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Research Article

Risk Factors Associated with Vitamin B12 Deficiency in the Elderly Treated in the Period 2016 in a Public Hospital in Peru

Marie Rivas Ch[1], Maria Elena Muñoz Zambrano[2]*, Julio Del Pozo L[3], Jenny Sanchez[4] and Ricardo León H[5]

[1]*Audit Surgeon, ESSALUD, Headquarters, Lima, Peru*

[2]*PhD Health and Development in the Tropics, University of Salamanca, School of Medicine, National University of San Marcos, National Institute of Health, Lima, Peru*

[3]*Surgeon, Ophthalmology Resident, School of Medicine, National University of San Marcos, Lima, Peru*

[4]*Degree in Statistics and the National Institute of Health, Lima, Peru*

[5]*Intern of Medical Technology, School of Medicine, National University of San Marcos, Lima, Peru*

***Corresponding Author:** Maria Elena Muñoz Zambrano, PhD Health and Development in the Tropics, University of Salamanca, School of Medicine, National University of San Marcos, National Institute of Health, Lima, Peru.

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Abstract

Introduction: Vitamin B12 deficiency is frequent in the elderly population due to physiological changes, which affect nutritional status according to estimates.

Objective: To determine the risk factors associated with vitamin B12 deficiency in the elderly population who were seen at the outpatient clinic of the Hospital Nacional Hipólito Unanue.

Methods: Observational, analytical, retrospective, case-control study. The sample size was 100 cases (vitamin B12 deficiency) and 200 controls (without vitamin B12 deficiency). Data obtained from medical records were collected. The Odds Ratio was used to demonstrate the association between risk factors and vitamin B12 deficiency.

Results: Within the association analysis, age obtained a $p < 0.001$ and OR 5.21 [3.00 - 9.04], being those older than 75 years, the majority group in the group of cases (78%). When associating gender with vitamin B12 deficiency, a $p < 0.001$ and OR 4.14 [2.45 - 6.99] was obtained. With respect to the presence of comorbidities, the group that presented 2 or more of these, obtained a $p < 0.001$ and OR 62.11 [28.10 - 137.24] and according to the number of drugs ingested, the group that consumed 2 or more, obtained OR 3.38 [2.048 - 5.57] and $p < 0.001$. With respect to eating habits, $p = 0.57$ and OR 1.35 [0.46 - 3.91].

Conclusion: Age, sex, presence of 2 or more comorbidities, and using 2 or more medications proved to be risk factors associated with vitamin B12 deficiency.

Keywords: *Risk Factors; Vitamin B12; Older Adult*

Introduction

Within the life cycle of the human being, aging is accompanied by physiological changes which affect the nutritional status, various factors such as low food intake, little gastric acid secretion is altered and as a consequence the reduction in iron absorption, vitamin B12 among others [1].

In 2015, the World Health Organization (WHO) published the "World Report on Aging and Health" which states that people can aspire to live beyond 60 years [2].

Estimates from the WHO (WHO) mention that between 2000 and 2050 the number of people aged 80 years or older will increase almost four times, reaching 395 million older adults [3].

In Peru, the National Institute of Statistics and Informatics (INEI) reported in 2015 that the older adult population (60 years and over) amounts to 3.11 billion 11 thousand 50 people which represent 9.7% of the population [4].

In addition, according to the 2014 National Household Survey (ENAHO), 39.1% of households are made up of an adult over 60 years of age and older and 8.1% of households are 80 years of age or older. More [4], this leads to a progressive increase in the prevalence of diseases in the elderly, including anemia secondary to vitamin B12 deficiency.

Vitamin B12 also known as cyanocobalamin or cobalamin, soluble in water (water soluble), cofactor in DNA synthesis and is involved in the metabolism of every cell of the human body [5].

Reviews of available scientific evidence have shown that low concentrations of vitamin B12 in the blood are related to neurodegenerative diseases and cognitive impairment [6].

It is important to know about the pathologies in this type of population, among which the importance of anemia stands out, which has a high prevalence that can range between 48 and 60% according to data from the National Geriatrics Research Consortium. Geriatric Diseases) and the Beverly Healthcare Data Ware House [7].

Anemia is one of the most common diseases that we can find on a daily basis, especially in elderly patients, and among the types of this pathology, there is anemia due to Vitamin B12 deficiency. Different authors estimate the elderly population with this deficiency to be more than 12% [8] however, despite the fact that a wide group of diseases and other factors are associated with vitamin B12 deficiency, there are not many studies about it.

