

# Vitamin B12 Encephalopathy-A Case Series

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## Abstract

Vitamin B12 deficiency manifests as triad of anaemia, gastrointestinal abnormalities and neurological abnormalities. The children with vitamin B12 deficiency are often misdiagnosed as it mimics autism spectrum disorders, colics and gastroenteritis. Its deficiency in children can cause poor weight gain, developmental regression, mental changes, abnormal movements, encephalopathy or may leads to long term neurological sequelae. The existence of vitamin B12 deficiency neuropathy was recognised in 1958. Seizures are rare but are seen especially in infants and there are only a few reports regarding the relationship between infantile spasm and vitamin B12 deficiency. Here we report 3 cases of vitamin B12 encephalopathy who presented with seizure and neurodevelopmental delay. They were later diagnosed as a case of severe vit B12 deficiency and successfully treated with IM vit B12 resulting in good neurological outcome almost towards normal.

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*Index terms*— neurological abnormalities, autism spectrum disease, infantile spasm.

## 1 Vitamin B12 Encephalopathy-A Case Series

Abstract-Vitamin B12 deficiency manifests as triad of anaemia, gastrointestinal abnormalities and neurological abnormalities. The children with vitamin B12 deficiency are often misdiagnosed as it mimics autism spectrum disorders, colics and gastroenteritis. Its deficiency in children can cause poor weight gain, developmental regression, mental changes, abnormal movements, encephalopathy or may leads to long term neurological sequelae. The existence of vitamin B12 deficiency neuropathy was recognised in 1958. Seizures are rare but are seen especially in infants and there are only a few reports regarding the relationship between infantile spasm and vitamin B12 deficiency.

Here we report 3 cases of vitamin B12 encephalopathy who presented with seizure and neurodevelopmental delay. They were later diagnosed as a case of severe vit B12 deficiency and successfully treated with IM vit B12 resulting in good neurological outcome almost towards normal.

One of our case was presented with INFANTILE SPASM which being a rare form of seizure in a case of B12 encephalopathy.

Any child presented with encephalopathy with knuckle hyperpigmentation without any prior history of fever, loose stool, vomiting one has to do Complete blood count, comment on peripheral smear & serum B12 to rule out B12 deficiency. We want to emphasize that early diagnosis & prompt treatment can alter the disease process.

Keywords: neurological abnormalities, autism spectrum disease, infantile spasm.

## 2 I.

Case Report n 1 st case -A 19 month old female baby admitted to paediatric department of MKCG medical college with complains of hyperpigmentation of skin for 4 months, unable to stand with support for 3 months and sudden flexion of neck, arms and thighs multiple times for 2 months. The child was born out of non-consanguineous marriage by normal vaginal delivery, the child has been continuing breast feed till now along with mixed diet from family pot. The family being vegetarian. The child was apparently normal till 15 months of age and had

