World Journal of Advanced Research and Reviews, 2020, 06(01), 001–005

World Journal of Advanced Research and Reviews

e-ISSN: 2581-9615, Cross Ref DOI: 10.30574/wjarr

Journal homepage: https://www.wjarr.com

(RESEARCH ARTICLE)

Micronutrient content in the diet of patients in psycho-neurological hospitals in Latvia

Beitane Ilze * and Marisheva Alla

Department of Nutrition, Faculty of Food Technology, Latvia University of Life Sciences and Technologies, 22 Rigas Street, Jelgava, LV-3004, Latvia.

Publication history: Received on 23 March 2020; revised on 29 March 2020; accepted on 30 March 2020

Article DOI: https://doi.org/10.30574/wjarr.2020.6.1.0076

Abstract

Mental health is influenced by a variety of factors, nutrition being one of the most important. Patients in psychiatric hospitals are provided with 24-hour care, including meals, and it is known that nutrition affects the well-being of patients. The intake of micronutrients has been associated with a reduction in depression.

The aim of the study was to evaluate patients' diets in Latvian psycho-neurological hospitals according to the micronutrient recommendations provided by the Ministry of Health for the nutritional intake of the Latvian population. All data from the 21 menus provided by three Latvian psycho-neurological hospitals were processed using the *Fineli* program. Vitamin (B_1, B_2, B_6, B_{12} and D) and mineral (calcium, iron, iodine, potassium, selenium, and zinc) content was determined for all menus, providing data on the total daily intake of micronutrients. The amount of potassium, selenium and zinc statistically significantly exceeded the recommended intake of trace elements for the population of Latvia. The amount of iron in the menus was found to be higher than that suggested by the national guidelines for men, whereas it was not statistically significantly different than the amount recommended for women. The amount of iodine in the menus was statistically significantly below the recommended level for both men and women. Iodine deficiency was observed in all hospital menus. No significant differences were found in the content of vitamins B_2 and B_{12} for both men and women, whereas vitamins B_1 and B_6 exceeded Latvian recommendations for women. All hospital menus contained inadequate vitamin D levels in comparison to the established recommendations.

Keywords: Minerals; Vitamins; Mental health; Psychiatric patients

1. Introduction

The World Health Organization's Mental Health and Mental Disorders reports state that the number of people worldwide who suffer from mental illnesses such as depression, anxiety etc. is growing [1, 2, 3]. Mental health is influenced by a variety of aspects, from genetic heritage to environmental factors, with nutrition also playing an important role. Various studies have shown a relationship between diet and mental health, with an emphasis on certain micronutrients, macronutrients and types of food. [4, 5, 6] However, there is ambiguity in the results of the studies because of contradictory conclusions. A systematic review of Quirk et al. [7] showed limited or conflicting levels of evidence of a link between mental health and different diets. Crawford et al. [8], on the other hand, indicated that depression can be associated with unhealthy diets, which means higher levels of unhealthy food/fast food choices and intake. Another study found differences in nutritional quality between patients with melancholic and atypical types of depression [9].

Patients in psychiatric hospitals are provided with 24-hour care, including meals. It is known that nutrition affects the physical, social and mental well-being of patients, as well as clinical outcomes and hospital stay satisfaction. Most

* Corresponding author: Beitane Ilze

hospitalized patients, including psycho-neurological hospital patients, are at risk of malnutrition in hospital [10]. Malnutrition in hospitalized patients is associated with reduced appetite and comorbidity. Loss of appetite may be associated with chewing and swallowing difficulties [11], anxiety, depression and use of medication. Burgos et al. [12] point out that patients with neurological conditions are at high risk of micronutrient deficiency.

Studies have confirmed the association between zinc deficiency and the development of depressive symptoms. Styczen et al. [13] revealed significantly lower zinc levels in patients with depression than in healthy subjects. Another study reported that the use of vitamin B complex had a positive effect on the reduction of depressive and anxiety symptoms [14]. Literature indicates that patients with depressive disorders have a need for vitamin D, vitamin B_6, iron, molybdenum and copper [2]. Increases in serum 25(OH) D concentration (≥100 nmol/L) resulted in improvements in the assessment of depression and anxiety [2]. Föcker et al. [15] also emphasized that the symptoms of depression can be improved with vitamin D supplementation.

With the essential role of micronutrients in the diet of psychiatric patients having been confirmed by literature [2], the aim of the present study was to evaluate patients' diets in Latvian psycho-neurological hospitals according to the micronutrient recommendations given by the Ministry of Health for the nutritional intake of the Latvian population, as there is no separate recommendation for psychiatric patients.

