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A Study of Clinical & Biochemical Profile of Patients with Periodic Paralysis with Special Reference to Hypokalemic Periodic Paralysis

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Abstract:
Background: *Periodic paralysis is a disorder with episodic, hyporeflexic, and short-lived skeletal muscle weakness. Patients present with repeated episodes of the weakness of the limb muscles which last for few hours to few days and are often precipitated by exercises, heavy meals or fasting. hypokalemic periodic paralysis (HPP) is a form of metabolic myopathy, which is characterized by hypokalemia, acute flaccid paralysis, potentially fatal episodes of muscle weakness and lifethreatening cardiac arrhythmias. But prompt and early recognition of this condition and initiation of treatment can lead to excellent recovery.*
Aim: *To study the clinical & biochemical profile of patients of hypokalemic periodic paralysis and to determine the association of dietary habits (fermented rice) with HPP.*
Methods*: The cross-sectional study design with the total 52 patients of HPP was selected in 21-60 year age group, from Pt. Jawaharlal Nehru Memorial Medical College, Department of Medicine, Raipur, C.G. (Pt. JNMMC) and associated hospital (Dr. BRAMH, Raipur, C.G.). The descriptive study was used for analyzing the data.* ***Results****: Total 52 patients were selected. The mean age of the patients was 37.98±9.18 years. Most of the subjects are male (n=42, 80.7%), taking fermented rice (bassi) in the diet (n=51, 98%), and had no precipitating event. Most of the subjects (n=50, 96.2%) had decreased tone in all 4 limbs, DTR absent (n=33, 63.46%), haemoglobin level <12gm% (n=34, 65.4%), low serum potassium level <3.5meq/l (n=42, 80.7%), and had sinus bradycardia in ECG (n=13, 25%)).*
Conclusion*: Limitations of the study include small sample size and lack a control group. Periodic paralysis is an episodic, short-lived and hyporeflexic skeletal muscle weakness. Most patients consumed fermented rice (bassi) on a daily basis and had hypokalemia. Patients presented with acute flaccid progressive motor paralysis should be treated with intravenous potassium regardless of low or normal serum potassium level as they responded well without any residual weakness.*
Keywords*- Hypokalemic Periodic Paralysis (HPP)*

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I. Introduction

Periodic paralysis is a disorder of different etiologies with episodic, hyporeflexic, and short-lived skeletal muscle weakness, with or without myotonia, and without sensory deficit or loss of consciousness1 (Rao, John, Thomas, Rajaratnam, & Seshadri, 2006). Patients present with repeated episodes of the weakness of the limb muscles which last for few hours to few days and are often precipitated by exercises, heavy meals or fasting2 (Cheng, Kuo, & Huang, 2013). During an attack of Periodic paralysis, the potassium level can be normal, low or high and the values usually do not correlate with the degree of weakness3 (Statland et al, 2017).

The most common types of periodic paralysis include hyperkalemic periodic paralysis, hypokalemic periodic paralysis, and Andersen-Tawil syndrome. hyperkalemic periodic paralysis and hypokalemic periodic paralysis are caused by genetic defects in high-speed tunnels (ion channels) of skeletal muscle fibers4 (Vicart et al., 2014). HPP is a form of metabolic myopathy, which represents a heterogeneous group of disorder which is characterized by hypokalemia, acute flaccid paralysis, and potentially fatal episodes of muscle weakness associated with the involvement of the respiratory muscles and life-threatening cardiac arrhythmias5 (Griggs, Resnick, & Engel, 1983). HPP is the prevailing form of familial periodic paralysis, with a prevalence of 0.4-1:100,000 6,7 (Kantola and Tarssanen, 1992; Fontaine et al., 1994). HPP inherited as autosomal dominant with reduced penetrance in women which gives a male: female ratio of ~3:18 (Elbaz et al., 1995)

HPP is often precipitated by high carbohydrate diet (e.g.-Rice), dehydration and strenuous physical activity. In Chhattisgarh, most of the people belong to low socioeconomic status and works as labor. In Chhattisgarh, most of the people take Rice as a staple food. Nowadays a number of cases of hypokalemic periodic paralysis are reported here. Most of the patients reporting during summer season i.e. May or June & they are of labor class/farmers who work in the field mostly in the daytime in very high temperature9 (Sugiura et al., 2000). Hypokalemia causes potentially fatal episodes of muscle weakness through the involvement of respiratory muscle and life-threatening cardiac arrhythmias. But prompt and early recognition of this condition and initiation of treatment can lead to excellent recovery.

