

# Psychosis with vitamin B12 deficiency and increased extrapyramidal side effects: A case report

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**Abstract.** Vitamin B12 is a methyl donor important for the continuity of neuronal metabolism. Deficiency in vitamin B12 has been associated with a variety of neuropsychiatric pathologies that include extrapyramidal symptoms such as mood disorders, depressive disorder, delirium, and paranoid psychosis. Extrapyramidal symptoms are also associated with factors such as gender, age, and the presence of a mood disorder. Novel generation antipsychotics are less likely to cause extrapyramidal symptoms than typical antipsychotics due to their selective anti-dopaminergic action and antagonistic effects on serotonin receptors. The present case report describes a patient with psychosis in which a vitamin B12 deficiency not only complicated the treatment of extrapyramidal symptoms, but also tended to increase them.

Key words: Extrapyramidal system, vitamin B12, new generation antipsychotics

## 1. Introduction

Vitamin B12 is a methyl donor involved in a variety of metabolic pathways in the nervous system that is important for the continuity of neuronal metabolism. Optimal blood levels of vitamin B12 are needed to ensure neuronal plasticity and to prevent neuronal degeneration. Moreover, vitamin B12 deficiency may be associated with several neuropsychiatric pathologies including slowed cognition, mental confusion, memory impairment, mood or depressive disorders, a tendency for violence, fatigue, delirium, and paranoid psychosis (1). Recent reports have also shown that vitamin B12 deficiency may also result in the manifestation of extrapyramidal symptoms (2).

The antipsychotic-associated risk of movement disorders depends on factors such as gender, age, the presence of any mood disorders or comorbid neurological pathologies, and the type of antipsychotic (whether it comprises typical or atypical features). The present report describes the case of a patient with psychosis and concomitant B12 deficiency who developed extrapyramidal symptoms following the use of olanzapine. These symptoms were resistant to

treatment despite the fact that the patient did not exhibit any apparent risk factors.

## 2. Case report

A 25-year-old, illiterate, single female patient (A.C.) was brought to the emergency department of our hospital by her relatives with complaints of psychotic symptoms and aggression. During her psychiatric examination, the patient's behavior was consistent with her chronological age and her style of dress was consistent with her sociocultural level but was careless, and she exhibited a marked decrease in her degree of self-care. She presented with auditory hallucinations (a female voice threatening to kill her) and her thought content included persecutory delusions in conjunction with associated aggressions. Additionally, the patient exhibited cogwheel rigidity in both of her arms. Following the clinical evaluation, she was hospitalized.

After the [Van, 09.11.2011] earthquake, the patient and her family were provided with accommodations at a state-owned guesthouse in Antalya; they stated that the patient's symptoms began a few weeks after the displacement. Although it developed and progressed slowly, the patient began talking to herself, having delusions about two people following her and wanting to kill her, and her behavioral functionality and self-care noticeably deteriorated. The patient's cousin, her aunt's son, also had psychotic disorders.

The patient initially visited a clinic four days prior to her visit to the emergency department of our hospital. Following the diagnosis of a psychotic disorder, the patient was prescribed olanzapine (15 mg/day) and the medication was

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regularly administered by her relatives. On the day of her hospitalization, routine blood tests did not reveal any abnormalities except for vitamin B12 deficiency, her electroencephalography (EEG) and magnetic resonance imaging (MRI) scans and her vital functions were normal. At this point, she was prescribed olanzapine (20 mg/day) and biperiden (4 mg); intramuscular B12 replacement was initiated after the laboratory results.

The patient's extrapyramidal symptoms were assessed in the neurology clinic and the examination findings were normal except for cogwheel rigidity in both arms. The extrapyramidal symptoms were thought to be side effects of the antipsychotic medication. The initial evaluation yielded a score of 3 on the Scale for the Assessment of Extrapyramidal Signs (Parkinsonism and Dystonia Questionnaire) due to the rigidities in her arms (mild in the right arm and moderate in the left). It was suggested that she continue treatment with the biperiden tablets.