2. Material and methods

The study included three Latvian psycho-neurological hospitals which each submitted detailed 7-day diets with nutritional and energy values. A total of 21 menus were analysed. Hospitals provided four meals per day. The nutritional and energy values of menus are set by the Latvian Cabinet of Ministers Regulation No 172, and therefore it was determined that there was no need to analyse these. All data from the received menus was processed using the *Fineli* program (www.fineli.fi) on the website of The National Food Composition Database in Finland, which is maintained by The National Institute for Health and Welfare. Vitamin (B_1, B_2, B_6, B_{12} and D) and mineral (calcium, iron, iodine, potassium, selenium, and zinc) content was determined for all menus, providing data on total daily intake of micronutrients, assuming that a patient would eat everything on the menu. MS Excel and IBM SPSS Statistics 22 were used for data analysis using descriptive statistical methods (mean, minimum/maximum and standard deviation). To determine statistically significant differences, a p value was used where $p<0.05$ is considered statistically significant.

3. Results and discussion

The results displayed in Table 1 showed that the amount of potassium, selenium and zinc statistically significantly exceeded the recommended intake of trace elements for the population of Latvia. However, none of the mineral amounts exceeded the tolerable upper intake levels specified by the European Food Safety Authority (EFSA). The sources of potassium in the menus included potatoes, carrots, zucchini, dairy products, chicken, bread and grains. Main sources of zinc were cheese, eggs, chicken, liver and grains (rice, wheat and rye). Sources of selenium were eggs, cheese, chicken and fish products. The results pose the question of whether the amounts discovered should be considered beneficial. Comai et al. [16] stated that higher levels of zinc in blood was linked to personality disorders. It shows that increased micronutrient content cannot always be considered as favourable. However, Li et al. [17] concluded in their study that intake of micronutrients such as zinc, iron, copper and selenium was associated with a reduction in depression.

Table 1 The dietary reference intakes of micronutrients in Latvia and their contents in psychiatric patients' diets

Micronutrients	**Recommended dietary intakes in Latvia**		**Amount of micronutrients in patients' diet per day**		**Mean amount (SD)**	***p-value***
	Female	Male	Min	Max		
Minerals						
Calcium, mg	800	800	410.5	1062.7	779.3 (295.6)	*p>0.05*
Iron, mg	15	9	11.5	20.9	14.4 (2.3)	*p>0.05 (female)* *p<0.05 (male)*
Iodine, µg	200	200	137.7	248.1	181.3 (26.6)	*p<0.05*
Potassium, mg	3300	3500	2546.9	4719.4	3541.2 (516.9)	*p<0.05*
Selenium, µg	50	60	49.2	98.5	74.5 (15.3)	*p<0.05*
Zinc, mg	7	9	10.2	16.8	13.3 (1.8)	*p<0.05*
Vitamins						
Vitamin B_1, mg	1.1	1.4	0.9	2.2	1.6 (0.3)	*p<0.05 (female)* *p>0.05 (male)*
Vitamin B_2, mg	1.5	1.5	1.1	3.2	1.7 (0.5)	*p>0.05*
Vitamin B_6, mg	1.3	1.5	1.4	2.3	1.7 (0.3)	*p<0.05 (female)* *p>0.05 (male)*
Vitamin B_{12}, µg	2.0	2.0	1.9	16.1	5.0 (6.6)	*p>0.05*
Vitamin D, µg	10	10	1.0	9.8	3.3 (2.8)	*p<0.05*

Calcium in patients' diets is not statistically significantly different from the recommended dose. The highest intake of calcium per day was observed at one hospital with a wide range of dairy products on the menu – cheese, yogurt and milk. However, this amount of calcium intake does not exceed the tolerable upper level.

The amount of iron in the menus was found to be higher than that suggested by the national guidelines for men, whereas it was not statistically significantly different than the amount recommended for women. The main sources of iron in hospitals were wheat, rice, pearl barley, buckwheat, beans, liver and meat products. The maximum iron intake at one hospital was related to the amount of liver products in the diet on that day. Theoretically, the required iron content in the menus was reached, but further studies on iron assimilation would be needed in the future. It should be noted that plant products contain non-heme iron, which is more sensitive to nutrients such as phytate, calcium and dietary fibre, which inhibit iron absorption [18]

The amount of iodine in the menus was statistically significantly below the recommended level for both men and women. Iodine deficiency was observed in all hospital menus. The main sources of iodine in hospitals were potatoes, bread, eggs, cheese and grits, but this was not enough to provide the necessary recommendations. Iodine deficiency is characteristic of the entire population of the Latvian region [19] and a public health problem worldwide [20]. The salt content of all hospitals' menus was higher than 5 g per day and, moreover, was not iodized, which could explain the lack of iodine compared to the recommendations. However, the lowest amount of iodine in the diet was 137.7 µg, which is a sufficiently high concentration compared to the daily amount of iodine that can cause goiter (<50 µg/day) [21].

Analysing the content of B vitamins in menus of psycho-neurological hospitals, it was concluded that no significant differences were found in the content of vitamins B_2 and B_{12} for both men and women, whereas vitamins B_1 and B_6 exceeded Latvian recommendations for women. However, vitamins B_1 and B_6 did not exceed the tolerable upper intake levels set by the EFSA. B vitamins are important for brain health in all age groups. Optimal B vitamins are linked to improved cognitive health during aging, as B vitamin deficiency is a major cause of neurological disorders and disabilities worldwide [22]. It has been reported in the literature that isolated vitamin B_2 deficiency is rare, but may be

related to the use of cyclic antidepressants which affect vitamin B_2 absorption and reduce bioavailability [23]. This means that psychiatric patients may be at risk of vitamin B_2 deficiency.