## 5 DISCUSSION

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44 attained all milestones appropriate for age till 15 months of life, following which she gradually lost the ability to  
45 stand with support and sit by herself. There was no associated fever, headache and vomiting. On examination,  
46 the child was irritable. There was intermittent flexor spasm (infantile spasm) multiple times a day and there  
47 was hyperpigmentation of skin over tongue, knuckles, knee and thighs (Figure ??,2 and 3). There were no signs  
48 of meningitis, reflexes were brisk and B/L plantar was flexor.CSF study was done to rule out meningitis, which  
49 came out to be normal.CBC showed severe anaemia and MCV was 94 fL (Figure ??). Because of macrocytic  
50 anaemia, knuckle pigmentation and neurological signs with a history of vegetarian diet,a provisional diagnosis  
51 of vitamin B12 deficiency was made. It was confirmed by doing serum B12 level, which came to be very low  
52 (<100pg/ml) (Figure 5).EEG came out to be normal. The patient was treated with IM neurobion injections daily  
53 for 7 days followed by weekly dose for 7 weeks. To control infantile spasm IV valproate started and after 72 hours  
54 oral clonazepam was added as seizure persisted. The patients cognition improved by day 3.The infantile spasm  
55 came under control from 6 th day onwards and from day 8 it seized completely. The patient was successfully  
56 discharged after regaining all the developmental milestones appropriate for age (figure ??). In 2 nd case-A 5  
57 yrs. old male child, product of non consanguineous marriage presented with unable to walk, stand, sit, speak  
58 with abnormal body movements and altered sensorium for last 15 days.(fig. ??) There was no history of fever,  
59 convulsion, loose stool and vomiting, respiratory difficulty. There was also no history of birth asphyxia and child  
60 is neuro developmentally normal. No similar episodes in past or no sibling in the family having similar problem.  
61 On examination child was in altered sensorium, vitals was stable, anthropometric measurement was normal for  
62 the age. On head to toe examination child having knuckle and periungual hyperpigmentation of both limbs (fig.  
63 ??, 3), angular stomatitis with sparse hypo pigmented brittle hair, some pallor, no cyanosis, clubbing, icterus,  
64 edema or lymphadenopathy. On CNS examination no cranial nerve deficit, hypotonia of both upper and lower  
65 limbs, power of both limbs was diminished (3/5). All superficial reflexes are normal except planter extensor,  
66 B/L Knee jerk was exaggerated and ankle jerk was diminished. Other systemic examination was within normal  
67 limits. On investigation complete blood count suggestive of megaloblastic anemia. Hb-6.7 gm%, MCV-110.8 fl.  
68 Serum electrolytes, urea, creatinine, liver function test was normal. Serum vitB12 was estimated and it was very  
69 low (73 pg/ml). CECT brain was also normal. After giving 2 wks. of daily vit B12(1mg IM) and folic acid,  
70 neurological and general well-being improved (fig 4,5).Repeat vit B12 level was 512pg/ml. Child discharged with  
71 im vit B12 wkly for 8 wk. then monthly once for 6 month alongwith folate therapy .The child was advised for  
72 monthly check up. In the 3 rd case-A 11 months female baby born out of non consanguineous marriage by normal  
73 vaginal delivery was admitted with complains of fever since last 6 days and fast breathing since last 2 days.On  
74 examination the child was febrile and pale ,respiratory rate was 52/min with chest indrawing. There were B/L  
75 conducted sounds in the chest with creps.The liver was enlarged 6cm below the coastal margin and spleen was  
76 just palpable. There was history of blood transfusion.Hence a provisional diagnosis of pneumonia with congenital  
77 hemolytic anaemia was made.On further inquiring about the history,it was found that the baby was apparently  
78 normal till 5 months of age,then she developed respiratory tract infection for which she was admitted in hospital  
79 for 4 days.Since then the baby had repeated respiratory tract infections.By 8 months of age there were regression  
80 of developmental milestones like ability to sit and neck control. There was one episode of generalized tonic clonic  
81 seizure. The child has been continuing breast feed till now along with mixed diet from family pot. The mother  
82 being vegetarian. There was hyperpigmentation of skin over palm, knuckles, knee and thighs (Figure ??,2 and  
83 3). There were no signs of meningitis, reflexes were brisk and B/L plantar was flexor.CSF study was done to rule  
84 out meningitis, which came out to be normal.CBC showed severe anaemia and MCV was 96.5 fL (Figure ??).  
85 Because of macrocytic anaemia, knuckle pigmentation and neurological signs with a history of vegetarian diet,a  
86 provisional diagnosis of vitamin B12 deficiency was made. It was confirmed by doing serum B12 level, which  
87 came to be low(145 pg/ml) (Figure 5). The patient was treated with IM neurobion injections daily for 7 days  
88 followed by weekly dose for 7 weeks. The patient was successfully discharged after regaining all the developmental  
89 milestones appropriate for age.

