

Frequency of Hyperthyroidism in Hypokalemic Periodic Paralysis

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ABSTRACT

Objective: To determine the frequency of hyperthyroidism in hypokalemic periodic paralysis

Study Type: Cross-sectional study

Place and Duration of Study: Department of Neurology, Chandka Medical College Hospital, Larkana from 1st January 2016 to 30th June 2016.

Methodology: Eighty four patients with hypokalemic periodic paralysis of both sexes aged 18 to 60 years enrolled. Later on, the blood sample was collected and sends to LINAR Hospital for measurement of serum TSH, FT₃ and FT₄. The hormone assays was analyzed by chemiluminescence assay using ADVIA Centuar manufactured by SIEMENS NewYork.

Results: The mean age was 40.24±9.96 years, 49 (58.3%) were males and 35 (41.7%) were females, 57 (67.9%) has duration of illness was >7 days and 27 (32.1%) had duration of illness >7 days. Mean TSH was 0.48±0.25, mean FT₃ was 198.17±19.38 and mean FT₄ was 19.43±6.65. The frequency of hyperthyroidism in hypokalemic periodic paralysis was 29 (34.5%) cases.

Conclusions: The frequency of hyperthyroidism in hypokalemic periodic paralysis was 34.5%.

Keywords: Hypokalemia, Periodic paralysis, Hyperthyroidism

INTRODUCTION

Hyperthyroidism is a set of disorders that involve excess synthesis and secretion of thyroid hormones by the thyroid gland. The resulting elevation in levels of FT₄, free tri-iodothyronine (FT₃) or both leads to the hypermetabolic condition of thyrotoxicosis. The heterogeneous group of muscle diseases known as periodic paralyses (PP) is characterized by episodes of flaccid muscle weakness occurring at irregular intervals. Muscle weakness happened due to hypokalemia could be life threatening complication that can be treated with medication. This type of muscle paralysis can result from potassium ion loss due to certain drugs or acid base disturbance.¹ Periodic paralysis was first described in 1875 by Hartwig.²

In Western countries, most cases of hypokalemic paralysis are due to familial hypokalemic periodic paralysis.³ However, in Hong Kong, where 97% of the populations are Chinese, the commonest cause is thyrotoxic periodic paralysis (TPP).⁴ Now, TPP is widely spread around the globe due to immigration and globalization.⁵⁻⁸ Association between thyrotoxicosis and periodic paralysis was first reported by Rosenfeld in 1902.⁹ Thyrotoxic periodic paralysis has identified in various regions of the world.^{10,11}

Mechanism of TPP involves increased activity of Na⁺-K⁺ ATPase which is directly and indirectly induced by thyroid hormone and hyperadrenergic action, respectively.^{12,13} Hypokalemic periodic paralysis (HPP) represents an endocrine emergency that can result in respiratory insufficiency, cardiac arrhythmias, and death. A study from China on periodic paralysis patients found that 45/56 patients (80.4%) were thyrotoxic.¹⁴ In other series of studies it has been found that TPP occurs in 13% of male and 0.17% of female thyrotoxic patients.⁴ Tran et al¹⁵ have found that in Japan incidence of TPP is 4.3% among male and 0.04% among female thyrotoxic patients. Forty cases with THPP were identified in the Turkish population.¹⁶ Another study in Thai population found that 11 (32%) patients of hypokalemic periodic paralysis had thyrotoxic period paralysis.¹⁷ A study conducted in Taiwan on symptoms and precipitating factors of TPP found that approximately 15% of the patients showed thyrotoxicosis symptoms.¹⁸ A comparative study of TPP from idiopathic hypokalemic period paralysis from Indian population showed that serum potassium was significantly lower in thyrotoxic period paralysis patients and recovery was faster in HPP while rest of features were almost similar in two groups.¹⁹ In one study from Australia 11 cases of thyrotoxic period paralysis were found in 5 Melbourne Teaching Hospitals.⁶

MATERIALS AND METHODS

This cross-sectional study was conducted at the Department of Neurology, Chandka Medical College Hospital, SMBBMU Larkana from 1st January 2016 to 30th June 2016 and 84 patients were enrolled. All patients with hypokalemic periodic paralysis of both sex aged 18 to 60 years were included. All other causes of hypokalemia i.e. DKA, type 1 and 2 RTA, GI loss i.e. laxative abuse, diarrhea or surreptitious vomiting based on patient's clinical history, drugs i.e. diuretic use and primary aldosteronism, Cushing syndrome were excluded. Later on, the blood sample was collected and sends to LINAR Hospital for measurement of serum TSH, FT₃ and FT₄. The hormone assays were analyzed by chemiluminescence assay using ADVIA Centuar manufactured by SIEMENS New York. Statistical data was analyzed through SPSS 25.0.

RESULTS

In present study, 40 (47.6%) 44 (52.4%) were ≥40 years of age with mean age was 40.24±9.96 years. Forty nine (58.3%) males and 35 (41.7%) females, 57 (67.9%) has duration of illness was >7 days and 27 (32.1%) had duration of illness >7 days. Hyperthyroidism in hypokalemic periodic paralysis was 29 (34.5%) cases (Table 1).

Table 1: Demographic assessment of study participants (n=84)

Variables	No.	%
Age		
<40	40	47.6
≥40	44	52.4
Gender		
Male	49	58.4
Female	35	41.6
Duration of illness (weeks)		
> 1	57	67.8
< 1	27	32.2
Hyperthyroidism in hypokalemic period paralysis		
Yes	29	34.5
No	55	65.5

DISCUSSION

Muscle weakness or paralysis in hypokalemia is a known condition that can be reversed with medications. Various underlying condition leads toward this problem including thyrotoxic paralysis.²⁰ Common symptoms of TPP includes thyrotoxicosis and muscle

paralysis. Now, it is widely spread all over the globe due to immigration and globalization.^{21,22}

The frequency of hyperthyroidism in hypokalemic periodic paralysis was 29 (34.5%) cases. Similarly, 40 cases with THPP were identified in the Turkish population.¹⁶ Another study in Thai population found that 32% patients of HPP was also had TPP.²³ In contrast, a study conducted in Taiwan on symptoms and precipitating factors of TPP found that few patients only represent symptoms of thyrotoxicosis.²⁴

Thyrotoxic periodic paralysis commonly occurs in the age group of ≥ 40 years; the mean age of our patients is also 41.6 years.²⁵ We also found that patients ≥ 40 years of age, the frequency of hyperthyroidism in hypokalemic periodic paralysis was 47.7% compared to 20% cases among patients of age < 40 years ($p=0.007$) and patients with duration of illness ≥ 7 days, the frequency of hyperthyroidism in hypokalemic periodic paralysis was 43.9% compared to 14.8% cases among patients with duration of illness < 7 days ($p=0.007$).

It has been proved that THPP appeared to be higher in men as compared to women.²⁶ In the present study, in male patients, the frequency of hyperthyroidism in hypokalemic periodic paralysis was 46.9% compared to 17.1% cases among female patients ($p=0.004$).

Similar to the findings of our study, in literature HPP could cause lethal complications in higher age males. Timely treatment will prevent further complications including cardiac diseases. Potassium supplements could prove beneficial for early treatment protocols. Best known treatment is thyroidectomy. Potassium level monitoring is highly suggested for the evasion of hyperkalemia.

CONCLUSION

The frequency of hyperthyroidism in hypokalemic periodic paralysis was 34.5% and hyperthyroidism is more prevalent in patients' ≥ 40 years, males and duration of illness ≥ 7 days.

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