals with the study of effectiveness of psychological intervention in managing the level of stress and in modifying poor/unhealthy lifestyle of hypothyroid female and its effects on subjects having high level of stress. Selected 10 cases are reported with an in-depth analysis.

PART-I

OBJECTIVES

The objectives of the present study framed as:

1. To determine the contribution of the psychological variables viz. life style, Stress, personality traits, and brain dysfunction in the determination of hypothyroidism.

2. To compare the Life Style, Level of Stress, Personality Traits and Brain Dysfunction of hypothyroid patients with their normal counterparts.

HYPOTHESIS
Hypothesis refers to the tentative solution of the problem which is generally framed when experimental or correlation type of studies are planned to be carried out. Since the present endeavour was designed as exploratory or survey type of research, there was no need to formulate hypothesis in this regard.

VARIABLES
In the present study while the Hypothyroidism acted as Criterion Variable, the other variables viz. Life-style, Stress, Personality and Brain Dysfunction as predictor variables. Life Style consists of five domain viz. (i) Dietary Habits (Life Style Domain-I or LSD-I), (ii) Sleeping Behavior (LSD-II), (iii) Social Support Network (LSD-IV), (iv) Spiritual Behavior (LSD-IV), and (v) Physical Activity (LSD-V). Personality consists of five domain viz. (i) Neuroticism, (ii) Extraversion, (iii) Openness, (iv) Agreeableness, and (v) Concesiousness.

DESIGN
Correlational research design was employed.

SAMPLE
The sample for the study is consisted of two groups. Group-I consisted of 100 female hypothyroid patients, age-range from 30 to 50 years taken from the clinics of physicians and S.N. Medical College, Agra. Group-II consisted of 100 non-hypothyroid females, matched with group-I in terms of age, gender, education and marital status. Subjects having any other somatic or psychological disorder were excluded from the sample.

TOOLS
1. Thyroid Stimulating Hormone (TSH) level acted as measure of hypothyroidism. High level of TSH was diagnosed by the doctor on the basis of pathologist’s reports obtained during last one year. TSH values above the normal/reference range i.e. 0.35 mU/L to 5.50 mU/L (milliunits per liter) were taken as measure for hypothyroidism.

2. Life Style Scale (LSS) by Khatoon and Mona (2010) (constructed by the researcher under the supervision of her research guide) was used to measure life style.

3. ICMR Psychosocial Stress Questionnaire developed by Srivastava (1992) was used to measure stress.

4. NEO Five Factor personality inventory (NEO PI-S Form) by McCrae & Costa (1985) was used to measure personality.

5. For measuring Brain Dysfunction, the PGI Battery of Brain Dysfunction developed by Pershad and Verma (1989) was used.

STATISTICAL ANALYSIS OF DATA

The data generated consequents to above measurement were analyzed in three ways:

1. Product Moment coefficients of correlation was employed to find out the relationship among TSH (Criterion variable) Life style, Stress, Personality traits, and Brain dysfunction (Predictors variables) of group I (hypothyroid patients) and group II (normal subjects).

2. Stepwise Multiple Regression Analysis was performed to determine the contribution of the predictor (psychological) variables viz. Life-style, Stress, Personality and Brain Dysfunction in the determination of the criterion variable hypothyroidism.
3. Mann Whitney U test was used to study the difference between means of Life style, Levels of Stress, Personality traits, and Brain dysfunction of group I (hypothyroid patients) and group II (Non-hypothyroid subjects).

**PART-II**

**SAMPLE**

Ten (10) hypothyroid female patients with high or very high level of stress and also have unhealthy or sedentary life style out of group-I, and who were willing to learn to manage their stress and sedentary life style, and co-operate in the intervention program were selected as sample for this part of the study.

**TOOLS AND TECHNIQUES**

- **Case Study** was done to analyze the information regarding patient’s personality structure and dynamics; functioning; weakness and strengths; the development of antecedents and possible future course of the patient’s conditions; and for further psychological intervention.

- **Bio-Feedback**: Medicare Bio-feedback System (Model No. XLII) was used to measure GSR of subjects.

- **Jacobson’s Progressive Muscle Relaxation**: PMR (Progressive Muscle Relaxation) is a technique given by Jacobson (1938) for reducing stress or tension under conditions of high emotional arousal.

- **Counselling**: Along with daily JPMR training individual sessions of counselling for about 30 minutes were also given in order to provide a regular time and space for subjects to talk
about their sedentary lifestyle and explore the reasons for unhealthy dietary habits, weak social support network, poor sleeping behaviour and physical activities.

**APPROACH**

Multiple assessment approach was used and pre, mid and post intervention measures of GSR were taken with the help of bio-feedback system.

