Subacute dementia in elderly due to vitamin B12 deficiency

Shreya Gattani[1*], Sourya Acharya[2], Roopesh Yarappa[3], Sakshi Gagneja[4]

[1,3]Resident, [2]Professor, [4]Assistant Professor, [1-4]Dept. of Medicine, [1-4]Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences (Deemed to be University) , Wardha, Maharashtra, India

***Corresponding Author: Shreya Gattani**
Email: drshreyagattani@gmail.com

Abstract
Dementia is a commonly encountered problem in the aging population. The cardinal manifestations of Vitamin B12 deficiency are dementia, delirium, cognitive impairment, confusion, memory losses, depression, acute psychosis, and rarely mania or schizophrenia. The neuropsychiatric manifestations due to Vitamin B12 deficiency are often accompanied by hematological abnormalities. We report a 68-year-old female who presented with complaints of behavioral changes, intermittent episodes of acute confusional state, memory deficits, inability to identify family members, lethargy and easy generalized fatigability. The laboratory investigations of the patient revealed macrocytic anemia with decreased Serum Vitamin B12 levels, Normal folate levels and elevated Serum Homocysteine levels based on which the patient was diagnosed with Hypovitaminosis of Vitamin B12 with Hyperhomocysteinemia. The patient showed dramatic improvement in the neuropsychiatric manifestations after receiving adequate supplementation of cobalamin.

Keywords: Dementia, Hypovitaminosis, Cobalamin, Hyperhomocysteinemia

Introduction
People residing in developing countries are more prone to suffer from Vitamin B12 deficiency.[1] The cardinal manifestations of Vitamin B12 deficiency are dementia, delirium, cognitive impairment, confusion, memory losses, depression, acute psychosis, and rarely mania or schizophrenia.[2] The neuropsychiatric manifestations due to Vitamin B12 deficiency are often accompanied by hematological abnormalities.[1] Apart from the above mentioned symptoms, Vitamin B12 deficiency can also cause ataxia, sensory disturbances like tingling and paresthesias, catatonia.[3] There has been evidence of dramatic response in patients of Vitamin B12 deficiency on receiving Cobalamin supplementation.[1]

Case Presentation
A 68-year-old female patient presented to the Medicine OPD along with his son with complaints of behavioral changes for the last 2 months. The son gave a history that the patient had intermittent episodes of acute confusional state which were frequently memory deficits and inability to identify family members. There were also complaints of sleep disturbances, markedly reduced physical activity, lethargy, and easy generalized fatigability. The patient had become isolated socially and had lost interest in day to day activities along with forgetfulness. The patient's appetite was reduced and she had apparently lost around 5-7 kgs of weight in the past 2 months. The patient did not have any past significant history of psychiatric illness, hypertension, diabetes mellitus, autoimmune diseases, alcohol abuse. The patient also did not have any past history of consumption of drugs or medications causing any cognitive or behavioral side effects. The patient had a history of consumption of a vegetarian diet throughout her lifetime.

On examination, the patient was pale with no evidence of icterus. The patient was conscious, co-operative but was disoriented to time, place and person with severe impairment of her cognitive functions, irrelevant talking and had short and long term memory loss. The patient appeared tired, confused, with decreased word output, inability to answer correctly, generalized slowness of thinking, inability to understand others and global attention deficit with loss of concentration. There were no other psychotic manifestations present. There was no evidence of any hypertension. Rest of the general physical examination was unremarkable and neurological examination revealed motor weakness of bilateral lower limbs having a power of 4+/5 with delayed and sluggish deep tendon reflexes and bilateral flexor plantars. The patient had an MMSE (Mini-Mental State Examination) Score of 15/30.

The hematological and biochemical laboratory investigations were as follows:-

Table 1:

Laboratory investigations	Results	Normal Values
Hemoglobin	**10.4** g/dL	12-18 g/dL
Mean Corpuscular Volume (MCV)	**122** fL	80-96 fL
Peripheral Blood Smear	Showed Normochromic, Macrocytic cells with anisopoikilocytosis	
WBC	6.4 X 10^3 / µL	$(4 – 10)^3$ / µL
Platelet	220 X 10^3 / µL	(150 – 400) X 10^3 / µL
Serum Iron	**7.2** µmol/L	11.6 – 31.3 µmol/L
Serum Folate	4.8 ng/mL	3-17 ng/mL

Serum Vitamin B12	**98** pg/mL	200 – 950 pg/mL
Serum Homocysteine	**156** µmol/L	5 – 15 µmol/L
Reticulocyte count	**0.2**%	0.5 – 3.5 %
Total Bilirubin	1.72 mg/dL	0.3 - 1 mg/dL
Direct Bilirubin	0.86 mg/dL	0.1 – 0.3 mg/dL
Serum Sodium	138 meq/L	136 – 145 meq/L
Serum Potassium	3.6 meq/L	3.0- 5.0 meq/L
Serum Creatinine	0.94 mg/dL	0.7 – 1.5 mg/dL
AST (SGOT)	38 U/L	0 – 35 U/L
ALT (SGPT)	44 U/L	0 – 40 U/L
Serum LDH	238 U/L	125 – 220 U/L

Thus, laboratory investigations revealed normochromic, macrocytic anemia with decreased Serum Vitamin B12 levels, Normal folate levels, and elevated Serum Homocysteine levels (Hyperhomocysteinemia). An MRI Brain Imaging of the patient was done which showed age-related atrophic changes. An upper GI endoscopy was performed which was normal.

