

Study of Periodic Paralysis Patients Clinical and Biochemical Profile with Particular Reference to Hypokalemic Periodic Paralysis at DMCH, Laheriasarai, Bihar

Pankaj Mohan Shrivastava¹, U. C. Jha²

¹Assistant Professor, Department of Medicine, Darbhanga Medical College & Hospital (DMCH), Laheriasarai, Bihar

²Associate Professor and Head of Department, Department of Medicine, Darbhanga Medical College & Hospital (DMCH), Laheriasarai, Bihar

Received: 15-10-2022 / Revised: 20-11-2022 / Accepted: 09-12-2022

Corresponding author: Dr U. C. Jha

Conflict of interest: Nil

Abstract

Background: Skeletal muscle weakness that is episodic, hyporeflexic, and transient is a symptom of periodic paralysis. Patients frequently experience periods of weakness in the limb muscles that last a few hours to a few days and are frequently brought on by physical activity, a big meal, or fasting. Hypokalemia, abrupt flaccid paralysis, potentially lethal episodes of muscle weakness, and life-threatening cardiac arrhythmias are the hallmarks of the metabolic myopathy known as hypokalemic periodic paralysis (HPP). However, rapid and early diagnosis of this ailment and start of treatment can result in a superb recovery.

Aim: To study the clinical and biochemical characteristics of those who suffer from hypokalemic periodic paralysis and to find out whether consuming fermented rice is associated with HPP.

Methods: 52 HPP patients overall were chosen for the cross-sectional study design in the 21–60 year age range from the Department of Medicine, Darbhanga Medical College and Hospital, Laherisarai, Bihar from April 2022 to October 2022. The data were analysed using the descriptive study.

Results: 52 patients in total were chosen. The patients were 37.98±9.18 years old on average. The majority of the subjects (n=42, 80.7%) are men who consume fermented rice (bassi) in their diet (n=51, 98%) and who have experienced no precipitating events. The majority of the cases (n=50, 96.2%) showed decreased tone in all four limbs, DTR absence (n=33, 63.46%), a haemoglobin level below 12 g/dL (n=34, 65.4%), low serum potassium levels below 3.5 meq/l (n=42, 80.7%), and sinus bradycardia on the ECG (n=13, 25%).

Conclusion: The study limitations include its limited sample size and lack of a control group. An episodic, transient, and hyporeflexic weakening of the skeletal muscles is known as periodic paralysis. Most individuals had hypokalemia and regularly ingested fermented rice (bassi). Regardless of whether the serum potassium level was low or normal, intravenous potassium should be administered to patients who had acute flaccid progressive motor paralysis since they responded well without showing any signs of residual weakness.

Keywords: Hypokalemic Periodic Paralysis (HPP)

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Different etiologies contribute to the illness known as periodic paralysis, which is characterised by episodic, hyporeflexic, and transient skeletal muscle weakness, either with or without myotonia, and without sensory impairment or unconsciousness [1]. Patients frequently have periods of weakness in the limb muscles that last a few hours to a few days and are frequently brought on by physical activity, a big meal, or fasting [2]. The potassium level can be normal, low, or high during an attack of periodic paralysis, and the values typically do not correlate with the level of weakness [3].

Hyperkalemic periodic paralysis, hypokalemic periodic paralysis, and Andersen-Tawil syndrome are the three most prevalent kinds of periodic paralysis. In skeletal muscle fibres' high-speed tunnels (ion channels), hyperkalemic periodic paralysis and hypokalemic periodic paralysis are brought on by genetic defects [4]. The metabolic myopathy HPP, which is characterised by hypokalemia, abrupt flaccid paralysis, potentially deadly episodes of muscle weakness linked to involvement of the respiratory muscles, and life-threatening cardiac arrhythmias [5] is a heterogeneous set of disorders.