**FOLLOW-UP**

Four (04) weekly follow-ups, followed by Two (02) fortnightly, Two (02) monthly, and Two (02) quarterly follow-ups were done to ascertain the maintenance of the gains from psychological intervention (GSR Bio-feedback measure, JPMR, & Counselling).
RESULTS

PART-I

Results are shown in the table:

Table–1: Stepwise Multiple Regression Analysis Coefficients for Predictors of TSH.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>p</th>
<th>β.r</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta (β)</td>
<td></td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>1st</td>
<td>(Constant) 108.783</td>
<td>24.011</td>
<td>4.531**</td>
<td>.000</td>
<td>.352</td>
<td>0.123904</td>
</tr>
<tr>
<td></td>
<td>Dietary Habits (Life Style Domain-I) -3.025</td>
<td>.813</td>
<td>-.352</td>
<td>-3.722**</td>
<td>.000</td>
<td>-.352</td>
</tr>
<tr>
<td></td>
<td>Stress .668</td>
<td>.320</td>
<td>.199</td>
<td>2.092*</td>
<td>.039</td>
<td>.262</td>
</tr>
<tr>
<td></td>
<td>Σβ.r = 0.123904</td>
<td>R² = 0.124</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>(Constant) 75.413</td>
<td>28.493</td>
<td>2.647**</td>
<td>.009</td>
<td></td>
<td>0.109472</td>
</tr>
<tr>
<td></td>
<td>Dietary Habits (Life Style Domain-I) -2.675</td>
<td>.817</td>
<td>-.311</td>
<td>-3.276**</td>
<td>.001</td>
<td>-.352</td>
</tr>
<tr>
<td></td>
<td>Stress .668</td>
<td>.320</td>
<td>.199</td>
<td>2.092*</td>
<td>.039</td>
<td>.262</td>
</tr>
<tr>
<td></td>
<td>Σβ.r = 0.16161</td>
<td>R² = 0.162</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>(Constant) 112.854</td>
<td>32.083</td>
<td>3.518**</td>
<td>.001</td>
<td></td>
<td>0.1056</td>
</tr>
<tr>
<td></td>
<td>Dietary Habits (Life Style Domain-I) -2.577</td>
<td>.799</td>
<td>-.300</td>
<td>-3.224**</td>
<td>.002</td>
<td>-.352</td>
</tr>
<tr>
<td></td>
<td>Stress .749</td>
<td>.314</td>
<td>.223</td>
<td>2.385**</td>
<td>.019</td>
<td>.262</td>
</tr>
<tr>
<td></td>
<td>Sleeping Behavior (Life Style Domain-II) -1.672</td>
<td>.711</td>
<td>-.215</td>
<td>-2.351*</td>
<td>.021</td>
<td>-.202</td>
</tr>
<tr>
<td></td>
<td>Σβ.r = 0.207456</td>
<td>R² = 0.207</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Regression Equation for Criterion Variable (Y, TSH) and predictor variables X₁ (Dietary Habits), X₂ (Stress), X₃ (Sleeping Behavior) based on final (3rd) regression model consequent to Stepwise Multiple Regression Analysis.
The regression equation obtained consequent to the final Regression model (3rd) of Stepwise Regression Analysis shows that every unit increase in predictors $X_1$, $X_2$, $X_3$ led to an increase in TSH by their respective coefficients of -2.577, 0.749, and -1.672 when 11.2854 was the value of constant.

Analyzing the results of the present study the following findings and conclusions drawn and are thus summarized:

The Product Moment Coefficients of Correlation revealed that:

1. Dietary Habits (Life Style Domain-I) \( r_{TSH,DietaryHabits} = -0.352 \ (p =0.000) \), and Sleeping Behavior (Life Style Domain-II) \( r_{TSH,SleepingBehavior} = -0.202 \ (p =0.022) \) were found to be negatively related with TSH.

2. Stress was found to be more strongly positively related with TSH \( r_{TSH,Stress} = 0.262 \ (p =0.004) \) than other predictor variables.

3. TSH was not significantly correlated with the others Predictor Variables i.e. Brain Dysfunction, Social Support Network, Spiritual Behavior, Physical Activity and Life Style-Total. Further TSH was also not found significantly correlated with the factors of predictor variable personality viz. Extraversion, Openness, Agreeableness, and Concesiousness.

