Original Research Article

A prospective study of clinical profile of hypokalemic periodic paralysis in paediatric patients

Payyavula Suresh Babu, Katada Narayan Rao*, Anand Acharya

Department of Pediatrics, Konaseema Institute of Medical Science, Amalapuram, Andhra Pradesh, India

Received: 01 January 2018

Accepted: 30 January 2018

*Correspondence:

Dr. Katada Narayan Rao,

E-mail: anand_kims@yahoo.co.in

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Hypokalemic periodic paralysis is not a frequent but a cause of weakness in paediatric age group patient and it is revised after treatment. If it is not diagnosed properly it could be life threatening but if it is treated properly recovery is good. It can be primary and secondary type and it can be localized or generalized. Present study has been designed with an aim to study the clinical profile, demography, and response to treatment of hypokalemic periodic paralysis in our region.

Methods: This a prospective clinical study conducted in the Department of Paediatrics and Emergency Medicine Konaseema Institute of Medical Science, Amalapuram, from November 2013 to March 2017. During this period around 42 patients with weakness and decrease serum potassium level was included in this study as per exclusion and inclusion criteria.

Results: Out of 42 patients, 6 patients were between 1 to 6 years of age, 10 patients were between 6 to 12 years of age and 26 patients were 12 to 18 years of age. Sex distribution has male predominance that is 26/16. 26 patients presented with quadriperesis that is (61.9%) and 16 (38.10%) presented with paraparesis or plegia, eleven patients have serum potassium level below 2 meq/L, 26 patients having between 2-3 meq/L, 3 patients having serum potassium 3-4 meq/L and two patients having serum potassium above 4 meq/L.

Conclusions: Male predominance and frequency of attack was more in second decade of life. Quadriperesis was the commonest mode of presentation. Most of the patient have had serum potassium level between 2 to 3 meq/L. ECG abnormalities has been observed in 85% of the patients most of these patients were treated with oral potassium chloride alone. Outcome was good in all patients.

Keywords: Clinical profile, Hypokalemic periodic paralysis, Paediatric patients

INTRODUCTION

Hypokalemic periodic paralysis is the most common form of periodic paralysis. It was studied by Hartwing and more elaborately by Aitkin and they have found the association between weakness and low potassium and its reversal after administration of potassium.^{1,2} It is not a frequent but a cause of weakness in paediatric age group patient and it is revised after treatment. If it is not diagnosed properly it could be life threatening but if it is

treated properly recovery is good, but it associated with risk of hyperkalaemia. It can be primary and secondary type and it can be localised or generalised. In primary type episode occurs frequently but in secondary type it not so.³

Hypokalemic periodic paralysis may be caused by a short-term shift of potassium into cells or larger deficit of potassium as a result of severe renal or gastrointestinal potassium loss. Present study has been designed with an

aim to study the clinical profile, demography, and response to treatment of hypokalemic periodic paralysis in our region.

METHODS

This a prospective clinical study conducted in the Department of Paediatrics and Emergency Medicine Konaseema Institute of Medical Science Amalapuram, from November 2013 to March 2017. During these period around 42 patients with weakness and decrease serum potassium level was included in this study as per exclusion and inclusion criteria.

Inclusion criteria

- Age from birth to 18 years
- Both sexes
- Weakness of all the limbs or both upper limbs

Exclusion criteria

Known case of neurological disorder.

All the patient included in this study were evaluated proper history of the patient were taken in most of the cases from mother, emphasis were given to know about precipitating factor, through clinical examination of the patient was done, frequency of attack was also taken into consideration for the confirmation of diagnosis, serum potassium estimation and urine potassium estimation was done, ECG of all the patient were done to find out the sign of hypokalaemia like bradycardia, U waves, flat T waves, PR and QT prolongation, Q-V block.

Before start of this study permission from institutional ethics committee was obtained and written informed consent was taken from parents or guardian of the patients.

Statistical analysis

Data collected were compiled on Microsoft excel seat and analysis was done by using proportion and chi-square test.

RESULTS

Forty-two cases of hypokalemic periodic paralysis was enrolled for this study in three and half years, as per inclusion and exclusion criteria. Out of 42 patients 6 patients were between 1 to 6yrs of age, 10 patients were between 6 to 12 years of age and 26 patients were 12 to - 18 years of age.

