Original Research Article

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

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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 quadriplegiasis that is (61.9%) and 16 (38.10%) presented with paraplegiasis 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. Quadriplegiasis 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%).

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

**Table 1: Demographic profile of the patients.**

| Age   | Number | Percentage |
|-------|--------|------------|
| 1-6   | 6      | 14.28      |
| 8-12  | 10     | 23.80      |
| 12-18 | 26     | 61.90      |
| Total | 42     |            |

| Sex   | Number | Percentage |
|-------|--------|------------|
| M     | 26     | 61.9       |
| F     | 16     | 38.09      |
| Total | 42     |            |

| Past history (no. of attacks) | Number | Percentage |
|-------------------------------|--------|------------|
| 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      |

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 2: Clinical presentation.**

| Clinical feature                        | Frequency | Percentage |
|-----------------------------------------|-----------|------------|
| Quadripareis/quadrilplegy               | 26        | 61.9       |
| Parapareis/paraplegia                   | 16        | 38.10      |

**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 quadripareisis have serum potassium 2-3 meq/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 quadripareisis. 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 |
|-----------------------|-----------------------|----|-----|-----|----|
| Quadripareisis or plegia |                      | 9  | 2   | 2   | 1  |
| Paraparesis or plegia  |                      | 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 + intravenous chloride | 8   | 19.04      | 100%     |
| Oral potassium chloride + Acetzolamide  | 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 Acetzolamide.

**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-Andalaraes et al.4 Brooke MH et al found that 60% of the pt in his study group were below 16urs 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.8,9 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 quadripareisis/plegia and rest were presented with paraparesis/plegia. Most of the clinical presentation of Quadripareisis/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 flattening 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. Quadripareisis 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.

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