HYPOTHYROIDISM

Microalbumiuria in Hypothyroidism: A Case Control Study

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ABSTRACT

Background: **Hypothyroidism is a disorder that affects multiple organ systems and its presentation is diverse. Recent research has shown that hypothyroidism is also independently associated with microalbuminuria.**

Objective: **We prospectively conducted this study to see the association of hypothyroidism with microalbuminuria.**

Materials and Methods: **This study was a single-center, prospective case-control study conducted on 100 cases. Age and gender-matched controls were enrolled simultaneously. Various demographic and biochemical parameters were recorded including age, sex, BMI, HB, serum Urea, serum creatinine, thyroid functions and blood sugar, in both cases and controls. Spot Urine samples were collected from all the subjects of study population to detect UACR.**

Results: **The mean age of the cases and controls in the study population was 36.85 ± 12.67 years and 39.46 ± 15.30 years respectively. The mean BMI of the cases and controls in the study population was 23.66 ± 3.04 and 22.68 ± 2.06. 76% of cases were women and amongst control population 53% were women. The odd's ratio for having microalbuminuria in the hypothyroid population was 4.68 as compared to controls with p-value < 0.001.**

Conclusion: **Hypothyroidism is associated with an increased risk of microalbuminuria.**

KEY WORDS

hypothyroidism, endothelial dysfunction, microalbuminuria

INTRODUCTION

Hypothyroidism is a common disorder affecting individuals worldwide. Thyroid hormones are essential for growth, neuronal development, reproduction and regulation of energy metabolism in humans[1,2)]. Hypothyroidism is a disorder that affects multiple organ systems and its presentation is varied and manifest. Several studies have indicated that thyroid hormones are required for renal growth, maintenance of normal physiology and functions thus alteration of thyroid hormones levels will result in renal dysfunction[3-6)]. Hypothyroidism is associated with increased transcapillary leaking of plasma proteins such as albumin, leading to mild proteinuria, microalbuminuria and generalized edema in these patients[7-9)]. Microalbuminuria is itself associated with endothelial dysfunction and increased risk for cardiovascular morbidity and mortality in high risk populations[10,11)]. Therefore, we conducted this study to prospectively determine the relationship between hypothyroidism and microalbuminuria.

Table 1: Demographic and biochemical profile of subjects

Parameter	Cases(n = 100)
Gender (women/men)	76/24
Age (years)	36.85 ± 12.67
BMI (kg/m^2)	23.66 ± 3.04
TSH(μIu/ml)	16.35 ± 26.19
Microalbuminuria(%)	39
Overt hypothyroidism (%)	38
Subclinical hypothyroidism(%)	62

Values are presented as mean ± SD, numbers (%)

TSH, thyroid stimulating hormone; BMI, bodymass index;

Table 2: Comparison between cases and control subjects

Parameter	Cases (n = 100)	Controls (n = 100)	p-value
Age (years)	36.85 ± 12.67	39.46 ± 15.30	0.55
Gender (women/men)	76/24	53/47	0.01#
BMI (kg/m^2)	23.66 ± 3.04	22.68 ± 2.06	0.11
Microalbuminuria (%)	39	12	0.001#
UACR(mg/gm)	104.20 ± 121.93	33.40 ± 53.37	0.05#

Values are presented as mean ± SD, numbers(%)

UACR, urinary albumin creatinine ratio;BMI, bodymass index;

#p-value significant if < 0.05

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MATERIALS AND METHODS

Selection of study population; Patients with overt and subclinical hypothyroidism were enrolled. Those with diabetes mellitus, hypertension, renal dysfunction, pregnancy, malignancy, recent urinary tract infection, those having heavy exercise on the day before testing for microalbuminuria, not willing to participate in study and those on thyroxine replacement therapy were excluded from study. After receiving ethical clearance from institutional ethical committee, a total of 100 patients with a diagnosis of treatment-naive primary subclinical or overt hypothyroidism presenting to the endocrinology OPD were prospectively enrolled in this study. Age and gender-matched healthy controls were enrolled for comparison of prevalence of microalbuminuria. Informed consent was obtained from all the subjects prior to enrolment in the study. All the participants were subjected to detailed history and physical examination and demographic and biochemical parameters were recorded including age, sex, BMI, HB, serum Urea, serum creatinine and blood sugar and thyroid functions tests in both cases and controls.

