and with Lipid Profile Relation thyroid hormones Lipid Ratio Overt Hypothyroidism Patients in Misurata

Fatma Mukhtar Elabidi[1], Adel Mohammed Mlitan[2], Huda Shaban Elgubbi[3], Amal Abdelkarim Swayeb[4]

Midecal laboratory tecnation in center Misurata midecal[1], a member at faculty of science Misurata universit[2/3], a member at faculty of Environmental and Natural recourse of Misurata universit[4].

Abstract

Overt hypothyroidism (OH) has been found to be a pathogenic relationship with dyslipidaemia, that is leading to risk CVD. The current study aimed to investigating the Relationship, thyroid hormone with lipid profile and lipid ratios in overt hypothyroidism patients in Misurata.

The data for the present case - control study was carried out on 115 (83 patients diagnosed OH and 32 control), aged (20 to above 50 years old), who attended the outpatient and inpatient diabetic and endocrine center in Misrata, from 27th December, 2017 to 21th March 2018. Their blood was collected for determination of Free Tri-iodothyronine (FT3), Free Tetra- iodothroxine (FT4) and Thyroid Stimulating Hormone (TSH) by using) Elecsys 2010 autoanalyser), whereas the lipid profile Total Cholesterol (TC), Triglyceride (TG), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL) using (I Lab 300 plus) Clinical Chemistry System, and lipid ratios (TG / HDL, TC / HDL and LDL / HDL),Very Low Density Lipoprotein (VLDL) (Formulas Fried Ewald). The association was analyzed using SPSS version 19.0 and was expressed as Person correlation coefficient, with ($P \leq 0.05$).

The result emphasized a major positive correlation among level TSH with TC and HDL levels at ($P \leq 0.05$) and level FT4 with TG / HDL at ($P \leq 0.05$), At the same time, there was a noteworthy negative correlation among level FT3 with TC, HDL levels at ($P \leq 0.05$). Moreover, the level FT4 also indicated a crucial negative correlation with TC, HDL and LDL levels at ($P \leq 0.05$) other parameters did not illustrate any statistically significant correlation in patients.

Conclusion There was a relationship among TST, FT3 and FT4 with some lipid profile and lipid ratios. Any alteration of TH causes changes in lipids, as well as lipid ratios is better indicators of dyslipidemia and risk of CVD in OH.

Received 2024/01 /03,
Accepted 2024/01 /10,
Available online /01 2024/01

Introduction:

There was relationship among TSH, FT3, and FT4 with some lipid profile and lipid ratios. Any alteration of TH causes changes in lipids, as well as lipid ratios is better indicators of dyslipidemia and risk of CVD in OH. It is associated with adverse effect on protein, carbohydrate and lipid metabolism. Hypothyroidism can be divided into Subclinical and Overt **(Masullo et al, 2018 & Manuchehri, 2008).**

OH, it is also known as clinical or primary hypothyroidism **(Shashi& Sharma, 2012)**. Is characterized by increased serum TSH levels, despite increased fT4 and fT3 levels, and also elevated in serum both of TC, TG, LDL and VLDL levels concentration and decreased in serum of HDL level concentration **(Duntas, 2002)**. In addition to increase serum TH levels, is associated with reduced metabolism, reduced lipolysis, increased weight gain, reduced TC clearance, and elevated TC. It is known that TH has genomic and non-genomic effects **(Hammes & Davis, 2015)**. It can also be resulting from Subclinical Hypothyroidism (SCH) in many patients **(Aryal & Joshi, 2014)**.

Materials and Method

Control study was carried out in 32 of them were euthyroid control among of them (16 males and 16 females) and 83 patients were suffering only from OH for sexes (32 males and 51 females), who attended the outpatient (hospital center Misurata department of internal medicine, Al Salam and Al Hesan clinic) and inpatient of diabetic and endocrine center in Misurata. From 27th December, 2017 to 21st March 2018, with the age of (20 to above 50 years).