### 3 Volume XVII Issue III Version I

### 4 Volume XVII Issue III Version I

### 5 Discussion

93 Vit B12 is also known as cyanocobalamine. it is essential for functioning of brain, spinal cord, peripheral or cranial  
94 nerves, and blood cell production. In 1877, Gardner and Osler coined the term pernicious anaemia to describe  
95 a patient with progressive arm numbness with difficulty in buttoning and using tools. [1] Deficiency produces  
96 dementia, peripheral neuropathy, subacute combined degeneration of the spinal cord, nutritional amblyopia  
97 (visual loss) and cognitive dysfunction [2]. Vitamin B12 deficiency can lead to serious sequelae in developing  
98 children as reported by Honzik et al [3]. The prevalence of vitamin B12 is difficult to ascertain because of its  
99 etiology and different assays [4]. It is an easily treated disorder that often goes undiagnosed in infant and  
100 children, placing them at high risk for permanent brain injury. Vitamin B12 deficiency occurs in infants born  
101 to mother, s with vitamin B12 deficiency due to any cause like vegetarianism, autoimmune pernicious anaemia,  
102 celiac disease, H.Pyloric infection, Crohn, s disease, gastric bypass, partial ilectomy, eating disorders, use of  
103 PPI etc. Children presents with non specific manifestation such as developmental delay, irritability, weakness,

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104 failure to thrive, abnormal pigmentation, hypotonia and hepatosplenomegaly. Vitamin B12 has a role in DNA  
105 synthesis, delayed DNA synthesis in rapidly growing hematopoietic cells may result in macrocytic anaemia. The  
106 neurological manifestation of cobalamin deficiency is may be due to homocysteine toxicity deposits in brain and  
107 infants may be predisposed due to incompletely formed blood brain barrier [5] .

## 108 **6 Volume XVII Issue III Version I**

109 Most of the initial data regarding vitamin B12 deficiency in infancy are from case studies of infants exclusively  
110 breast fed by mothers on vegetarian diet. This case reiterates the association between infantile spasm and  
111 vitamin B12 deficiency. Infantile spasm are a unique form of seizure disorder as their occurrence is mostly  
112 limited to infancy and they are refractory to conventional anticonvulsant drugs. In India, a hospital population  
113 radioassay study with a cut off of 200 pg/ml found a vitamin B12 deficiency in 0.88% of patients with border line  
114 values in 3.8% [5] .Infants born to vitamin B12 replete mothers have stores of vitamin B12 that are adequate  
115 to sustain them for first several months post partum hence vitamin B12 rarely occurs before 4 months of age  
116 [6] . The neurological complex, defined as myelosis funicularis, consists of the following symptoms: 1. Impaired  
117 perception of deep touch, pressure and vibration, loss of sense of touch, very annoying and persistent paresthesias  
118 2. Ataxia of dorsal chord type 3. Decrease or loss of deep muscle-tendon reflexes 4. Pathological reflexes-Babinski,  
119 Rossolimo and others, also severe paresis.

120 III.

## 121 **7 Conclusion**

122 Encephalopathy due to vit B12 deficiency is very rare in children but any child presented with encephalopathy  
123 with knuckle hyperpigmentation without any prior history fever, loose stool,vomiting one has to do CBC, PS and  
124 serum B12 level to rule out B12 deficiency.Management with vit B12 supplementation and folic acid is mainstay  
125 of therapy. 90% patients have improvement in symptoms and rest 10% have residual moderate to severe disability  
126 following early treatment [7] . Hence early diagnosis and treatment is required.

## 127 **8 Contributors**

128 Dr. Sunil Kumar Agarwalla-revising it critically for important intellectual content. Dr. Nasreen Ali-conception,  
129 design and drafting.

