



Original Article

Prevalence of Hypothyroidism in Esrd Patients with Maintenance Hemodialysis

Haseeb Jameel Memon¹, Bhagwan Das^{2*}, Asma Naveed³, Rafia Memon¹, Sughand Memon⁴, Santosh Kumar⁵¹ Liaquat University Hospital, Hyderabad, Pakistan² Department of Nephrology, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan³ Department of Nephrology, Bahria University of Medicine and Dental College (BUMMDC), Pakistan⁴ Department of Critical Care Medicine, Ziauddin University Hospital, Karachi, Pakistan⁵ Department of Nephrology, Jinnah Sindh Medical University, Karachi, Pakistan

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*Corresponding Author:

Bhagwan Das
 Department of Nephrology, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan
dr_jairamani@hotmail.com

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ABSTRACT

The kidney affects "the thyroid gland causing various derangements in its function whenever the kidney is impaired, even with a minor imperfection in its job, and this makes dialysis patients more prone to thyroid disorders with subsequent increase in mortality and morbidity.

Objective: To determine the frequency of hypothyroidism in ESRD patients who are on maintenance hemodialysis. **Methods:** A descriptive cross-sectional study was conducted at Department of Nephrology, Liaquat University of Medical and Health Sciences Jamshoro, upon a sample of 140 patients having age between 18 to 70 years presented with end stage renal disease with 3 months or more of maintenance hemodialysis were consecutively enrolled. Investigations was advised for TSH levels, T3, T4. The presence of hypothyroidism along with baseline and clinical characteristics were noted. **Results:** Of 140 patients, the mean age of the sample was 62.31± 9.78 years. Majority of the sample were males as compared to females, i.e., 93 (66.4%) and 47 (33.6%). History of thyroid disorder was observed in 83 (59.3%) patients. Comorbidity showed that type 2 diabetes mellitus was observed in 65(46.4%) and hypertension in 77(55%) patients. The mean TSH, T3 and T4 level was found to be 4.67± 0.20, 0.97± 0.37, and 5.33± 0.69 respectively. Frequency of hypothyroidism was found to be 53 (37.9%) patients. **Conclusion:** A considerably higher number of patients were presented with hypothyroidism in "ESRD patients who are on maintenance hemodialysis.

INTRODUCTION

Chronic kidney disease is an increasing disease of all age groups causing irreversible loss of kidney function [1]. It is divided into five stages on the basis of glomerular filtration rate. Stage V disease has glomerular filtration rate less than 15ml/min/1.73m, also called as End Stage Renal Disease (ESRD) [2]. The patients of chronic kidney disease stage 5 cannot sustain their life without renal replacement therapy either in the form of dialysis or renal transplant [3, 4]. A larger number of chronic kidney disease patients have high prevalence of unrecognized endocrine complication of thyroid dysfunction. Hypothyroidism is common in progressively deranged renal function in some large

population based studies [5]. The 3rd National Health and Nutrition Examination survey that includes data from 14,623 participants shows prevalence of hypothyroidism was 5.4%, 10.9%, 20.4%, 23.0%, and 23.1% among those with estimated glomerular filtration rates (eGFRs) of ≥90, 60-89, 45-59, 30-44, and <30ml/min/1.73m², respectively [5]. Primary hypothyroidism is common in CKD patients as the metabolism of thyroid hormones is disturbed due to effect on pituitary-thyroid axis [6]. The symptoms of chronic kidney disease (CKD) and hypothyroidism overlap in many aspects, making it difficult to recognize primary hypothyroidism in ESRD [7]. There is a high prevalence of

thyroid dysfunction in patients of advanced chronic kidney disease including those who are receiving dialysis [8]. Reduced levels of thyroid hormones i.e. Total and free serum thyrotropin are associated in patients on maintenance hemodialysis [9]. The derangements in thyroid function tests may be associated with cardiovascular morbidity and mortality in CKD and ESRD patients as shown in various data [10]. The presence of Hypothyroidism is associated with an increased risk of mortality from cardiovascular causes in the dialysis population. The study was conducted with an aim to determine the frequency hypothyroidism in the local hemodialysis population as local data on this topic was not available.