About 10 ml of venous blood sample were collected between (8.00 -10.00 Am) after fasting of 12 - 14 hour by venipuncture from patients and controls, local antiseptic used to clean the arm vein, using a 10 ml disposable syringe and put it in plain tube (without anticoagulation), the blood was allowable to clot in plain tube an hour time at room temperature. The serum was separated from whole blood for all samples by centrifuged at about 3000 revolution for 5 to 10 minutes **(Yousif, 2001; Abd AL- fatah, 2008)**, then serum was separated into two tubes for estimation of TC, TG, HDL-C, LDL, other the tube of TSH, FT3 and FT4. Serum VLDL is calculated using of the formulation, VLDL = TG / 5 by applying equation lipid ratios (TC/HDL, TG/HDL and LDL /HDL) Calculated using the following formulas: Atherogenic index (AI)= Log (TG / HDL), Castellis Risk index - 1 (CRI-1) = (TC / HDL), Castellis Risk index - 2 (CRI-2) = (LDL / HDL) **(Friedewald et al, 1972)**.

Statistical analysis the data collected ware analyzed by using the computer facility of the available statistical software packages of Statistical Package for Social Sciences (SPSS), version 19 was employed for statistical analysis. Bivariate correlations were performed using the Pearson correlation coefficients test *(r)* were intended to count the relationship between thyroid hormones with lipid profile and lipid ratio, All *P*- values were two – sided, and (p - value ≤ 0.01 and ≤ 0.05) was seen to be statistically significant.

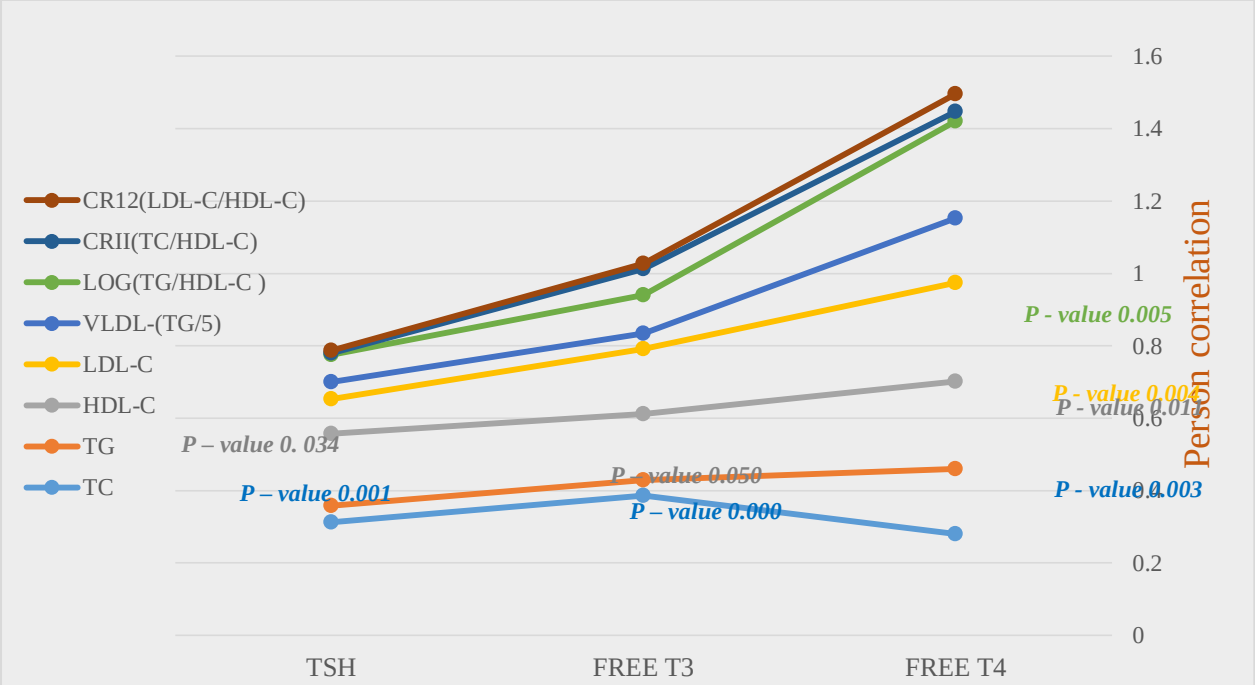
RESULTS and DISCUSSION

The result shown in **Table 1** and **Figure 1,** observed that moderate significant positive correlation among levels of serum TSH with level TC at (P = 0.001). and level HDL at (P = 0.034). While moderate negative significant correlation level FT3 with level TC at (P = 0.001). The levels of serum FT4 showed moderate significant negative correlation with level TC at (P = 0.003) and HDL - C at (P = 0.011). and but level LDL at (P = 0.004). Moreover, a moderately significant positive correlation with TG / HDL at (P = 0.005).

