

Combined effect of Levothyroxine, Antihyperlipidemic and oral hypoglycemic agents on lipid profile and cognition level in hypothyroidism patients.

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ABSTRACT

Aim: To evaluate the effect of combination therapy on lipid profile and cognition level in hypothyroidism patients.

Methods: A prospective observational study was conducted in a private hospital at Tiruchengode. Patients who were under the management of thyroid disorder and hyperlipidemia more than 10 years was screened and selected for the study. There were 155 patients were included in the study and the patients who were on Levothyroxine 50mcg as control (Group 1), Group 2 Patients prescribed with levothyroxine 50mcg and Atorvastatin 20mg were checked with lipid profile parameter like Total cholesterol (TC), Triglycerides (TG), High density Lipoprotein (HDL-C), Low density Lipoprotein (LDL-C) and compared with control group values. Group 3 patients prescribed with levothyroxine 50mcg and Atorvastatin 20mg, Glimepride 2mg, Metformin 500mg were checked with lipid profile, compared with control group. The patients were interviewed using a Mini mental state examination questionnaire and their cognitive skills were assessed and compared with control group. Independent samples T test was used to compare the complication of the management.

Conclusion: Hyperlipidemia management with levothyroxine 50mcg and Atorvastatin 20mg, Glimepride 2mg, Metformin 500mg (Group 3) has an association on the managing lipid profile efficiently than the control (Group 1) Significant (**$p < 0.01$**). Cognition impairment was high in the combination therapy. (**$p < 0.01$**)

Keywords: Hyperlipidemia, Hypothyroidism, Lipid profile, Cognitive impairment.

INTRODUCTION

Hypothyroidism is the metabolic disorder of the thyroid gland that not produce sufficient amount of thyroid hormone for the metabolic need of the body. Human body has the largest endocrine gland present in the neck. This weighs about 15-20 gm in human. The gland is composed of spherical follicles that secretes and stores thick, colloid, sticky protein material. This gland receives the blood from the inferior thyroid artery.

Hypothyroidism requires proper management and improperly treated hypothyroidism resulting in metabolic management difficulty. Normal thyroid function was mandatory for normal human being brain development. On other hand patients with improper or abnormal thyroid values leads to wider range of neurological symptoms, including anxiety, depression, psychosis, encephalopathy, marked tremor, Graves ophthalmopathy, muscle weakness, and even cerebrovascular events. (1)

The levels of homocysteine, folate, cobalamin and thyroid stimulating hormone (TSH), free thyroxine (fT4), free triiodothyronine (fT3) and renal function were measured before and after treatment. Hypothyroidism patients shows higher level of homocysteine level. Cognition was also affected in hypothyroidism patients (2). So in this study effect of combination therapy on lipid profile and cognition level was planned to access.

METHODS

Study design and sample

A prospective observational study was conducted in a private multispecialty hospital at Tiruchengode. The patients with hypothyroidism and hyperlipidemia with age group of 20 to 60 were inclusive criteria of the study. Totally 196 patients were screened and 155 patients who are according to the inclusive criteria and the proper follow up patients were finally included in the study. Chronically ill patients, Patients with multiple Drug therapy, improper availability of patients were excluded from the study. And the collected patients were separated into two groups. Institutional Ethical committee approval was obtained from the Vivekanandha medical care hospital. Informed consent was obtained from all the patients who were included in the study.

Group 1 Patients prescribed with levothyroxine 50mcg, Group 2 patients prescribed with levothyroxine 50mcg and Atrovastatin 20mg alone and in group 3 levothyroxine 50mcg, Atrovastatin 20mg with Glimepride 2mg and Metformin 500mg. Separated groups were checked with lipid profile parameter like Total cholesterol (TC), Triglycerides (TG), High density Lipoprotein (HDL-C), Low density Lipoprotein (LDL-C) Cholesterol is one of the lipids found in the blood stream. Mini mental state Examinations (MMSE) Score were calculated for the both the groups and data were compared and risk of cognition was assessed in this study. The MMSE is screening tool that provides a brief, objective measure of cognitive function. MMSE scores are very useful in quantitatively estimating the severity of cognitive impairment and also in serially documenting cognitive change. The study population underwent a standardized assessment for cognitive function by using Folstein's Mini Mental State Exam (MMSE). (3) Any score greater than or equal to 25 points (out of 30) is effectively normal. Below this score indicates mild (21-24 points), moderate (10-20 points) and severe (<9 points) cognitive impairment. (4, 5,6)

Orientation: The object was asked the date, and then asked specifically for parts omitted.