The most common type of familial periodic paralysis is HPP, which has an incidence of 0.4–1:100,000. HPP is inherited as autosomal dominant with lower penetrance in women, giving a male to female ratio of about ~3:18. High carbohydrate diets (like rice), dehydration, and vigorous exercise frequently trigger HPP. Most individuals in Chhattisgarh have poor socioeconomic standing and work as labourers. Many examples of hypokalemic periodic paralysis have been documented recently. The majority of patients who present during the summer, in May or June, are of the labour class or farmers who work primarily

throughout the day in very hot temperatures [9].

Respiratory muscle and possibly fatal cardiac arrhythmias are involved in hypokalemia-induced episodes of muscular weakness. However, rapid and early diagnosis of this ailment and start of treatment can result in a superb recovery. Our study fills a gap in the literature by examining the clinical and biochemical characteristics of hypokalemic periodic paralysis patients as well as the relationship between dietary factors (fermented rice) and the condition.

Material and Methods

From April 2022 to October 2022, the study was carried out at Department of Medicine, Darbhanga Medical College and Hospital, Laheriasarai, Bihar. Patients diagnosed with hypokalemic periodic paralysis who were admitted to the hospital, were of both sexes, between the ages of 21 and 60, and were willing and able to give informed consent (n = 52) were included in our study. The following patients were excluded from our study: those with bladder or bowel involvement, altered level of consciousness, hypokalemia resulting from any other cause (renal, adrenal, thyroid dysfunction; renal tubular acidosis; abuse of diuretics and laxatives), other causes of acute flaccid paralysis (Gullian barre syndrome, GBS), porphyria, and poliomyelitis.

After obtaining informed consent, data were gathered using a pre-established proforma. A thorough history was taken, noting any instances of weakness, thyroid disease, drug use, drug consumption, diarrhoea, vomiting, hypertension, and renal disease. A thorough systemic examination and comprehensive neurological examination were performed, including with measurements of muscular strength, muscle tone, and deep tendon reflexes. All patients had haematological (complete blood count), biochemical

(ILAB650 machine blood urea, serum creatinine, sodium, and potassium), ECG, and radiographic examinations. Using descriptive statistics, the patient's sociodemographic information, clinical profile, and biochemical profile were examined. Frequency (N, %) and mean \pm SD were used to express the descriptive statistics.

Results

The present study was conducted in the Department of Medicine, DMCH, Laheriasarai, Bihar and included 52 patient with Hypokalemic Periodic Paralysis, aged between 21-60 years.

Table 1: Demographic Profile of the study subjects

Demographic factors	Frequency (n=52)	Percentage (n%)
Age group (yrs)		
Mean \pm SD	37.98 \pm 9.18	
Age Range	21-60	
Gender		
Male	42	80.7
Female	10	19.3
Education		
Illiterate	14	26.9
Upto 8 th	35	67.3
Upto 12 th	3	5.7
Dietary Habits (Bassi, Rice)		
Person taking Fermented Rice in diet	51	98
Person not taking Fermented Rice	1	1.9
Frequency of fermented rice intake in a day		
Twice	27	51.9
Thrice	21	40.38
Four Times	4	7.6

The study demographic profile showed that the patients' mean age was 37.98 9.18 years, with a range of 21 to 60 years. Our study also reveals that the majority of the subjects (n=42, 80.7%) are male, educated to the eighth standard (n=35, 67.3%), consume fermented rice (bassi) in their diet (n=51, 98%), and do so twice daily (n=27, 51.9%).

Table 2: Precipitating factors for Hypokalemic Periodic Paralysis

Precipitating factors	Frequency (n=52)	Percentage (n%)
Diarrhea	2	3.8
Exertion	2	3.8
Heavy Meal	9	17
None	39	51

Precipitating factors for Hypokalemic Periodic Paralysis show that the majority of patients (n=39, 51%) had no precipitating event, followed by 9 patients (17%) who had a substantial meal just before this episode, and 2 patients (3.8%) who experienced exercise and diarrhoea.