Worldwide there is a paucity of reports documenting the clinical profile of hypokalemic periodic paralysis in neurological practice and even no study is available in our area. There is an unmet need for a study regarding the clinical and

biochemical profile of the patient with hypokalemic periodic paralysis. Our study is an attempt to fulfill the lacuna in this area with the aims and objectives to study the clinical & biochemical profile of patients of hypokalemic periodic paralysis and to determine the association of dietary habits (fermented rice) with hypokalemic periodic paralysis.

II. Method

Subject

The study was conducted at the Department of Medicine, Pt. JLNMMC, and Dr. BRAM Hospital Raipur, Chhattisgarh, from January 2016 to May 2017. Patients presented in the hospital who diagnosed with Hypokalemic periodic paralysis, aged between 21 to 60 years of both sexes, Willing and capable to give informed consent (n = 52) were included in our study. Patient with the bladder or bowel involvement, alteration in level of consciousness, hypokalemia due to any other cause (Renal, adrenal, thyroid dysfunction; renal tubular acidosis; diuretic and laxative abuse), Other causes of Acute flaccid paralysis (Gullian barre syndrome, GBS), Porphyria, and Poliomyelitis were excluded from our study.

Measures

Informed consent was obtained and following it data were collected in a predetermined proforma. A detailed history including any previous episodes of weakness, thyroid disease, drug intake, diarrhea, vomiting, hypertension, and renal disease was noted.

Detailed systemic examination and complete neurological examination including assessment of muscle tone, muscle power, and deep tendon reflexes were done. All patients were subjected to the hematological (complete blood count), biochemical studies (Blood Urea, Serum Creatinine, Serum Sodium, Serum Potassium by ILAB650 machine), ECG and radiological studies.

Statistical Analysis

The patient's socio-demographic detail, clinical profile and the biochemical profile was analysed using descriptive statistics. The descriptive statistics were expressed as frequency (N, %) and mean ± standard deviation.

III. Result

The present study was conducted in the Department of Medicine, Pt. JLNMMC, Raipur, and Dr. B.R.A.M. Hospital, Raipur (C.G.) and included 52 patient with Hypokalemic Periodic Paralysis, aged between 21-60 years.

Table1. Demographic Profile of the study subjects

Demographic factors	Frequency(n=52)	Percent (n%)
Age group (yrs)		
Mean±SD	37.98±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

Table 1. Show demographic profile of the study subjects, and it reveals that the mean age of the patients was 37.98±9.18 years with the age range of 21-60 yrs. Our study also shows that the most of the subjects are male (n=42, 80.7%), educated up to have studied up-to 8th standard (n=35, 67.3%), taking fermented rice (bassi) in diet (n=51, 98%) and take fermented rice (Bassi) twice a day (n=27, 51.9%).

Table2. Precipitating factors for Hypokalemic Periodic Paralysis

Precipitating factors	Frequency	Percent
Diarrhea	2	3.8
Exertion	2	3.8
Heavy meal	9	17
None	39	51

Table 2. Show precipitating factors for Hypokalemic periodic Paralysis and it reveals that the majority (n=39, 51%) of the patients had no precipitating event, 9 patients (17%) had a heavy meal before this episode, followed by 4 patients out of which 2 patients(3.8%) had diarrhoea and exertion.

Table3. Clinical profile of the study subjects

Clinical Profile of the subjects	Frequency	Percent
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%

Table 3. Show clinical profile of the study subjects and it reveals that the most of the subjects (n=50, 96.2%) had decreased tone in all 4 limbs, DTR is absent (n=33, 63.46%), and had bilateral mute planter response (n=27, 53.84%) followed by bilateral flexor planter response (n=23, 46.15%).