The patient was started in 1mg of intravenous Inj. Vitamin B12 (Methylcobalamin) daily for the first two weeks. The patient was then discharged and was advised Inj. Vitamin B12 once a week for one month followed by 500mg of oral cobalamin thrice a day for a lifetime. The patient was called for follow up 2 months later.

The patient presented to us in Medicine OPD, 2 months later for a follow-up visit. There was a significant improvement in the patient's behavior and cognition. The patient was fully oriented and had a marked improvement in memory. There was an improvement in day to day physical activity of the patient. The patient no longer complained of easy fatigability and lethargy. The patient had an MMSE (Mini-Mental State Examination) Score of 30/30. The MCV dropped to 90fL.

The patient was being regularly followed up in Medicine OPD

Discussion

Dementia, a commonly encountered problem in the aging population, may be attributable to Alzheimer's Disease, Vascular diseases, senile atrophic changes,, etc.[4] Hypovitaminosis of Vitamin B12, is commonly encountered in senile patients presenting with dementia but often may be unnoticed by the attending physicians.[4]

Folic acid is present in mammalian circulation primarily in the form of 5-methyl-Tetrahydrofolate (THF).[5] 5-methyl-THF acts as a coenzyme in the formation of methionine from homocysteine. Methionine is later converted to S-Adenosylmethionine (SAM), which plays a crucial role in DNA Methylation and subsequent gene expression.[2,5] Disturbances in DNA Methylation and elevated levels of serum homocysteine, due to its non-conversion to methionine, is primarily responsible for neuropsychiatric manifestations of Vitamin B12 deficiency.[2] Also, the role of Vitamin B12 in causing hematological abnormalities is established.[4] However, there may be instances wherein Hypovitaminosis of Vitamin B12, may manifest as a primary hematological or a primary neuropsychiatric abnormality.[4]

Megaloblastic Anemia is the most frequently encountered hematological abnormality due to Vitamin B12 deficiency.[6] It may happen, that neurological manifestation is the only presentation or an initial presentation preceding hematological abnormality in cases of Vitamin B12 deficiency.[1] While, Pernicious anemia, is recognized as the most common cause of Vitamin B12 deficiency worldwide, the other causes of Vitamin B12 deficiency are malabsorption syndromes, atrophic gastritis, achlorhydria or hypochlorhydria, major GI surgery such gastrectomy, chronic alcoholism, pancreatic insufficiency, amyloidosis, reduced dietary folate intake, vegetarian or vegan diet and medications.[1-4,6]

Vitamin B12 deficiency clinically manifests at critically low levels (<100 pg/mL).[6] The recommended daily dietary intake of Vitamin B12 is 2-5 µg/day.[4] Vitamin B 12 supplementation is known to cause a marked improvement in the hematological abnormality, however, the outcome in cases of neuropsychiatric disturbances is variable and is dependent upon the severity of the disease.[4]

Conclusion

Early identification, diagnosis, and initiation of appropriate treatment helps in timely correction and dramatic improvement in patients presenting with Vitamin B12 deficiency.[6]

Conflict of Interest: None.

References

1. Almoallim H, Mehdawi FS, Cheikh MM, Al-dhaheri F, Aqeel AM. Reversible Vitamin B12 Deficiency Presenting with Acute Dementia, Paraparesis, and Normal Hemoglobin [Internet]. Case Reports in Neurological Medicine. 2016 [cited 2019 Apr 13]. Available from: https://www.hindawi.com/journals/crinm/2016/4301769/
2. Lerner V, Kanevsky M. Acute dementia with delirium due to vitamin B12 deficiency: a case report. *Int J Psychiatry Med* 2002;32(2):215–20.
3. Avasthi A, Sahoo M, Singh P. Negative symptoms presenting as neuropsychiatric manifestation of vitamin B12 deficiency. *Indian J Psychiatry* 2011;53(4):370.
4. Goebels N, Soyka M. Dementia Associated With Vitamin B12 Deficiency: Presentation of Two Cases and Review of the Literature. *J Neuropsychiatry Clin Neurosci* 2000;6.

5. Abbasi IHR, Abbasi F, Wang L, Abd El Hack ME, Swelum AA, Hao R, et al. Folate promotes S-adenosyl methionine reactions and the microbial methylation cycle and boosts ruminants production and reproduction. AMB Express [Internet]. 2018 Apr 23 [cited 2019 Apr 15];8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5913057/
6. Poovathingal M, George G, Panicker G, Abhilash S. A clinical Pandora: Unusual manifestations of Vitamin B12 deficiency. *Int J Adv Med Health Res* 2015;2(2):106.

How to cite this article: Gattani S, Acharya S, Yarappa R, Gagneja S. Subacute dementia in elderly due to vitamin B12 deficiency. *Ann Geriatrics Educ Med Sci* 2019;6(1):13-5.