Laboratory evaluation; serum TSH (thyroid stimulating hormone) levels and serum T3 and T4 values were obtained using chemiluminescence assay performed in the hospital laboratory. A patient with a serum TSH between 5 to 10 microIU/mL and normal T3/T4 levels was labeled as having primary subclinical hypothyroidism[12,13]. A patient with a serum TSH more than 10 microIU/mL and reduced T3/T4 levels was labeled as having overt hypothyroidism[14]. Microalbuminuria was defined as urinary albumin excretion in the range of 30-299 mg/g of creatinine[9]. UACR (urine albumin creatinine ratio) were measured in spot urine using a urinary dipstick provided in micro albumin kit test using tetrabromophenol blue reagent method.

RESULTS

The mean age of the cases and controls in the study population was 36.85 ± 12.67 years and 39.46 ± 15.30 years respectively. The mean BMI of the cases and controls in the study population was 23.66 ± 3.04 and 22.68 ± 2.06. 76% of cases were women and while there were only 53% of women in control group. Out of 100 cases 62% had subclinical hypothyroidism and 38% were overtly hypothyroid. 39% of cases population and 12% of controls had microalbuminuria. Microalbuminuria was seen in 20 patients with overt hypothyroidism and 19 patients with subclinical hypothyroidism. The odd's ratio for having microalbuminuria in the hypothyroid population was 4.68 as compared to controls with p-value < 0.05. Mean ± SD TSH in case population was 16.35 ± 26.19 and Mean ± SD UACR in cases and controls was 104.20 ± 121.93, 33.40 ± 53.37 respectively. (Table 1 and 2).

DISCUSSION

Hypo functioning of thyroid gland affects almost all organs of body. Not only overt but subclinical hypothyroidism also had varied systemic affects. Thyroid hormones have been shown to influence renal development and physiology in many studies[2-5]. Many authors have described that edema in hypothyroidism is not only because of accumulation of glycosaminoglycans but also results from extravasation of albumin and other proteins[3-7]. In fact some studies have shown reversibility of acute kidney injury after treatment with levothyroxine in patients with hypothyroidism[3,4]. Recent studies have shown that hypothyroidism is also independently associated with microalbuminuria[8,10].

In our study, out of 100 cases population 62% had subclinical and 38% patient's overt hypothyroidism and the point prevalence of microalbuminuria was 39%. Inconsistent prevalence of microalbuminuria has been observed in different studies[8,14].

In this study 12% of control and 39% of hypothyroid population had microalbuminuria. The odd's ratio for having microalbuminuria in hypothyroid patients was 4.68 which was statistically significant. Sridhar an *et al*. and Chang *et al*. has also shown higher odds ratio of having proteinuria in hypothyroid patients[14,15]. Aljabri KS *et al*. has described that hypothyroidism was independently associated with higher likelihood of microalbuminuria in type 2 diabetes mellitus patients[16]. El-Eshmawy MM *et al*. in their study has elucidated that subclinical hypothyroidism in prediabetic population was associated with microalbuminuria independent of confounding variables[8].

Ours was a case control study, which is strength of our study and there are only few case control studies on this subject in world literature. But our study has few limitations. First, simple size was small and follow-up thyroid function tests were not done which are needed to confirm the association between the clinical course of hypothyroidism and microalbuminura. Second, only a single spot urine sample was tested for detecting microalbuminuria.

In future, further studies can be conducted with a larger sample size to demonstrate the possible pathogenesis of this association that would help in further substantiating association of hypothyroidism and microalbuminuria. This would further help in establishing newer recommendations for the treatment of subclinical and overt hypothyroidism.

CONCLUSION

This study demonstrated that hypothyroidism was significantly associated with an increased risk of microalbuminuria and thus could be associated with an increased risk of adverse cardiovascular outcomes.

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