4. The inter-correlations between the Predictor Variables were found to be comparatively higher than their correlations with Criterion Variable.
5. Further, the stepwise multiple regression analysis revealed that Dietary Habits was found to be the most significant predictor of TSH as compared to other significant predictors i.e. Stress and Sleeping Behavior. Dietary Habits has the strongest negative contribution ($B=-2.577$) in determination of criterion variable i.e. TSH. The regression coefficient is negative, which shows that unhealthy or poorer the dietary habits of patients, higher the abnormal TSH level and symptoms of the hypothyroidism.

6. Stress was found to be the 2\textsuperscript{nd} most significant predictor of TSH. In other words, highest positive contribution ($B=.749$) in the determination of TSH was that of Stress. Which shows that higher the level of stress higher the level of TSH and higher the consequent symptoms of disease.

7. Sleeping Behavior was found to be the 3\textsuperscript{rd} more significant predictor of TSH. It is the 2\textsuperscript{nd} highest negative contributor ($B=-1.672$) in the determination of TSH. This indicates that poorer the quality of sleep higher the level of TSH and symptoms of hypothyroidism.

8. The other predictors viz. Social Support, Spiritual Behavior, Physical Activity (dimensions of life style) Life Style-Total, Brain Dysfunction, and Personality Factors viz. Extraversion, Openness, Agreeableness, Consciousness and Personality (Total) were not found to contribute significantly towards TSH. But Neuroticism (one of personality factors) was found to be the non-significant predictor of TSH.

9. Further, the Mann Whitney U test analysis revealed that there exists a significant difference in Life Style of two groups. Hypothyroid women have found unhealthy/sedentary lifestyle ($M_1=173.5$ and $M_2=234.92$; $Z_u=12.186$, $p<0.000$) than their normal counterparts.
10. Hypothyroid women scored lower on the four domains of lifestyle i.e. Dietary Habits ($M_1=29.36$ and $M_2=50.15$; $Zu=9.744$, $p<0.000$), Sleeping Behavior ($M_1=25.80$ and $M_2=47.80$; $Zu=9.064$, $p<0.000$), Social Support Network ($M_1=38.94$ and $M_2=51.38$; $Zu=8.137$, $p<0.000$) and Physical Activity ($M_1=24.41$ and $M_2=31.72$; $Zu=9.067$, $p<0.000$), as compared to their normal counterparts. But no significant difference has been found in the spiritual behavior of the two groups ($M_1=55.02$ and $M_2=53.87$; $Zu=0.551$, $p>0.05$).

11. There exists a significant difference in level of stress of hypothyroid and non-hypothyroid women ($M_1=34.55$ and $M_2=23.32$; $Zu=7.87$, $p<0.000$). Hypothyroid women were found to have higher level of Stress as compared to their normal counterparts. When they face the psychological impact of stress, they often feel the physical and mental ramifications including stomach pain, pain in their neck and shoulders, rapid irregular heartbeats, insomnia, fatigue, depression, nervousness, panic or anxiety attacks.

12. There exists a significant difference in personality characteristics of hypothyroid and non-hypothyroid women ($M_1=143.74$ and $M_2=144.22$; $Zu=6.272$, $p<0.000$). It was found that women of the two groups differ on Neuroticism ($M_1=29.13$ and $M_2=25.94$; $Zu=4.600$, $p<0.000$), Extraversion ($M_1=29.77$ and $M_2=28.9$; $Zu=1.753$, $p<0.04$) and Conscientiousness ($M_1=29.36$ and $M_2=34.02$; $Zu=5.855$, $p<0.000$) personality facets. But no significant difference has been found in their Openness ($M_1=27.52$ and $M_2=25.82$; $Zu=0.337$, $p>0.05$) and Agreeableness ($M_1=27.96$ and $M_2=29.54$; $Zu=1.376$, $p>0.08$) personality traits.

13. Hypothyroid women have found to possess more ‘Neurotic’ personality characteristics rather than other personality traits. They have a tendency to experience negative affects.
But they were also found to be more social, than their normal counterparts. On the other hand, non-hypothyroid females were found more scrupulous, punctual, and reliable than hypothyroid females.

14. Significant difference has been found between brain dysfunction of two groups. 
\( (M_1=16.43 \text{ and } M_2=13.3; \ Z_u=6.944, \ p<.000) \). More impairments were seen in mental activity or cognitive functioning of hypothyroid women than their normal counterparts. Thyroid problems also affect patients’ memory, attention, perceptual processes and learning processes.

PART-II

Result Table-5: Showing Mean of GSR Readings Multiple Assessments Before, During & After Intervention.