## 130 **9 Conflict of Interest**

131 There was no conflict of interest and no funds received.

## 132 **10 Volume XVII Issue III Version I**

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Figure 1: Figure 1 , 2 , 3 : 4 :



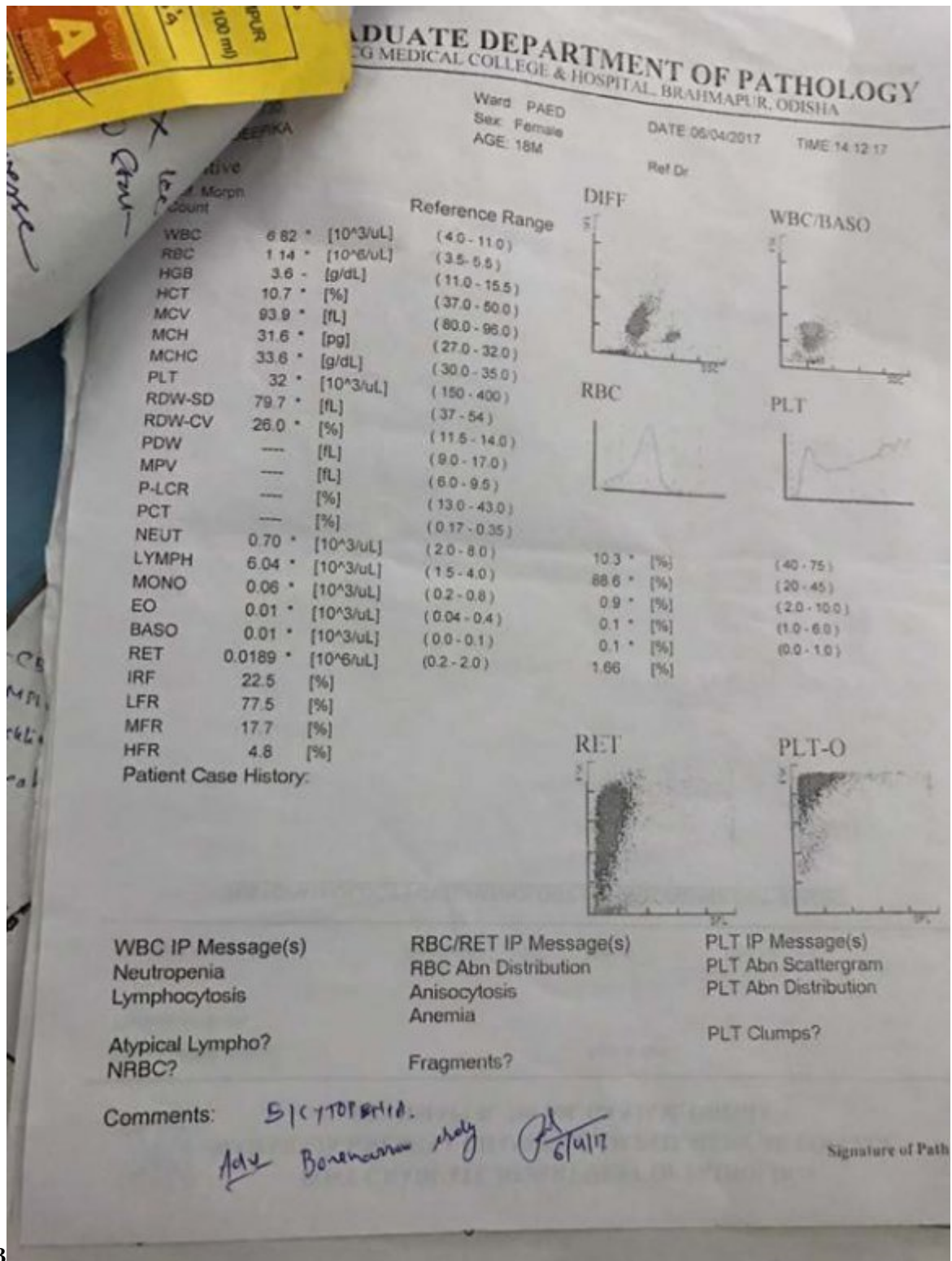
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Figure 2: Figure 5 :



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Figure 3: Fig. 1 :Figure 4 & 5 :



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Figure 4: Figure 1 , 2 & 3 :



