

## Vitamin B12 Deficiency in Persons with Intellectual Disability in a Vegetarian Residential Care Community

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The goal of this study was to determine the prevalence of vitamin B12 deficiency among intellectually disabled persons in a vegetarian remedial community in Israel. In this community, 47 individuals with intellectual disability (ID) live in 7 enlarged families in a kibbutz style agricultural setting. These 47 individuals and 17 of their caregivers were screened for vitamin B12 deficiency. There were 25.5% of the disabled vs. 11.8% of the caregivers found to have levels of vitamin B12 lower than 157 pg/ml. It is concluded that persons with ID in this vegetarian residential care community seemed to be at a higher risk for vitamin B12 deficiency.

**KEYWORDS:** cobalamin, vitamin B12 deficiency, prevalence, intellectual disability, mental retardation, residential care, Israel

**DOMAINS:** child health and human development, medical care, psychiatry, nursing

### INTRODUCTION

The prevalence of vitamin B12 (cobalamin) deficiency can range from 3–29%[1] in the general population, whereas in vegetarians it can reach up to 40%[2]. The daily intake of vitamin B12 in the Western diet is 5–15 mcg/day[3] and the intake in individuals with intellectual disability (ID) has been measured to be 10.8 mcg daily[4]. The minimum daily requirement for cobalamin is 2.5 mcg according to Harrison's Principles of Internal Medicine[5].

Since persons with ID also live in households, communities, or residential care centers with a vegetarian nutritional way of life, the literature was surveyed to find information on vitamin B12 deficiency, but the prevalence of vitamin B12 deficiency in this population has not been studied before. The purpose of the present study was therefore to determine the prevalence of vitamin B12 or cobalamin deficiency in persons with ID and their caregivers in a vegetarian remedial community.

## METHODS

The Division for Mental Retardation in Israel provides service to over 25,000 persons with ID and among them, 6,500 individuals in close to 60 residential care centers around the country. One center in the south of Israel was selected for this pilot study. This center has been arranged like a kibbutz with seven housing units, each with a family, their own children, and seven persons with ID, who share living quarters, kitchen, and dining room. During the day, the family members, other staff, volunteers, and the people with ID work together in the fields, a bread factory, an olive oil press, a wax candle factory, and a weaving factory.

The inspiration for this therapeutic approach came from the German-Austrian philosopher Rudolf Steiner (1861–1925), and today there are about 300 therapeutic communities around the world working with persons with ID at all ages. In all these communities, an effort is made to harmonize the different elements of life, because the basic problem is considered to be a “dissonance” within the “symphony of life” and the healing process tries to find a suitable “consonant” solution. Work, social life, and cultural life serve as therapeutic activities together with individual treatment. The more harmonious the development of the person, the more independent the person becomes in achieving harmony in the environment. A vegetarian lifestyle is part of the therapeutic philosophy.

As part of the yearly routine blood examination of the residents with ID, a specimen was drawn for vitamin B12 levels and examined at the Clalit Health Service Laboratory (normal range 157–1059 pg/ml). In addition, 17 vegetarian caregivers were examined. Statistical analysis was not found to be relevant in this small study.

## RESULTS

The residential care center studied had 47 adults (22 females and 25 males): 42 persons aged 19–45 years, 4 aged 46–60 years, and 1 above 61 years. In addition, 11 had mild, 26 moderate, and 10 severe ID.

Of the 47 persons with ID screened, 12/47 (25.5%) were found to have vitamin B12 levels lower than 157 pg/ml, while 2/17 (11.8%) of the caregivers group had vitamin B12 lower than 157 pg/ml.

Looking at the vitamin B12 levels in persons with ID from various etiologies, persons with ID and cerebral palsy had the lowest average level (200 pg/ml), followed by fragile X (206.7 pg/ml), while persons with Down syndrome had the highest average (272 pg/ml). Persons with epilepsy had lower vitamin B12 deficiency (average at 180.72 pg/ml) than persons without epilepsy (average at 260.02 pg/ml).

## DISCUSSION

There are very few studies on vitamin B12 deficiency in the population of persons with ID. Cunningham and co-workers from Stewarts Hospital in Ireland[4] studied the dietary intake of 115 male and 217 female persons with mental handicap (aged 15–64 years) in five long-term institutions and found the vitamin B12 intake to be 10.8 mcg/day.

Hanley et al.[6] (from the Hospital for Sick Children in Toronto) described a case of an 18-year-old female with phenylketonuria (PKU) who presented at follow-up after years of absence with various

symptoms such as spastic paraparesis, tremor, disorientation, slurred speech, distractibility, deteriorating mental function, and megaloblastic anemia. During the investigation, vitamin B12 deficiency was found and after treatment, most of her symptoms disappeared. The case story resulted in further investigation of 37 adolescents at that clinic with PKU and it was found that 6 (16%) had subnormal serum B12 levels and another 6 had borderline low values. Another case story[7] of an adult with PKU and vitamin B12 deficiency has been reported.

We have not been able to find studies of vitamin B12 deficiency in the population of vegetarians with ID, but Pongstaporn and Bunyaratavej[2] studied 179 vegetarians and 58 controls without ID in Thailand. They found that hemoglobin, hematocrit, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, white blood cells, neutrophils, serum ferritin, and serum vitamin B12 in vegetarians were significantly lower than controls ( $p < 0.05$ ). Vitamin B12 deficiency was found in 40% of the vegetarians.

Our small sample showed that a large number (25.5%) of the persons with ID living on a vegetarian diet and 11.8% of their caregivers living in the same environment and eating the same food have vitamin B12 deficiency. Since the dietary source of cobalamin is animal products, such as meat and dairy foods, it is no wonder that vegetarians are prone to deficiency.

## CONCLUSION

It seems that persons with ID in this residential care center are at a higher risk for vitamin B12 deficiency. We therefore recommend routine investigations for vitamin B12 levels in this population.

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