<table>
<thead>
<tr>
<th>Ss No.</th>
<th>VARIABLE</th>
<th>INTERVENTION</th>
<th>FOLLOW-UPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before Intervention</td>
<td>During Intervention</td>
</tr>
<tr>
<td>S-1</td>
<td>STRESS</td>
<td>205</td>
<td>170</td>
</tr>
<tr>
<td>S-2</td>
<td></td>
<td>318</td>
<td>252</td>
</tr>
<tr>
<td>S-3</td>
<td></td>
<td>216</td>
<td>105</td>
</tr>
<tr>
<td>S-4</td>
<td></td>
<td>170</td>
<td>135</td>
</tr>
<tr>
<td>S-5</td>
<td></td>
<td>150</td>
<td>110.5</td>
</tr>
<tr>
<td>S-6</td>
<td></td>
<td>181</td>
<td>153</td>
</tr>
<tr>
<td>S-7</td>
<td></td>
<td>209</td>
<td>127</td>
</tr>
<tr>
<td>S-8</td>
<td></td>
<td>242</td>
<td>225</td>
</tr>
<tr>
<td>S-9</td>
<td></td>
<td>204</td>
<td>195.5</td>
</tr>
<tr>
<td>S-10</td>
<td></td>
<td>235</td>
<td>178</td>
</tr>
</tbody>
</table>

Mean of GSR Readings in kΩ
The results of the Part-II of the study revealed that:

1. In before intervention measure GSR readings (average of 7 days) of all the patients were positive and showing high levels of stress. After the intervention started GSR reading gradually began to reduce showing a decline in the stress level of all these subjects. During intervention measure GSR of almost all the subjects reduced. In after intervention measure and follow-up measure GSR of all the subjects was found to be negative direction which showing more and more relaxation achieved by the patients.

2. In after intervention measure and follow-up measures GSR reading remained in negative sides which show relaxed state of patents. Thus, the intervention programme proved to be very effective in reducing stress and also in enhancing relaxation.

3. Biofeedback-assisted relaxation (JPMR) is effective in reducing the stress level among hypothyroid female patients. The results are significant as all the 10 subjects have benefited considerably by the intervention programme.

4. The information revealed from case study of the patients with high level of stress (with reference to the extreme cases), all the subjects reported improvement in their psychosomatic symptoms due to sickness i.e. irritability, restlessness, impaired concentration, insomnia, headaches, lethargy, physical inactivity and gastrointestinal complaints etc. After the counselling intervention programme all the subjects have reported that they are satisfied with the intervention and would like to continue it as part of their daily routine so that they can lead a normal healthy life.
CONCLUSION

Various studies have established the fact that many psychological factors influence health and well-being. Though the different psycho-social predictors have been studied separately, but there are only a few studies which have investigated the relative contribution of different psycho-social factors in hypothyroidism. Therefore, in the present study the investigator has investigated the psychological predictors of hypothyroidism among female patients. The findings of the present study shows that the Psychological Variables i.e. Dietary Habits (Life Style Domain-I), Stress and Sleeping Behavior (Life Style Domain-II) contribute towards Hypothyroidism of Women. Further, the results reveal that there existed a significant difference in Lifestyle, Level of stress, Personality traits and Brain dysfunctions of hypothyroid and non hypothyroid women. Hypothyroid women proved to have comparatively sedentary lifestyle particularly unhealthy dietary habits, low level of sleeping behavior and poor physical activity; high level of stress; brain dysfunction or cognitive impairments and neurotic personality characteristics in comparison to their normal counterparts. All of these psycho-somatic symptoms are common among women who experience stress, but can be severe/ compounded with a hypothyroid disorder. Results of part-II of the study leads us to conclude that psychological intervention consisting of bio-feedback-assisted muscle relaxation, behavioral and cognitive strategies based counseling is very effective in reducing the stress level and improving the sedentary lifestyle of hypothyroid patients. Reduction in stress leads to high level of relaxation, which maintains the healthy bodily functioning. These findings will be helpful in the prevention and treatment of hypothyroid conditions. The findings also seem to have implications for developing effective programmes for the prevention of stress-related ailments.
LIMITATIONS & SUGGESTIONS

➢ The study has been conducted on a limited sample of 100 female hypothyroid patients selected from Agra city only. A more exhaustive study needs to be conducted on a larger sample selected from other cities.

➢ The study is limited to hypothyroid patients of 30-50 years of age only. Subjects of other age groups i.e. young (aged 18-30 years) elderly people (aged above 50 years) and can also be included in the sample for future study.

➢ The study is limited to female hypothyroid patients only. Further research may to be conducted on male patients also.

➢ To make comparison among patients suffering from sub-clinical features of hypothyroid disorder, different groups may cluster as per the severity of the symptoms for further research.

➢ Psychological intervention programme has been given to a small group of 10 hypothyroid patients only. The same should be tried on larger groups of patients with various sub-clinical features of hypothyroidism.

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