Table 4. Biochemical profile of the study subjects

Biochemical profile of the subject	Frequency	Percent
Haemoglobin level		
Less than 12 gm%	34	65.4%
More than12gm%	18	34.6%
TLC		
4,000-11,000	40	76.9%
>11,000	10	19.6%
<4,000	02	3.9%
Platelet count		
1.5-4.5 lakh	39	75%
<1.5 lakh	07	13.5%
>4.5 lakh	06	11.5%
Serum Urea level		
15-45mg%	44	83%
>45mg%	4	7.5%
<15mg%	4	7.5%
Serum potassium		
3.5-5.5	10	19.3%
<3.5	42	80.7%
>1.5mg%	6	11.3%
Serum Sodium level		
135-145meq/l	34	65.38%
>145meq/l	02	3.8%
<135meq/l	16	30.7%
ECG changes		
Sinus Bradycardia	13	25%
ST flattening	05	9.6%
QT prolongation	06	11.5%
U-wave	11	21.1%
Normal	17	32.6%

Table 4. Shows biochemical profile of the study subjects and it reveals that the most of the subjects had haemoglobin level <12gm% (n=34, 65.4%), Normal TLC (n=40, 76.9%), normal serum urea level (n=44, 83%), normal 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%),

This table also reveals that the among majority of the subject had sinus bradycardia in ECG (n=13, 25%)) followed by U-wave (n=11, 21.1%).

IV. Discussion

Our study reveals that the mean age of the patients with hypokalemic periodic paralysis was 37.98 years, and the age range was 21-60 years. Furthermore, our study also revealed that most of the subjects are male and got primary education. Studies conducted by Mohapatra et al, (2016)10, Garg et al, (2013)11 and Kayal et al, (2013)12 observed similar findings and concluded that the hypokalemic periodic paralysis was more prevalent among male and earning members of the society. Our study shows that majority of the patients had no precipitating event while some patient had heavy meal, 7iarrhea and exertion before this episode. Studies conducted by Mohapatra et al, (2016)10 and Garg et al, (2013)11 also could not identify any precipitating factors in the majority of the subjects. Furthermore, they concluded that the high carbohydrate intake was the most common precipitating

factor associated with such paralytic attacks. Chhattisgarh is the region where most of the people were working in the filed, residing in rural areas and taking fermented rice (bassi) twice a day in their regular diet which may be the leading factors for precipitating periodic paralysis.

Our study revealed that majority of the subjects had decreased tone in all 4 limbs and DTR is

absent. Study conducted by Mohapatra et al, (2016)10 showed that the Deep tendon reflexes were preserved in the patient with HPP, while study conducted Garg et al, (2013)11 and Kayal et al, (2013)12 found similar result and concluded that in majority of the patient the deep tendon reflexes were absent or hypoactive.

Our study shows that the most of the subjects were anemic with a haemoglobin level of <12gm%, and had low serum potassium level<3.5meq/l. Most of the subjects had normal serum urea level, normal creatinine level, and had normal serum sodium level. Our study also reveals that the among the majority of the subject had sinus bradycardia in ECG, followed by U- wave. Studies conducted by Mohapatra et al, (2016)10, Garg et al, (2013)11 and Kayal et al, (2013)12 concluded that the serum potassium concentrations were lower in patients with secondary hypokalemic paralysis than in those with primary hypokalemic paralysis though the difference was statistically not significant.

V. Conclusion

Despite our best effort, there are limitations of our study, which includes Small sample size and a lack of a control group these limitations can be overcome in the future studies.

Periodic paralysis is an episodic, short-lived and hyporeflexic skeletal muscle weakness. The patient most commonly presented with quadriparesis followed by paraparesis. Most patients consumed fermented rice (bassi) on a daily basis and had hypokalemia. All patients presented with acute flaccid progressive motor paralysis should be treated with intravenous potassium regardless of low or normal serum potassium level as they responded well without any residual weakness. Though the studies lack in this field and a further comprehensive gene study is required to find out the cause of hypokalemic periodic paralysis in CG.

Conflict Of Interest:
authors declare The no conflicts of interest in this work

Reference

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