Sex distribution has male predominance that is 26/16. Regarding history of attack in the past, thirty-four patients has no history of attack, six patients having 1 to 2 attacks in the past only two patients having history of

more than two attacks. Ten patients having family history of attack. There was no precipitating factor in 6 patients (14.28%), 18 patients have attack after high carbohydrate food that is (43.85%), sleep was precipitating factor in 2 pts and 6 patients have attack after exercise, out of 42 patients' diarrhoea was precipitating factor in 18 (43.80%).

Table 1: Demographic profile of the patients.

		Number	Percentage
Age	1-6	6	14.28
	8-12	10	23.80
	12-18	26	61.90
	Total	42	
Sex	M	26	61.9
	F	16	38.09
	Total	42	
Past history (no. of attacks)	NIL	34	80.95
	1-2	6	14.28
	>2	2	4.76
Family history	present	10	23.80
	Absent	32	76.19
Precipitating factor	NIL	6	14.28
	After food	18	42.80
	Sleep	2	4.76
	Exercise	6	14.28
	Diarrhoea	10	23.80

As per Table 2, 26 patients presented with quadriplegia that is (61.9%) and 16 (38.10%) presented with paraparesis or plegia.

Table 2: Clinical presentation.

Clinical feature	Frequency	Percentage
Quadriplegia/quadriplegic	26	61.9
Paraparesis/paraplegia	16	38.10

Eleven patients have serum potassium level below 2meq/L, 26 patients having between 2-3meq/L, 3 patients having serum potassium 3-4 meq/L and two patients having serum potassium above 4 meq/L. Urine potassium level was less than 20 in 38 patients and more than 20 in only four patients.

Table 3: Investigational parameters of the patients.

parameters		Frequency	Percentage of patients
Serum Potassium meq/L	<2	11	36.19
	2-3	26	61.9
	3-4	3	7.1
	>4	2	4.76
Urine Potassium meq/L	<20	38	90.47
	>20	4	9.5

As per Table 4, 6 (14.28%) patients have normal ECG, 36 (85.71%) patients have U wave in ECG. 18 patients (42.85%) have T- flattening.

Increased PR interval was found in 16(38.09%), QT prolongation was present in 14 (13.33%) A-V block was presentation in 3 patients.

Table 4: ECG changes.

ECG pattern	Number	Percentage
Normal	6	14.28
U wave	36	85.71
T-flattens	18	42.85
Increase PR interval	16	38.09
QT-prolongation	14	33.33
A-V block.	3	7.1

Regarding relation serum potassium level and clinical manifestation out of eleven patients below 2 meq/L serum potassium a presented with quadriplegia/paresis and two presented with paraparesis or plegia. 24 patients with quadriparesis have serum potassium 2-3 meg/L and 2 patients have paraparesis/plegia.

In the patients with serum potassium 3-4 meq/L quadriplegia/paresis was present in 2 patients and paraplegia/ paresis was present in one patients. One patient with serum potassium above 4 meq/L presented with quadriparesis. This relation was not significant statistically with p value 0.2580.

Table 5: Relation between serum potassium and clinical MEMPS.

Clinical presentation	Serum potassium level			
	<2	2-3	3-4	>4
Quadriparesis or plagia	9	2	2	1
Paraparesis or plagia	2	2	1	1

Chi-square statistic is 4.0317 p values 0.2580

Table 6: Response to treatment.

Tt modalities	No.	Percentage	Response
Oral potassium chloride	28	66.66	100%
Oral potassium Chloride + intra venous chloride.	8	19.04	100%
Oral potassium chloride + Acetazolamide	6	14.28	100%

There was 100% recovery in oral potassium chloride treatment group 28 (66.66%) patients were treated in that group. 8 patients were treated with oral + intravenous potassium and rest were treated with oral potassium and Acetazolamide.

DISCUSSION

In present study in our institution during three and half year forty-two patients were included as per exclusion and inclusion criteria. In the present study we have found that 61.90% of the patient were between age group 12 to 18yrs, only 14.28% were below 6 years and rest were between 6 to12 years. These findings supported by the work of Ariza-Andaraloes et al.⁴ Brooke MH et al found that 60% of the pt in his study group were below 16yrs of age.⁵

In present study male predominance was observed and has been corroborated with the finding of Rao N et al and Maurya PK et al.^{6,7}

In present study most of the patients were presented with first episode of attack and family history was present in 23.80% of pts. This is supported by the finding of Rao et al and Kayal AK et al.^{6,8} We have found that 67% of the patient has no family history which indicates its secondary origin Kayal et al.⁸