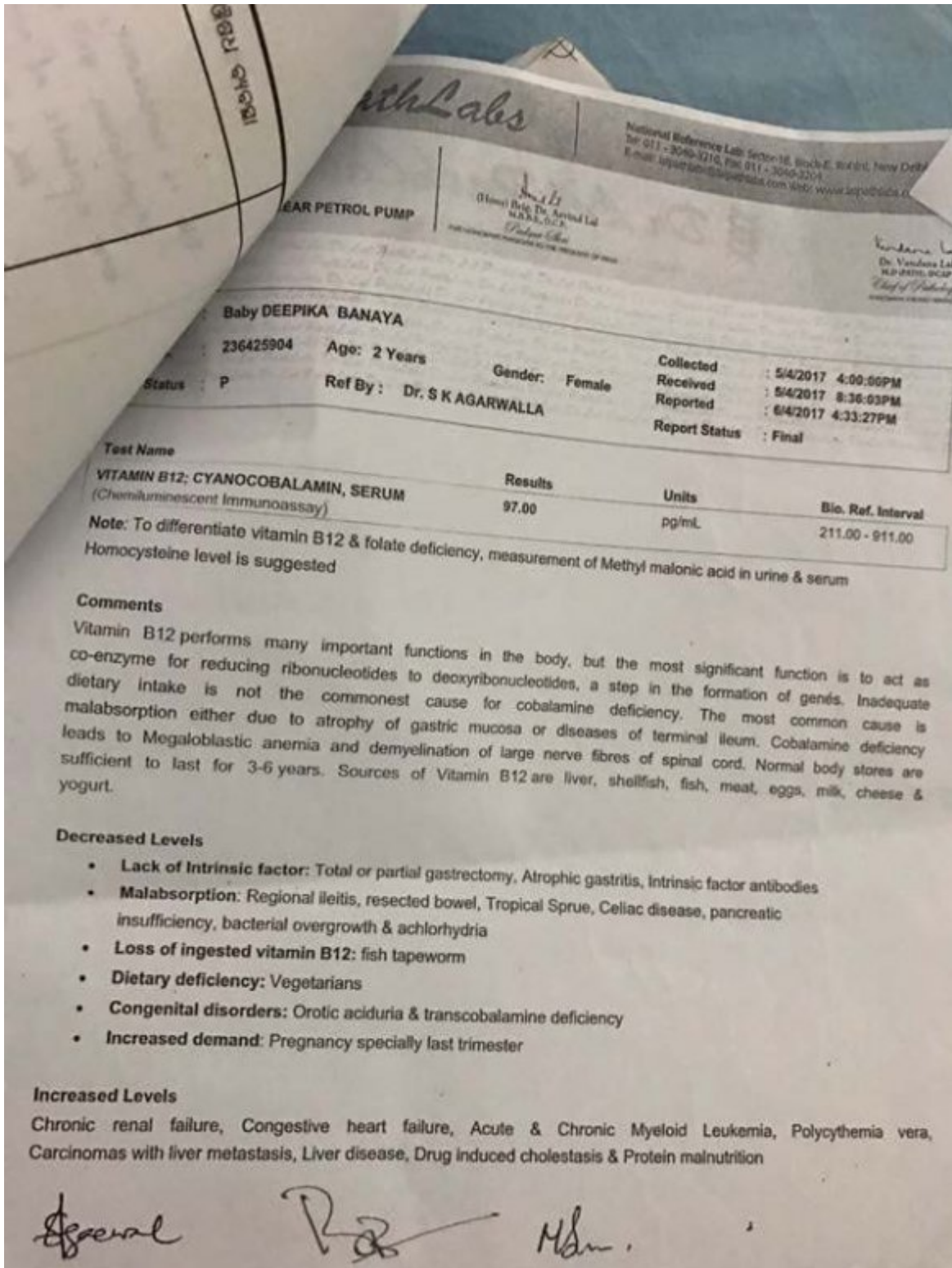


Figure 6:



134 .1 Acknowledgements

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