Objective of the Study

This study was carried out with the objective of determining the risk factors associated with vitamin B12 deficiency in the elderly treated in 2016 in a public hospital in Peru.

Methods

Design: Observational, retrospective, analytical, case-control type study.

Population: Patients over 60 years of age of both sexes attended by an outpatient clinic of the geriatric service of the Hospital Nacional Hipólito Unanue (HNHU) during the period January - December 2016. A database obtained from the medical records was prepared.

Show

A sample size was determined through the statistical formula of the number of cases and controls with a 1: 2 ratio, taking into account 40% as an expectation of frequency of exposure among controls, an estimation error of 5% and a significance level of 0.05 (95% confidence), having 100 cases and 200 controls.

Results

Tables were presented on the significance (p), estimate of risk (OR) and confidence interval of each variable studied.

Table 1 shows us the results of the epidemiological factors associated with vitamin B12 deficiency in older adults seen in the HNHU geriatric clinics. We can see that 78% of the older adults in the group with vitamin B12 deficiency (cases) were aged 75 years or older, that is, they were from the elderly group and 59.5% of older adults in the control group had ages below 75 years; adulthood represented to be an associated risk factor for vitamin B12 deficiency and this could be corroborated with the Chi^2 test with a value of $p < 0.001$.

Epidemiological factors	Cases with vitamin B12 deficiency		Controls No vitamin B12 deficiency		OR IC 95%	Chi^2 test
	N° 100	% 100	N° 200	% 100		
Age					5.20* [300 - 9.03]	0.00*
Old age (<75 years)	22	22	119	59.5		
Elderly (> or = 75 years)	78	78	81	40.5		
Gender					4.14* [245 - 6.99]	0.00*
Male	73	73	79	39.5		
Female	27	27	121	60.5		
Comorbidities					62.11 [28.10 - 137.24]	0.00*
Presence of 2 or more comorbidities	91	91	28	14		
Presence of only 1 comorbidity	9	9	172	86		
Usual medication					3.38* [2.04 - 5.57]	0.00*
2 or more medications in use	63	63	67	33.5		
1 drug in use only	37	37	133	66.5		
Feeding Habits					1.35 [0.46 - .91]	0.57
Restrictive diet	6	6	9	4.5		
Balanced diet	94	94	191	95.5		

Table 1: *Epidemiological factors associated with vitamin B12 deficiency in older adults treated at the Hospital Nacional Hipólito Unanue 2016.*
Source: Data collection sheet.

Another of the epidemiological factors evaluated was the gender of the older adult patients; The results showed us that 73% of the older adults with vitamin B12 deficiency (cases) were male and 39.5% of the older adults in the control group also belonged to this gender, therefore there was a 4.14 times higher risk that older male adults had vitamin B12 deficiency, this result was corroborated with the Chi^2 test that had a value of $p < 0.001$, there was a statistically significant association between gender and vitamin B12 deficiency.

In relation to vitamin B12 deficiency, we see that 91% of older adults with vitamin B12 deficiency had 2 or more comorbidities and 14% of controls who did not have vitamin B12 deficiency, presented 2 or more comorbidities, the calculation The OR shows us that the presence of two or more comorbidities is a risk factor for vitamin B12 deficiency; Chi^2 test, $p < 0.001$, indicates that there is a statistically significant association.

In the results of the usual medication of the elderly as a risk factor associated with vitamin B12 deficiency, we see that 63% of older adults with vitamin B12 deficiency used 2 or more drugs for the treatment of some morbidity and on the other hand 33.5% of the group

of older adults in the control group (those who did not have vitamin B12 deficiency) also took 2 or more medications for the treatment of some morbidity; The calculation of the OR shows us that taking 2 or more drugs as a treatment for some morbidity in the elderly was a risk for having vitamin B12 deficiency, the calculation of Chi^2 ($p < 0.001$) only confirms that there is an association between taking more than two medications and being deficient in vitamin B12 in older adults.

The influence of a restrictive diet on the vitamin B12 deficiency in the elderly allows us to observe that only 6% of the elderly with vitamin B12 deficiency had an unbalanced diet and 4.5% of the elderly in the control group who also had an unbalanced diet, did not present a vitamin B12 deficiency, the OR calculation shows us that having an unbalanced diet does not mean to be a risk factor associated with vitamin B12 deficiency. Our Chi^2 test had a value of $p = 0.57$ ($p > 0.05$), which indicates that there is no statistically significant association between having an unbalanced diet and vitamin B12 deficiency.