Table 3: Clinical profile of the study subjects

Clinical Profile of the subjects	Frequency(n=52)	Percentage (n%)
Tone in all limbs		
Decrease in all 4 limbs	50	96.2
Normal in both upper limbs and decrease in both lower limbs	2	3.8
DTR		
Diminished	19	36.5
Absent	33	63.46
Planter Response		
Bilateral Flexor	23	46.15
Bilateral Mute	27	53.84

The majority of the subjects (n=50, 96.2%) had decreased tone in all four limbs, DTR is absent (n=33, 63.46%), and they had bilateral silent planter responses (n=27, 53.84%) followed by bilateral flexor planter responses (n=23, 46.15%), according to the clinical profile of the study participants.

Table 4: Biochemical profile of the study subjects

Biochemical profile of the subject	Frequency (n=52)	Percentage (n%)
Hemoglobin level		
Less than 12 gm%	34	65.4
More than 12 gm%	18	34.6
TLC		
4,000-11,000	40	76.0
>11,000	10	19.6
<4,000	02	3.9
Platelet count		
1.5-4.5 lakh	39	75.0
<1.5 lakh	07	13.5
>4.5 lakh	06	11.5
Serum Urea Level		
15-45mg%	44	83.0
>45mg%	4	7.5
<15mg%	4	7.5
Serum Potassium Level		
3.5-5.5 mg%	10	19.3
<3.5 mg%	42	80.7
>1.5mg%	6	11.3
Serum sodium Level		
135-145meq/L	34	65.38
>145 meq/L	02	3.8
<135 meq/L	16	30.7
ECG changes		
Sinus Bradycardia	13	25.0
ST flattening	05	9.6
QT prolongation	06	11.5
U-wave	11	21.1
Normal	17	32.0

The majority of the study participants had haemoglobin levels below 12 g/dL (n=34, 65.4%), normal TLC (n=40, 76.9%), normal serum urea level (n=44, 83%), normal serum creatinine level (n=46, 88.7%), low serum potassium level <3.5meq/l (n=42, 80.7%), and normal serum sodium level (n=34, 65.38%), according to the biochemical profile of the This table also shows that U-waves (n=11, 21.1%) were more common than sinus bradycardia (n=13, 25%) in the subjects.

Discussion

According to our study, the average age of the patients with hypokalemic periodic paralysis was 37.98 years old, with a range of age between 21 and 60. Our survey also showed that the majority of the subjects were male and had only received a primary education. Studies by Mohapatra *et al.* (2016) [10]. Garg *et al.* (2013) [11]. and Kayal *et al.* (2013) [12]. found similar results and came to the conclusion that men who earn a living were more likely to experience hypokalemic periodic paralysis. According to our study, the majority of patients did not have any precipitating events, but some patients did experience large meals, diarrhoea, and exertion before to this episode.

The majority of the individuals in the studies by Mohapatra *et al.* (2016) [10]. and Garg *et al.* (2013) [11] could not be linked to any triggering variables. They also came to the conclusion that the most frequent triggering factor for such paralytic events was a high carbohydrate diet. The majority of the population in Chhattisgarh worked in the field, lived in rural regions, and consumed fermented rice (bassi) twice daily as part of their usual diet, which may be the main causes of periodic paralysis.

Our study showed that DTR is lacking and that the majority of the individuals had decreased tone in all four limbs. While studies by Garg *et al.* (2013) [11] and Kayal *et al.* (2013) [12] obtained similar results and

concluded that in the majority of patients, the deep tendon reflexes were absent or hypoactive, Mohapatra *et al.* (2016) [10]'s study demonstrated that the Deep tendon reflexes were preserved in the patient with HPP.

