

● INTRODUCTION

Hypothyroidism is a systemic hypometabolic syndrome caused by decreased thyroid hormone synthesis and secretion or inadequate biological effects. Hypothyroidism without standard treatment will lead to hypertension, hyperlipidemia, infertility, cognitive impairment and mental disorders, and even serious complications such as heart failure and myxoid edema coma. The severity of clinical symptoms of hypothyroidism depends on the timing and extent of untreated hypothyroidism [1], and early treatment of hypothyroidism is essential for patient health and better disease prognosis. Levothyroxine(L-T4) is the first choice for hypothyroidism. However, the bioavailability of levothyroxine in vivo varies with the age, weight, diet, drug combinations and complications of patients. A number of studies have found that in the process of hypothyroidism treatment, there is a high proportion of L-T4 dosage insufficient and excessive replacement. Only 43%-62.8% of the patients are properly treated, and nearly half of the patients are substandard. [2-5]. Overuse of L-T4 or underuse of L-T4 will lead to persistent adverse effects of hypothyroidism and hyperthyroidism in patients. Scientific and reasonable calculation of L-T4 dose will help patients to control hypothyroidism symptoms in time.

● OBJECTIVE

To study the influencing factors of L-T4 dose in patients with hypothyroidism in real world and establish a predictive model of the daily dose of L-T4.

● METHODS

A cross-sectional survey was conducted, screening for patients with hypothyroidism randomly. The patient's basic information, such as age,gender,weight,Body mass index(BMI),the history of female menopause,causes and duration of hypothyroidism,and serum concentration of thyroid hormones and related antibodies were causal variables; the daily dose of L-T4 was used as outcome variable. We studied the key factors that may influence the outcome variables, and used the multiple linear regression techniques to establish a patient L-T4 doseprediction model.

● RESULTS

Factors that may affect L-T4 dose in patients include age(P<0.001),hypothyroidism duration (P=0.001),causes of hypothyroidism(P=0.036), serum free triiodothyronine(FT3) concentration(P<0.001) and serum free thyroxine(FT4) concentration(P<0.001). After using the stepwise method for variable screening, the L-T4 dose predictive model for hypothyroidism patients was: the daily dose of L-T4=63.98-0.43*age+0.76*hypothyroidism duration+4.68*causes of hypothyroidis-9.85*serum FT3 concentration+3.39*serum FT4 concentration, R=0.557,R-Square=0.310,Adjusted R-Square=0.261(Table 1). The predicted residual is distributed within 2 standard deviations.



Table 1.Results of multiple linear regression analysis

Variables	Unstandardized Coefficients		Standardized Coefficients	t	P
	Beta	SE	Beta		
Constant	63.977	11.700	-	5.468	0.000
Age	-0.425	0.119	-0.239	-3.581	0.000
Hypothyroidism duration	0.762	0.216	0.229	3.523	0.001
Causes of hypothyroidis	4.683	2.215	0.132	2.115	0.036
Serum FT3 concentration	-9.845	2.169	-0.304	-4.540	0.000
Serum FT4 concentration	3.386	0.636	0.362	5.327	0.000

● CONCLUSIONS

Record the patient's age, the cause and duration of hypothyroidism, and measure the serum FT3 and FT4 concentrations to help predict the daily dose of L-T4 in patients with hypothyroidism in the real world; the established L-T4 dose prediction model has certain predictive performance, which can provide reference for optimal oral dose of L-T4 in hypothyroidism patients.

References:[1]Cooper D S, Biondi B. Subclinical thyroid disease[J]. Lancet,2012,379(9821):1142-1154.[2]Vaisman F, Coeli C M, Ward L S, et al. How good is the levothyroxine replacement in primary hypothyroidism patients in Brazil? Data of a multicentre study[J]. J Endocrinol Invest,2013,36(7):485-488.[3]Tan N C, Chew R Q, Koh Y L, et al. Primary hypothyroidism in the community: Lower daily dosages of levothyroxine replacement therapy for Asian patients[J]. Medicine (Baltimore),2017,96(7):e6145.[4]Okosieme O E, Belludi G, Spittle K, et al. Adequacy of thyroid hormone replacement in a general population[J]. QJM, 2011,104(5):395-401. [5]Somwaru L L, Arnold A M, Joshi N, et al. High frequency of and factors associated with thyroid hormone over-replacement and under-replacement in men and women aged 65 and over[J]. J Clin Endocrinol Metab, 2009,94(4):1342-1345.