Another of the variables studied were drugs (Table 2). In the group with vitamin B12 deficiency (cases), metformin (59%) and omeprazole (56%) prevailed and in the control group (without vitamin B12 deficiency), we have losartan (33.5%) and ranitidine (29%).

Drugs	
Cases	**Controls**
Metformin (59%)	Losartan (33.5%)
Omeprazole (56%)	Ranitidine (29%)
Losartan (19%)	Omeprazole (23%)
Ranitidine (17%)	Metformin (22.5%)
Colchicine 16%)	Insulin (19.5%)
Insulin (6%)	Colchicine (13%)

Table 2: *Drugs used in patients with and without vitamin B12 deficiency.*
Source: Data collection sheet.

Discussion

Our results on the risk factors under study as the first variable we have adulthood associated with vitamin B12 deficiency; These findings are consistent with the study carried out at the PNP San José Geriatric Hospital [9], where the most frequent cause of anemia was vitamin B12 deficiency, with the average age in this case being 83 ± 11.1 years. In the study by Ramírez P and Cols [10], in a sample of 100 older adults, a prevalence of vitamin B12 deficiency of 30% (n = 30) was reported using a cut-off point of < 150 pmol/L. In both studies, older ages prevailed (approximately older than 75 years), as did the study carried out in Chile [11], where there is a deficit of vitamin B-12 and folates, which increase with age.

In relation to gender, 73% of the elderly with vitamin B12 deficiency (cases) were male and 39.5% of the elderly in the control group also belonged to this gender, therefore, there were 4.14 times more risk than older male adults with vitamin B12 deficiency, there was a statistically significant association between gender and vitamin B12 deficiency. This could be corroborated in the study carried out by Sánchez H and Cols [11], where it was found that men presented significantly higher prevalences than women, with values of 37.1% (95% CI: 31.8 - 41.5) and 19.9% (95% CI: 17.0 - 23.0), respectively ($p < 0.001$). Similarly, Ramírez P and Cols [10] reported that vitamin B12 deficiency was higher in men than in women.

Regarding the presence of comorbidities associated with vitamin B12 deficiency, it could be shown that 91% of older adults with vitamin B12 deficiency had the presence of 2 or more comorbidities and 14% of controls who did not have deficiency of vitamin B12,

presented 2 or more comorbidities, therefore, the presence of 2 or more comorbidities was also a risk factor. In the research carried out by Rosales B and Cols [12] a high prevalence of anemia was also observed in the elderly, among whom is vitamin B12 deficiency, and it is described that anemia is associated with various diseases. There are not many studies about this type of association, however, the literature supports that various pathologies are associated with this deficiency as chronic diseases: kidney failure, heart failure, among others [13].

63% of older adults with vitamin B12 deficiency used 2 or more medications for the treatment of some morbidity, the group of older adults in the control group in 33.5%, also took 2 or more medications for the treatment of some morbidity; The calculation of the OR shows us that it meant to be a risk for having vitamin B12 deficiency, these results agree with what was done by Ortiz MBA [13] where the consumption of drugs, if it turned out to be a risk factor for anemia, it should be noted that, in that In the elderly population, the most frequent type of anemia was due to vitamin B12 deficiency. If we focus more on drug use, we can conclude that both the consumption of metformin and the consumption of omeprazole influence vitamin B12 deficiency, something similar to that found by Mindiola., *et al* [14].

Finally, when studying the types of diets, it is observed that only 6% of older adults with vitamin B12 deficiency had an unbalanced diet and 4.5% of older adults in the control group who also had an unbalanced diet, did not present vitamin B12 deficiency, therefore, having an unbalanced diet does not mean to be a risk factor associated with vitamin B12 deficiency; there is a disadvantage in our medical records, since the type of diet that patients consume is not written exactly. It should be noted that according to reviews made previously [13], strict vegetarians do have a greater risk factor for vitamin B12 deficiency; just as malnutrition influences this deficit; however, we were unable to collect the information necessary for this purpose.

Conclusion

A significant relationship was found between four factors associated with vitamin B12 deficiency: age, sex, the presence of two or more comorbidities, and the use of two or more medications.

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Conflicts of Interest

The authors declare that they have no conflicts of interest in the publication.

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