

**Case Report:****Hypokalaemic paralysis due to Sjögren's syndrome**G. Ramakrishna,<sup>1</sup> P. Sandeep,<sup>2</sup> S. NageshKumar,<sup>3</sup> N. Rukumangadha,<sup>4</sup>A.K. Chowhan,<sup>4</sup> M.M. Suchitra,<sup>5</sup> R. Ram,<sup>2</sup> B. Vengamma,<sup>1</sup> V. Siva Kumar<sup>2</sup>*Departments of <sup>1</sup>Neurology, <sup>2</sup>Nephrology, <sup>3</sup>General Surgery, <sup>4</sup>Pathology, <sup>5</sup>Biochemistry,  
Sri Venkateswara Institute of Medical Sciences, Tirupati***ABSTRACT**

Acute generalized weakness has a wide differential diagnosis that includes neurologic, metabolic, and infectious aetiologies. Acute hypokalaemic paralysis is a rare but treatable cause of acute weakness. We present a 23-year old lady, with history of sudden difficulty getting up from recumbency. Her initial investigations revealed hypokalemia with non-anion gap metabolic acidosis and alkaline urine. Minor salivary gland biopsy confirmed the diagnosis to be Sjögren's syndrome.

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**INTRODUCTION**

The clinical features of hypokalaemia vary greatly between individual patients. Symptoms seldom occur until serum potassium concentration is less than 3 mEq/L. The clinical features include fatigue, myalgia, muscular weakness, hypoventilation and complete paralysis. The evaluation of hypokalaemia begins by ruling out decreased intake. The redistribution of potassium into the cells usually causes a relatively small change in serum potassium. It occurs due to metabolic alkalosis, influence of hormones like insulin, anabolic states like increased red blood cell production in pernicious anaemia with vitamin B<sub>12</sub> and total parenteral nutrition. Increased loss of potassium could be renal or non-renal loss. Renal loss of potassium could be due to increased distal tubule flow due to diuretics and salt-wasting nephropathies, increased secretion of potassium in distal tubule due to mineralocorticoid excess, distal tubule delivery of non-absorbable anions and some miscellaneous conditions like amphotericin use and Liddle's syndrome. Non-

renal loss is by excessive sweating or through gastrointestinal tract in conditions like diarrhoea. The association of hypokalemia with metabolic acidosis is noted mainly in gastrointestinal losses and renal tubular acidosis.

Acute generalized weakness has a wide differential diagnosis that includes neurologic, metabolic, and infectious aetiologies.<sup>1</sup> Acute hypokalaemic paralysis is a rare but treatable cause of acute weakness. Therefore, it is imperative for physicians, particularly those working in acute care settings, to be aware of this condition.

**CASE REPORT**

A 23-year-old lady presented with a history of difficulty in getting up from lying down position. The weakness of limbs was sudden in onset. It was first noticed following overnight sleep. There was no history of loss of consciousness, speech defects or bowel and bladder dysfunction. There was no other significant past, obstetric, family or drug

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**Figure 1:** Clinical photograph showing caries teeth

history. On examination, she was conscious, coherent and answering questions well. There was no pallor, clubbing, cyanosis, lymphadenopathy or jaundice. Skin was dry especially over the face. She had poor dentition with multiple caries teeth (Figure 1). Tongue was pigmented. Cardiovascular, respiratory, gastrointestinal examination was unremarkable. Neurological examination revealed normal mental functions, no speech and cranial nerve deficits, power in upper and lower limbs was grade 1/5 Medical Research Council (MRC) grading; deep tendon reflexes were absent. There were no cerebellar signs and signs of meningitis.

Her baseline investigations are listed in Table 1. Her initial investigations revealed hypokalemia with nonanion-gap metabolic acidosis and alkaline urine. While she was being treated for hypokalemia, she was further investigated for the cause of metabolic acidosis with hypokalemia. Her other investigations were: urine potassium is 40 mEq/L. It suggested the loss of potassium was through urine. The transtubular potassium gradient (TTKG) calculated by the formula  $[K^+]_u \div (OSM_u / OSM_p) / [K^+]_p$  where  $[K^+]_u$  = urine potassium (mEq/L);  $(OSM_u)$  = urine osmolality (mOsm/kg);  $(OSM_p)$  = plasma osmolality (mOsm/kg);  $[K^+]_p$  = plasma potassium (mEq/L) was 8.29. A TTKG greater than 4 suggests urinary loss of