Registration: The names of 3 unrelated objects, clearly and slowly were said, about one second for each. The most commonly used were apple, table, and penny. After said all 3, subject was asked to repeat them. Attention & Calculation: The subject was asked to begin with 100 and count backward by 7. Stop after 5 subtractions (93, 86, 79, 72, 65). Score the total number of correct answers. (7,8,9)

Recall: The subject was asked to recall the 3 words that you previously asked Him/her to remember.

Data collection tool

Data were collected through specially designed data entry format in order to collect the details of the Patient details including name, age, sex, known allergy, educational status, I.P no/O.P no, date of admission, date of discharge and patient history including present complaints, past medical history, past medication history, social history and family history, Vital signs (Body temperature, Blood pressure and pulse rate), lipid profile (Total cholesterol (TC), Triglycerides (TG), Low density lipoprotein (LDL- C), High Density lipoprotein (HDL-C), Mini mental state examinations (MMSE), drugs treatment details were collected. The study was approved by the Human Ethics Committee of the study hospital. Written informed consent was obtained from the patients prior to interview.

Statistical analysis

Statistical Analysis was done using SPSS Version 16 software were used to compare the data in that Independent samples T test was used to analysis the study.

RESULTS AND DISCUSSION

There were 155 patients observed in all group totally during the 8 months study period. And their age, gender wise classification of patients were is detailed in Table 1.

Table 1: Demographic Characteristics of Patients

Variables	Levothyroxine 50mcg (Group 1)	Levothyroxine 50mcg and Atorvastatin 20 mg alone (Group 2)	Levothyroxine 50mcg Atorvastatin 20 mg Glimepride 2mg with Metformin 500 mg (Group 3)	Total
Age in years,				
20-40	50	19	22	91
41-60	32	17	15	64
Gender,				
Male,	24	10	15	49
Female	58	26	22	106

2. Categorization of the overall study population

The study population (Table 2) was categorized into two as follows; 53% (n=82) of hypothyroidism patients without complications known as control group and 47% (n=73) of established hypothyroidism patients with complications marked as case group.

Table No: 2 Categorization of Case and Control

Groups	Percentage (%)
Control (n=82)	53
Case (n=73)	47

3. MMSE score of overall controls and cases

Significant difference in MMSE score was observed between case and control; however significant ($P<0.01$) cognitive decline was observed in case as compared to control as mention in table 3.

Table No: 3 MMSE score of overall control and cases

Groups	MMSE Score	P value
Control (n=82)	26.18±1.07	<0.01
Case (n=73)	16.82±4.12	

4. Lipid profile of control and cases

Patients were on the Levothyroxine 50 mcg therapy was labeled as control group and patients with combination therapy like levothyroxine with atorvastatin and Levothyroxine, Atorvastatin, Glimepride with Metformin therapy was marked as case group. All groups was checked with Total Cholesterol (TC), Triglycerides(TG), High Density lipoprotein (HDL-C), Low Density lipoprotein (LDL-C), and the mean and standard deviation was calculated by using ANOVA statistical method as mentioned in table 4.

Table 4. Mean TC, TG, LDL-C & HDL-C concentration of study populations

Drug	Total Cholesterol	Triglyceride	LDL_C	HDL-C	P Value
Levothyroxine (Control)	274.03±33.24	214.47±36.95	194.08±31.97	36.97±3.41	<0.01
Levothyroxine +Atorvastatin	164.47±12.98	134.08±15.50	87.42±13.79	50.28±5.3	
Levothyroxine +Glimepride +Metformin +Atorvastatin	167.43±26.87	134.57±10.99	91.00±28.46	49.57±4.4	

On cardiovascular risk management in hypothyroidism patients on Levothyroxine, Atrovastatin, glimepride, metformin combination therapy and levothyroxine mono therapy with dyslipidemia patients was compared in the lipid profile of total cholesterol, triglycerides, low density lipoprotein shows significant (<0.01) reduction was found in combination therapy. And also high density lipoprotein also shows significantly (<0.01) increased in the combination therapy. (10)

Our finding was supported by study previously conducted in subclinical hypothyroidism and clinical hypothyroidism patients that the memory impairment was significant difference between clinical and subclinical hypothyroidism and also concluded that newly diagnosed hypothyroidism patients have lesser cognitive defect (11).

5. CONCLUSION

MMSE was found to be more useful tool to monitor the cognitive status. Cognitive impairment was found in hypothyroidism patients. Elevated TC, TGs, HDL and VLDL was noted in study population with levothyroxine monotherapy.

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