According to our study, the majority of the participants had low serum potassium levels (<3.5 meq/l) and were anaemic, with a haemoglobin level of less than 12 percent. Most of the participants' serum salt, creatinine, and urea levels were all within normal ranges. The majority of the subjects in our study displayed sinus bradycardia in their ECG, which was followed by a U-wave, according to our study. Studies by Mohapatra *et al.* (2016) [10]. Garg *et al.* (2013) [11] and Kayal *et al.* (2013) [12] found that although the difference was not statistically significant, patients with secondary hypokalemic paralysis had lower serum potassium values than those with primary hypokalemic paralysis.

Conclusion

Despite our best efforts, our study has several limitations, which include Future research will be able to get over the study's constraints of a small sample size and no control group. An episodic, transient, and hyporeflexic weakening of the skeletal muscles is known as periodic paralysis. Quadriparesis was the most frequent presenting condition, followed by paraparesis. Most individuals had hypokalemia and regularly ingested fermented rice (bassi). Regardless of whether the serum potassium level was low or normal, all patients who had acute flaccid progressive motor paralysis should get intravenous potassium since they responded well without showing any signs of residual weakness.

Reference

1. Rao N., John M., Thomas N., Rajaratnam S., & Seshadri M. S. A etiological, clinical and metabolic profile of hypokalaemic periodic paralysis in

- adults: A single-centre experience. *National Medical Journal of India*. 2006; 19(5): 246.
2. Cheng C. J., Kuo E., & Huang C. L. Extracellular potassium homeostasis: insights from hypokalemic periodic paralysis. In *Seminars in nephrology*. 2013, May; 33(3):237-247.
 3. Statland J. M., Fontaine B., Hanna M. G., Johnson N., Kissel J. T., Sansone V. A., & Griggs R. C. A Review of the Diagnosis and Treatment of Periodic Paralysis. *Muscle & Nerve*. 2017.
 4. Vicart S., Sternberg D., Arzel-Hézode M., Franques J., Bendahhou S., Lory P., & Fontaine B. Hypokalemic periodic paralysis. 2014.
 5. Griggs R. C., Resnick J., & Engel W. K. Intravenous treatment of hypokalemic periodic paralysis. *Archives of neurology*. 1983; 40(9): 539-540.
 6. Kantola I. M., & Tarssanen L. T. Diagnosis of familial hypokalemic periodic paralysis Role of the potassium exercise test. *Neurology*. 1992; 42(11): 2158-2158.
 7. Jurkat-Rott K., Lehmann-Horn F., Elbaz A., Heine R., Gregg R. G., Hogan K., & Fontaine B. A calcium channel mutation causing hypokalemic periodic paralysis. *Human Molecular Genetics*. 1994;3(8): 1415-1419.
 8. WB Saunders, Elbaz A., Vale-Santos J., Jurkat-Rott K., Lapie P., Ophoff R. A., Bady B., & Padberg, G. W. Hypokalemic periodic paralysis and the dihydropyridine receptor (CACNLIA3): genotype/phenotype correlations for two predominant mutations and evidence for the absence of a founder effect in 16 Caucasian families. *American journal of human genetics*. 1995; 56(2): 374.
 9. Sugiura Y., Aoki T., Sugiyama Y., Hida C., Ogata M., & Yamamoto T. Temperature-sensitive sodium channelopathy with heat-induced myotonia and cold-induced paralysis. *Neurology*. 2000; 54(11): 2179-2181.
 10. Mohapatra B. N., Lenka S. K., Acharya M., Majhi C., Oram G., & Tudu K. M. Clinical and aetiological spectrum of hypokalemic flaccid paralysis in western Odisha. *J Assoc Physicians India*. 2016; 64(5): 52-58.
 11. Garg, R. K., Malhotra, H. S., Verma, R., Sharma, P., & Singh, M. K. Etiological spectrum of hypokalemic paralysis: A retrospective analysis of 29 patients. *Annals of Indian Academy of Neurology*. 2013; 16(3): 365.
 12. Kayal A. K., Goswami M., Das M., & Jain R. Clinical and biochemical spectrum of hypokalemic paralysis in North: East India. *Annals of Indian Academy of Neurology*. 2013;16(2): 211.