Table (1): The Pearson correlation of Thyroid Hormones with Lipid profile and Lipid ratios in patients * Correlation is significant at the 0.05 level (2- tailed).** Correlation is significant at the 0.01 level (2-tailed).

Parameters		TSH (0.27 - 4.2)	Free T3 (3.1 -6.8)	Free T4 (12 -22)
TC (140-220)	Pearson Correlation	.312**	-.386-**	-.281-**
	Sig. (2-tailed)	.001	.000	.003
	N	115	115	109
TG (Up t0 200)	Pearson Correlation	.047	-.043-	.179
	Sig. (2-tailed)	.622	.651	.064
	N	114	114	108
HDL - C (30-75)	Pearson Correlation	.198*	-.183-*	-.241-*
	Sig. (2-tailed)	.034	.050	.011
	N	115	115	109
LDL - C (Recommend values < 130) Low risk (130-159) High risk (> 160)	Pearson Correlation	.096	-.179-	-.273-**
	Sig. (2-tailed)	.310	.058	.004
	N	113	113	108
VLDL - C (TG / 5)	Pearson Correlation	.047	-.043-	.179
	Sig. (2-tailed)	.622	.651	.064
	N	114	114	108
Log (TG / HDL - C)	Pearson Correlation	-.075-	.106	.268**
	Sig. (2-tailed)	.429	.260	.005

	N	114	114	108
CRI1 (TC / HDL - C)	Pearson Correlation	-.005-	-.072-	.026
	Sig. (2-tailed)	.955	.441	.792
	N	115	115	109
CRI2 (LDL-C/HDL-C)	Pearson Correlation	-.007-	-.016-	-.049-
	Sig. (2-tailed)	.943	.867	.611
	N	113	113	108



Figur (1): The Pearson correlation of Thyroid Hormones with Lipid profile and Lipid ratios in patients * Correlation is significant at the 0.05 level (2- tailed). ** Correlation is significant at the 0.01 level (2-tailed).

In this study, a significant positive correlation among TSH and TC was revealed, supporting the data reported by **(Khan et al, 2013; Adlat et al, 2016; Sangeeta et al, 2016)**, who they found maintain significant positive correlation among TSH and lipids such as TC ana LDL in hypothyroidism, while study done by **(Malik et al, 2018)** in 64 patients with OH, but differed with other studies **(Dipankar et al, 2012).** Negative and insignificant correlation was observed among TSH and TC in hypothyroidism, whereas **(Khalife et al, 2017)** in female hypothyroidism, as well as in this study also significant positive correlation among TSH and HDL. A recent study by **(Regmi et al, 2010)** in OH **(Kavitha et al, 2016)** in hypothyroidism,

supported the findings of the present study, whereas findings of studies **(Amer & Haridas, 2017)** negative and insignificant correlation was observed among TSH and HDL in 100 patients with OH **(Dipankar et al, 2012)** in hypothyroidism, do not support this study.

On the other hand, in present study significant negative correlation was observed among FT3 with TC this agrees with the studies **(Mahajan & Singh, 2011; Huang et al, 2019)**, however unlike the findings **(Saini et al, 2012)** positive and insignificant correlation in OH patients.

A significant negative correlation was observed among FT4 and TC these findings are consistent with **(Saini et al, 2012; Khan et al, 2013)** but differed with **(Mahajan & Singh, 2011; Adlat et al, 2016)**, significant negative correlation FT4 with HDL was similar to a study done by **(Saini et al, 2012).** In Pearson correlation test table (1) shows that there were significant negative correlation FT4 and LDL. The same work result has been described by **(Khan et al, 2013)**, but disagreed with **(Saini et al, 2012)**. The recent study that of FT4 and TG/ HDL showed a positive and significant correlation, and it did not show any statistically significant correlation among thyroid hormones and these parameters in patients.

CONCLUSION

In OH was associated with abnormalities in the serum TSH, FT3, FT4, TG, VLDL levels and lipid ratios TC / HDL and TG / HDL, so any alteration of TH causes changes in some lipid profile and some lipid ratios. Hence, finally dyslipidemia may be leading to development of CVD atherosclerosis. It could be simply an account the lipid ratios especially (TC / HDL, TG / HDL and LDL/HDL) from lipid profile are better indicators of dyslipidemia and risk of CVD in OH.

References

Abd AL- Fatah, H. S. (2008). Effect of thyroid gland dysfunction on serum leptin and lipid profile in women. *(Master dissertation, University of Baghdad)*, 1-97.