METHODS

Upon a sample of 140 patients (chosen via non-probability consecutive sampling). Patient having both gender and age between 18 to 70 years presented with end stage renal disease with 3 months or more of maintenance hemodialysis were recruited for the research after taking informed written consent. Investigations were advised for TSH levels, T3, T4. The presence of hypothyroidism along with baseline and clinical characteristics were noted. Descriptive statistics were analyzed by SPSS version 21

RESULTS

Of 140 patients, the mean age of the patients was 62.31±9.78 years. Most of the patients were males as compared to females, i.e., 93 (66.4%) and 47 (33.6%). Urban residence was observed in 62 (44.3%) patients while rural residence in 78 (55.7%). The mean height, weight, and BMI of the patients was found to be 1.55±0.06, 60.53±5.13 kg, 26.74±5.19 kg/m² respectively. There were 71 (50.7%) patients with >25 kg/m² BMI and 69 (49.3%) with ≤25 kg/m² BMI. The mean duration of ESRD was 5.92±1.39 months. There were 92 (65.7%) patients with ≤6 months duration of ESRD and 48 (34.3%) with >6 months duration of ESRD. The mean duration of hemodialysis was 4.41±1.99 months. There were 82 (58.6%) patients with ≤4 months duration of hemodialysis and 58 (41.4%) with >4 months duration of hemodialysis. History of thyroid disorder was observed in 83 (59.3%) patients. The mean TSH, T3 and T4 level was found to be 4.67±0.20, 0.97±0.37, and 5.33±0.69 respectively. Frequency of hypothyroidism was found to be 53 (37.9%) patients. A significant association of hypothyroidism was observed with duration of ESRD (p-value <0.001) and hypertension whereas age (p-value 0.695), gender (p-value 0.415), BMI (p-value 0.696), residence (p-value 0.853), duration of hemodialysis (p-value 0.988), history of thyroid disorder (p-value 0.360), and type 2 diabetes mellitus (p-value .627) were found to be insignificant.

| Duration Of Esrd (in Months) | Hypothyroidism | | Total | p-value |
|------------------------------|----------------|-----------|-----------|---------|
| | Present | Absent | | |
| ≤6 | 23 (25.0) | 69 (75.0) | 92 (100) | <0.001 |
| >6 | 30 (62.5) | 18 (37.5) | 48 (100) | |
| Total | 53 (37.9) | 87 (62.1) | 140 (100) | |

Table 1: Comparison of Hypothyroidism with Age of the Patients

DISCUSSION

A large number of chronic kidney disease patients have high prevalence of unrecognized endocrine complication of thyroid dysfunction [11]. Hypothyroidism is common in progressively deranged renal function in some large population based studies [12]. The 3rd National Health and Nutrition Examination survey that includes data from 14,623 participants shows prevalence of hypothyroidism was 5.4%, 10.9%, 20.4%, 23.0%, and 23.1% among those with eGFRs of ≥90, 60-89, 45-59, 30-44, and <30 ml/min/1.73m², respectively [13]. Primary hypothyroidism is common in CKD patients as the metabolism of thyroid hormones is disturbed due to effect on pituitary-thyroid axis [14]. The symptoms of CKD and hypothyroidism overlap in many aspects, making it difficult to recognize primary hypothyroidism in ESRD [15,16]. There is a high prevalence of thyroid dysfunction in patients of advanced chronic kidney disease including those who are receiving dialysis [17]. Reduced levels of thyroid hormones i.e., Total and free serum thyrotropin are associated in patients on maintenance hemodialysis [18]. The derangements in thyroid function tests may be associated with cardiovascular morbidity and mortality in CKD and ESRD patients as shown in various data [19]. According to the current study findings, the frequency of hypothyroidism was found to be 37.9% patients. Somewhat similar frequency was observed in a previous study as well. 5 Similarly, in Shantha et al., study, "in 137 hemodialysis patients tested for TSH and FT4, SCH prevalence was 24.8% [20]. Nevertheless, all agreed that dialysis patients had a high prevalence of hypothyroidism, and even confirmed in a larger-scale study of 8840 hemodialysis patients based on baseline TSH, they observed that 22% of them had hypothyroidism, but they did not test FT4, so they had no results about overt and subclinical hypothyroidism [21]. Thus, one can conclude that the prevalence of hypothyroidism defined as high TSH is similar in different population but varies in terms of its category (SCH and overt hypothyroidism). An important point to consider in this regard is that studies had different definitions for hypothyroidism, and this arises from the arguments about the accepted TSH level in dialysis, as some authors propose that levels between 5 and 20 IU/ml are considered normal in dialysis patients and so no treatment is required, though in studies that assessed mortality found that TSH even in high

normal range (3–5 μ IU/ml) was associated with a higher risk of mortality[22]. Limitation of this study is that it was a cross-sectional study; therefore, cause-effect relationships cannot be assessed. Moreover, we did not estimate the prevalence of low FT4 and FT3 since it was, especially low FT3, associated with mortality and worse prognosis. Furthermore, anti-thyroid antibodies were not tested in our study, which may help to find the etiology whether a primary thyroid abnormality or due to renal impairment. Finally, we did not have a comparison group of healthy controls to study the differences between them, but we compared with other studies in our population and different ones.

CONCLUSION

A considerably higher number of patients were presented with hypothyroidism in ESRD patients who are on maintenance hemodialysis”.

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