Most frequent precipitating factor in the present study was high carbohydrate diet that is 42.85% followed by Diarrhoea that is 123.80% which supported by the study of Mohapatra et al but diarrhoea was the common precipitating factor in study of Kamar et al.^{9,10}

Out of 42 patients, 61.90% of the patients were presented with quadriparesis/plegia and rest were presented with paraparesis/plegia. Most of the clinical presentation of Quadriparesis/plegia was between serum potassium below 3 meq/L which is similar to the study of Kalitaj et al.¹⁰

Prominent U wave formation common ECG changes found in (85.71%) of the Pt followed by U wave with T wave fluttering in 42.85% of the pt. This find is corroborating with the finding Ablawatt SK et al and Nurettin et al.^{11,12}

Most of the patient were treated with oral potassium chloride that is 66.66%, only 19.04 % of the patient were treated with Intravenous KCl but response of treatment was 100% in all three modalities of treatment which is supported by the study of Jacob O et al.¹²

CONCLUSION

we would like to conclude that there is male predominance and frequency of attack was more in second decade of life. Quadriparesis was the commonest mode of presentation. Most of the patient have had serum potassium level between 2 to 3 meq /L.ECG abnormalities has been observed in 85 % of the patients most of these patients were treated with oral potassium chloride alone. Outcome was good in all patients.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Hartwig H. On a case of intermittent paralysis spinalis. Inaugural dissertation. Halle, Germany, Lipke. 1874.
2. Aitken RS, Allott EN, Castleden LI, Walker M. Observations on a case of familial periodic paralysis. *Clin Sci*. 1937;3:47-57.
3. Rao N, John M, Thomas N, Rajaratnam S, Seshadri MS. Aetiological, clinical and metabolic profile of hypokalaemic periodic paralysis in adults: a single-centre experience. *Natl Med J India*. 2006;19(5):246-9.
4. Ariza-Andraca CR, Frati-Munari AC, Ceron E, Chavez de los Rios JM, Martinez-Mata J. Primary hypokalemic periodic paralysis. Presentation of 18 cases. *Gac Med Mex*. 1993;129(2):139-45.
5. Brooke MH. Disorders of skeletal muscle. neurology in clinical practice. In: Bradley WG, Daroff RB, Fenichel G, eds. *Neurology in Clinical Practice*. 3rd ed. Philadelphia: Butterworth-Heinemann; 2000.
6. Stedwell RE, Allen KM, Binder LS. Hypokalaemic paralysees: a review of the aetiologies, pathophysiology, presentation and therapy. *Am J Emerg Med*. 1992;10(2):143-8.
7. Maurya PK, Kalita J, Misra UK. Spectrum of hypokalaemic periodic paralysis in a tertiary care centre in India. *Postgrad Med J*. 2010;86:692-5.
8. Kayal AK, Goswami M, Das M, Jain R. Clinical and biochemical spectrum of hypokalemic paralysis in North: East India. *Ann Indian Acad Neurol*. 2013;16(2):211.
9. Mohapatra BN, Lenka SK, Acharya M, Majhi C, Oram G, Tudu KM. Clinical and aetiological spectrum of hypokalemic flaccid paralysis in Western Odisha. *J Assoc Physicians India*. 2016;64(5):52-8.
10. Kumar MR, Bharath RV, Rammohan P, Amit Agrawal. Clinical profile in hypokalemic periodic paralysis cases. *Eur J Gen Med*. 2014;11(1):6-9.
11. Kalita J, Goyal G, Bhoi SK, Chandra S, Misra UK. Comparative study of thyrotoxic periodic paralysis from idiopathic hypokalemic periodic paralysis: an experience from India. *Ann Indian Acad Neurol*. 2012;15(3):186-90.
12. Ahlawat SK, Sachdev A. Hypokalemic paralysis. *Postgrad Med J*. 1999;75(882):193-7.
13. Dogan NO, Avcu N, Yaka E, Isikkent A, Durmus U. Weakness in the emergency department: hypokalemic periodic paralysis induced by strenuous physical activity. *Turk J Emerg Med*. 2015;15(2):93-5.
14. Levitt JO. Practical aspects in the management of hypokalemic periodic paralysis. *J Trans Med*. 2008;6:18.

Cite this article as: Babu PS, Rao KN, Acharya A. A prospective study of clinical profile of hypokalemic periodic paralysis in paediatric patients. *Int J Contemp Pediatr* 2018;5:473-6.