potassium. Serum parathormone 28.2 pg/mL (reference range: 14-72 pg/mL), serum 25(OH) D<sub>3</sub> 9.6 ng/mL (reference range 11-70 ng/mL), serum ceruloplasmin 26.5 mg/mL (reference range: 13-36 mg/mL), C-reactive protein less than 6 mg/L (negative). Computed tomography (CT) of the abdomen was normal. Minor salivary gland biopsy revealed periductular infiltrates of more than 50 lymphocytes at a density of more than one focus/4 mm<sup>3</sup>. Schirmer's test was positive. Bone marrow biopsy was reported to be normal study. Serological testing for hepatitis B and C; and human immunodeficiency virus were negative. Antinuclear antibody, anti double-stranded deoxyribonucleic acid antibodies and anti-neutrophilic cytoplasmic antibodies were negative. Serological testing for anti Sjögren's syndrome A antigen (SSA) antibodies and anti Sjögren's syndrome B antigen (SSB) antibodies were positive. Thyroid stimulating hormone was 8.5 µIU/mL (range: 0.34-4.25 µIU/mL)

As the patient satisfied three of four objective criteria of the American-European classification system (modified by Tzioufas and Voulgarelis)<sup>2</sup> (Table 2), namely, a positive Schirmer's test, positive minor salivary gland biopsy and anti-SSA and anti-SSB antibody results, she was diagnosed to have Sjögren's syndrome.

She was treated with intravenous supplementation of potassium and sodium bicarbonate. She required daily replacement of 100 mEq/L of potassium for three days to achieve correction of serum potassium levels to normal. She regained power once serum potassium was corrected. An ophthalmology consultation was taken. Slit lamp examination ruled out Kayser-Flescher ring and cystine crystals in cornea. Serum ceruloplasmin levels were normal. Liver function tests were normal thus excluding chronic active hepatitis and primary biliary cirrhosis. Bone marrow biopsy was normal thus excluding amyloidosis. Normal serum parathormone and vitamin D

**Table 1: Laboratory investigations at the time of initial presentation**

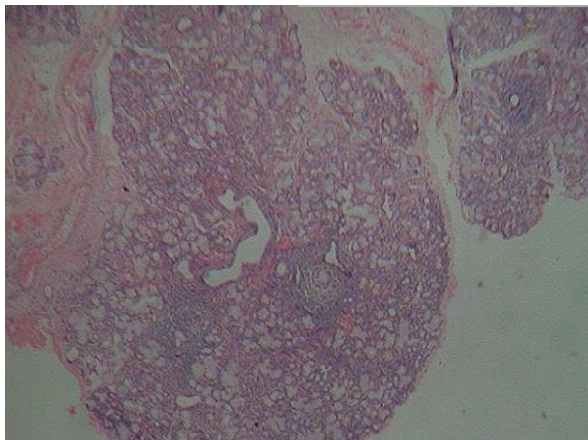
<b>Test</b>	<b>Result</b>
Haemoglobin	10.1 g/dL
ESR	15 mm after first hour
Blood urea	20 mg/dL
Serum creatinine	0.8 mg/dL
Fasting plasma glucose	95 mg/dL
Postprandial plasma glucose	98 mg/dL
Total serum proteins	7.1 g/dL
Serum albumin	3.0 g/dl
Serum total bilirubin	0.8 mg/dL
Aspartate aminotransferase	50 IU/L
Alanine aminotransferase	20 IU/L
Serum alkaline phosphatase	77 U/L
Serum calcium	6.4 mg/dL
Serum uric acid	4.5 mg/dL
Serum phosphorus	2.6 mg/dL
Serum sodium	134 mEq/L
Serum potassium	2.8 mEq/L; repeat values at 6 hours and 8 hours after admission were 2.6 mEq/L 3.1 mEq/L
Serum chloride	108 mEq/L
Serum magnesium	1.2 mEq/L
Arterial blood gas analysis	
pH	7.270
PaCO <sub>2</sub>	95.8 mm Hg
PaO <sub>2</sub>	39.8 mm Hg
HCO <sub>3</sub> <sup>-</sup>	16.2 mmol/L
Anion gap	7 mmol/L
Urine examination	
pH	8.0
Albumin	Trace
Sugar	Absent
Ketones	Nil
Bile salts	Nil
Epithelial cells	1-2/hpf
WBC	3-5/hpf
RBC	1-2/hpf

ESR = erythrocyte sedimentation rate; WBC = white blood cells; RBC = red blood cells; PaO<sub>2</sub> = arterial oxygen tension; PaCO<sub>2</sub> = arterial carbon dioxide tension

levels excluded hyperparathyroidism and vitamin D resistant conditions. Minor salivary gland biopsy revealed periductular infiltrates of more than 50 lymphocytes at a density of more than one focus/4 mm<sup>3</sup> (Figures 2 and 3). In view of minor salivary gland biopsy findings, the patient was enquired regarding sicca symptoms and these were absent. After the confirmation of Sjögren's syndrome she was treated with oral prednisolone (1 mg/kg/day) potassium citrate and sodium bicarbonate (1 mEq/kg/day). The prednisolone was tapered off after eight weeks at 5 mg per week and stopped. At the last follow up visit, she had completed the tapering course of oral prednisolone and was doing well on follow up.