Following her hospitalization, the patient did not exhibit any clinical improvement other than increased sleep time in the second week. In contrast, a parkinsonian posture, resting tremors in her hands, and neck pain that was indicative of dystonia developed in addition to the rigidities in both arms. Subsequently, the patient's Parkinsonism and Dystonia Questionnaire score was determined to be 9. Because the patient's psychosis persisted and her movement disorder rapidly progressed with no response to biperiden, a regimen of electroconvulsive therapy (ECT) was planned for every other day. After the third ECT session, no dystonia was observed and her tremors had decreased but the cogwheel rigidity persisted in both arms; her Parkinsonism and Dystonia Questionnaire score was assessed as a 4. After the tenth ECT session, the patient exhibited a remission in her psychotic state and parkinsonian symptoms and scored a 1 on the Parkinsonism and Dystonia Questionnaire due to mild rigidity in her right arm.

### 3. Discussion

The present case report describes the clinical follow-up of a patient with psychosis and vitamin B12 deficiency who developed progressive extrapyramidal symptoms following the treatment of olanzapine. Although the patient exhibited progressive Parkinson-like signs that manifested secondary to olanzapine treatment, the vitamin B12 deficiency was thought to be a significant factor in her symptoms because this vitamin is necessary for the healthy functioning of a variety

of neuronal systems, including the extrapyramidal system.

Antagonism of dopamine function in the nigrostriatal region is thought to be responsible for extrapyramidal side effects. A vitamin B12 deficiency in the absence of antipsychotic use may cause extrapyramidal symptoms in conjunction with bilateral signal increases in the globus pallidus, where dopaminergic neurons are highly active (3). Patients with Parkinson's disease exhibit high homocysteine levels in the blood and cerebrospinal fluid and vitamin B12 deficiency may alter homocysteine metabolism and result in hyperhomocysteinemia and neurodegeneration. On the other hand, a high dose of a vitamin B complex including B12 produces anti-parkinsonian effects regardless of homocysteine levels (4).

Atypical antipsychotics cause fewer extrapyramidal side effects than typical antipsychotics due to their antagonism of serotonin receptors and selective blockage of dopamine. Olanzapine is an atypical antipsychotic that can cause extrapyramidal side effects similar to those of clozapine (5). Moreover, olanzapine is a new generation antipsychotic that is similar to clozapine in terms of molecular structure and shares its preclinical and clinical features (6). Tardive dyskinesia that can be caused by other psychotics have also been reported to disappear following treatment with olanzapine (7).

The patient in the present report exhibited an increase in extrapyramidal symptoms following use of olanzapine, an antipsychotic associated with a relatively lower risk of movement disorders, despite treatment with biperiden. This increase in symptoms suggests that psychotic patients may have a tendency to display treatment-resistant extrapyramidal symptoms. Furthermore, patients with Parkinson's disease, who also tend to exhibit extrapyramidal symptoms, are treated with vitamin B12. Thus, B12 levels may represent an important indicator to risk of extrapyramidal symptoms and treatment resistance, as in the present case.

### References

1. Lerner V, Kanevsky M, Dwolatzky T, et al. Vitamin B12 and folate serum levels in newly admitted psychiatric patients. *Clinical Nutrition* 2006; 25: 60-67.
2. Kumar S. Vitamin B12 deficiency presenting with an acute reversible extrapyramidal syndrome. *Neurology India* 2004; 52: 507-509.
3. Sharrief AZ, Raffel J, Zee DS. Vitamin B12 deficiency with bilateral globus pallidus abnormalities. *Arch Neurol* 2012; 69: 769-772.

4. Haghdoost-Yazdi H, Fraidouni N, Faraji A, Jahanihashemi H, Sarookani M. High intake of folic acid or complex of B vitamins provides anti-Parkinsonism effect: No role for serum level of homocysteine. *Behavioural Brain Research* 2012; 233: 375-381.
5. Sacristan JA, Gomez JC, Ferre F, et al. Incidence of extrapyramidal symptoms during treatment with olanzapine, haloperidol and risperidone: results of an observational study. *Actas Espanolas de Psiquiatria* 2001; 29: 25-32.
6. Bymaster FP, Calligaro DO, Falcone JF, et al. Radioreceptor binding profile of the atypical antipsychotic olanzapine. *Neuropsychopharmacology* 1996; 14: 87-96.
7. Kimberly HL, Johnson CG, Littrell S, Peabody CD. Marked Reduction of Tardive Dyskinesia With Olanzapine. *Arch Gen Psychiatry* 1998; 55: 279-280.