Adlat, S. A., Shamsan, B., & Al-Eryani, E. (2016). Lipoprotein (a), Lipid Profile and Mean Platelet Volume in Hypothyroid Patients in Sana'a, Yemen: A Case-Control Study. *Yemeni Journal for Medical Sciences*, *10*, 6-14.

Amer, H. R., & Haridas, N. (2017). Correlation between Thyroid-Stimulating Hormone and Lipid Profile in female patients of clinical and subclinical hypothyroidism. PARIPEX- Indian *Journal of Research, 6*(9), 1-3.

Dipankar, S. P., Mali, B. Y., Borade, N. G., & Patwardhan, M. H. (2012). Estimation of lipid profile, body fat percentage, body mass index, waist to hip ratio in patients with hypothyroidism and hyperthyroidism. *J Phys Pharm Adv*, *2*(9), 330-336.

Duntas, L., H. (2002). Thyroid disease and lipids. *Journal of the American Thyroid*, *12*(4), 287-293.

Friedewald, W. T., Levy, R. I., & Fredrickson, D. S. (1972). Estimation of the concentration of low-density lipoprotein cholesterol in plasma. without use of the preparative ultracentrifuge. *Journal of Clinical chemistry*, *18*(6), 499-502.

Hammes, S. R., & Davis, P. J. (2015). Overlapping nongenomic and genomic actions of thyroid hormone and steroids. *Journal of Best practice & research Clinical endocrinology & metabolism*, *29*(4), 581-593.

Huang, F., Wu, L., Qiu, Y., Bu, K., Huang, H., & Li, B. (2019). The role of free triiodothyronine in high-density lipoprotein cholesterol metabolism. *Medicine*, *98*(36), 1-5.

Kavitha, M. M., Chandrashekharayya, S. H., Sangappa, V., Kashinakunti, M. R., & Gurupadappa, K. (2016). A study to assess the relation between severity of hypothyroidism and Lipid parameters. *International Journal of Clinical Biochemistry and Research*, *3*(1), ISSN 2394-6369, 23-27.

Khalife, H., Khalife, H., Farhat, S., Khalife, H., & Abdel-Sater, F. (2017). A retrospective Study in Lebanon. Thyroid – Stimulating hormone and its Possible association with serum lipids. *World Journal of pharmacy and pharmaceutical Sciences*, *6*(11), 81-92.

Khan, M. A. H., Majumder, I., Hoque, M., Fariduddin, M., Mollah, F. H., & Arslan, M. I. (2013). Lipid profile in hypothyroid patients: a cross sectional study. *Journal of Medicine today*, *25*(1), 21-24.

Mahajan, R. D., & Singh, R. (2011). Thyroid dysfunction and total cholesterol-experience in a tertiary care hospital. *Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2*(2), 268-273.

Malik, A., Zaman, A., Izhar, K., & Iqbal, Y. (2018). Correlation of Thyroid Stimulating Hormone with Homocysteine and Lipid Profile in Hypothyroidism. *Journal of Liaquat University of Medical & Health Sciences*, *17*(03), 147-151.

Masullo, L. F., Magalhaes, R. A., Lemes, R. P. G., de Almeida Filho, T. P., de Castro, M. F., Maia Filho, P. A., Cunha, T. O. V., Quidute, A. R. P., Fontenele, E. G. P., Sun, G., & Martins, M. R. A. (2018). Levothyroxine Replacement Improves Oxidative Status in Primary Hypothyroidism. *Journal of frontiers in Endocrinology*, *9*(655), 1-5.

Saini, V., Yadav, M. A., Arora, S., Singh, R., & Bhattacharjee, J. (2012). Association between different degrees of hypothyroidism and serum lipids. *Internet Journal of Medical Update-EJOURNAL*, *7*(2), 3-8.

Sangeeta, N., Singh, Y. A., Devi, O. P., Singh, R. R., Chubalemla, L., Abhishek, D., Basar, G., Ibrahunlang, R., Devi, N. O., & Singh, M. A. (2016). Lipid Profile in Thyroid Dysfunction Patients. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), 15*(12), 39-43.

Shashi, A., & Sharma, N. (2012). Lipid profile abnormalities in hypothyroidism. *International Journal of Science and Nature*, *3*(2), 354-60.

Yousif, B. M. (2001). *Determination of some Trace Elements in Serum of Hyperthyroidism and Hypothyroidism patients.* (Doctoral dissertation, University of Khartoum), 1-95.