## DISCUSSION

Sjögren's syndrome represents a group of diseases characterized by a common pathological feature: namely, inflammation and destruction of exocrine glands. It was originally described as the triad of dry eyes, dry mouth, and rheumatoid arthritis.<sup>3</sup> Sjögren's syndrome may occur alone (primary Sjögren's syndrome) or in association of other connective or autoimmune disorders (secondary Sjögren's syndrome). In 1993,<sup>4</sup> a preliminary set of criteria for the diagnosis of Sjögren's syndrome were defined which were subsequently validated in a prospective study.<sup>5</sup> At present the

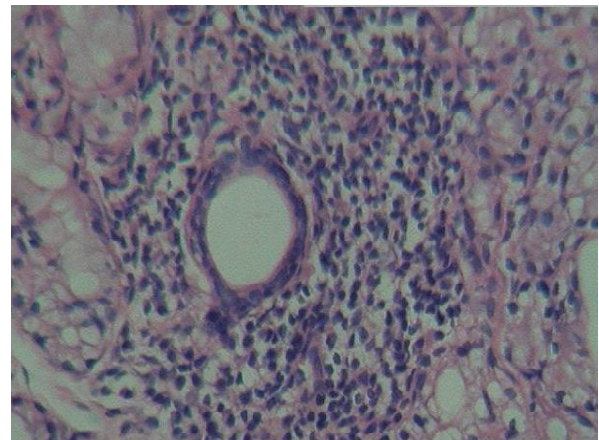


**Figure 2:** Photomicrograph showing lobules of salivary acini and dilated ducts with surrounding lymphocyte collection (Haematoxylin and eosin, × 40)

diagnosis of Sjögren's syndrome is according to the American-European classification system (modified by Tzioufas and Voulgarelis).<sup>2</sup> According to this classification the diagnosis of primary Sjögren's syndrome requires 4 of 6 of the criteria (Table 2); in addition, either criterion number 5 or criterion number 6 must be included. Sjögren's syndrome can be diagnosed in patients who have no sicca symptoms if 3 of 4 objective criteria are fulfilled.

Antibodies against SSA are found in approximately 50% of patients with the disease. Antibodies against SSB are present in 40-50% of patients with primary Sjögren syndrome and in 15% of patients with systemic lupus erythematosus (SLE). Titres of anti-SSA and anti-SSB antibodies do not reflect disease activity.<sup>6</sup>

Renal involvement in Sjögren's syndrome has been reported in 18.4% to 67% of patients.<sup>7</sup> Distal renal tubular acidosis (RTA) was reported more common than proximal RTA<sup>8</sup> although the latter was more common in association with Fanconi's syndrome.<sup>9</sup> Sjögren's syndrome presenting as hypokalaemia has been occasionally reported in the past<sup>10,11</sup> and presentation similar to that observed in our patient is rare.<sup>12-14</sup>



**Figure 3:** Photomicrograph showing periductal chronic inflammatory infiltrate comprising lymphocytes and plasma cells (Haematoxylin and eosin, × 400)

**Table 2: Diagnostic criteria for Sjogren's syndrome**

1. Ocular symptoms: dry eyes for more than 3 months, foreign-body sensation, and use of tear substitutes more than 3 times daily
2. Oral symptoms: feeling of dry mouth, recurrently swollen salivary glands, frequent use of liquids to aid swallowing
3. Ocular signs: schirmer test performed without anaesthesia (< 5 mm in 5 min), positive vital dye staining results
4. Oral signs: abnormal salivary scintigraphy findings, abnormal parotid sialography findings, abnormal sialometry findings (unstimulated salivary flow < 1.5mL in 15min)
5. Positive minor salivary gland biopsy findings
6. Positive anti-SSA or anti-SSB antibody results

SS-A = Sjogren's syndrome A antigen; SS-B = Sjogren's syndrome B antigen

RTA was suspected as there was hyperchloremic (normal anion-gap) metabolic acidosis associated with hypokalemia. As urine pH was greater than 5.5, distal RTA was provisionally diagnosed.

All hypokalaemic paralysis are not always due to neurologic causes and RTA is not always due to idiopathic causes. Identification of treatable cause of RTA, like Sjögren's syndrome was possible because of a high index of suspicion. The clinical picture of dental caries in a patient with hypokalemia alerted us to investigate for Sjögren's syndrome.

Occurrence of RTA in a patient with Sjogren's syndrome is considered to be an extraglandular manifestation. Further, as confirmed in a recent study,<sup>5</sup> where acute and chronic interstitial nephritis were noted on renal biopsy in 6/24 (25%) and 11/24 (45.8%) patients respectively. This prompted us to initiate oral corticosteroid treatment in our patient.

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