All hospital menus contained inadequate vitamin D levels in comparison to the established recommendations. The maximum vitamin D content was provided on days when fish products were on the menu. Vitamin D is present in eggs, butter and cheese, but incorporating these products in the diet cannot provide the required amount of vitamin D. It is known that psychiatric patients are at greater risk of vitamin D deficiency if the amount of time spent in hospital is prolonged. McCue et al. [24] indicated that a large proportion of psychiatric patients suffered from vitamin D deficiency; therefore, all psychiatric patients should be screened for vitamin D deficiency.

4. Conclusion

The overall results showed that the situation regarding nutrition for psychiatric patients was not critical, but it would require improvements to the dietary content of the menus, focusing on certain aspects such as vitamin D, iodine, etc. Further research is needed on this matter.

Compliance with ethical standards

Acknowledgments

The authors are grateful to the Latvian psycho-neurological hospitals for the submitted menus.

Disclosure of conflict of interest

The authors do not disclose any conflict of interest.

References

[1] World Health Organisation. (2019). Mental Disorders.

[2] Kimball SM, Mirhosseini N and Rucklidge J. (2018). Database analysis of depression and anxiety in a community sample – response to a micronutrient intervention. Nutrients, 10, 152.

[3] Meegan AP, Perry IJ and Phillips CM. (2017). The association between dietary quality and dietary guideline adherence with mental health outcomes in adults: A cross-sectional analysis. Nutrients, 9, 238.

[4] Burgos R, Breton I, Cereda E, Desport JC, Dziewas R, Genton L, Gomes F, Jesus P, Leischker A, Muscaritoli M, Poulia KA, Preiser JC, Van der Marck M, Wirth R, Singer P and Bischoff SC. (2018). ESPEN guideline clinical nutrition in neurology. Clinical Nutrition, 37, 354-396.

[5] Daley C, Patterson A, Sibbritt D and MacDonald-Wicks L. (2015). Unsaturated fat intakes and mental health outcomes in young women from the Australian longitudinal study on women's health. Public Health Nutrition, 18, 546-553.

[6] Davison KM, Gondara L and Kaplan BJ. (2017). Food insecurity, poor diet quality, and suboptimal intakes of folate and iron are independently associated with perceived mental health in Canadian adults. Nutrients, 9, 274.

[7] Quirck SE, Williams LJ, O'Neil A, Pasco JA, Jacka FN, Housden S, Berk M and Brennan SL. (2013). The association between diet quality, dietary patterns and depression in adults: a systematic review. BSC Psychiatry, 13, 175.

[8] Crawford GB, Khedkar A, Flaws JA, Sorkin JD and Gallicchio L. (2011). Depressive symptoms and self-reported fast-food intake in midlife women. Preventive Medicine, 52, 254-257.

[9] Rahe C, Baune BT, Unrath M, Arolt V, Wellmann J, Wersching H and Berger K. (2015). Associations between depression subtypes, depression severity and diet quality: cross-sectional findings from BiDirect Study. BMC Psychiatry, 15, 38.

[10] Konturek PC, Herrmann HJ, Schink K, Neurath MF and Zopf Y. (2015). Malnutrition in hospitals: it was, is now, and must not remain problem! Medical Science Monitor, 21, 2969-2975.

[11] Kirkland LL, Kashiwagi DT, Brantley S, Scheurer D and Varkey P. (2013). Nutrition in the hospitalized patient. Journal of Hospital Medicine, 8(1), 52-58.

[12] Burgos R, Breton I, Cereda E, Desport JC, Dziewas R, Genton L, Gomes F, Jesus P, Leischker A, Muscaritoli M, Poulia KA, Preiser JC, Van der Marck M, Wirth R, Singer P and Bischoff SC. (2018). ESPEN guideline clinical nutrition in neurology. Clinical Nutrition, 37, 354-396.

[13] Styczen K, Sowa-Kucma M, Siwek M, Dudek D, Reczynski W, Szewczyk B, Misztak P, Topor-Madry R, Opoka W and Nowak G. (2017). The serum zinc concentration as a potential biological marker in patients with major depressive disorder. Metabolic Brain Disease, 32, 97-103.

[14] Lewis JE, Tiozzo E, Melillo AB, Leonard S, Chen L, Mendez A, Woolger JM and Konefal J. (2013). The effect of methylated vitamin B complex on depressive and anxiety symptoms and quality of life in adults with depression. ISRN Psychiatry, 621453.

[15] Föcker M, Antel J, Grasemann C, Führer D, Timmesfeld N, Öztürk D, Peters T, Hinney A, Hebebrand J and Libuda L. (2018). Effect of an vitamin D deficiency on depressive symptoms in child and adolescent psychiatric patients – a randomized controlled trial: study protocol. BMC Psychiatry, 18, 57.

[16] Comai S, Bertazzo A, Vachon J, Daigle M, Toupin J, Cote G and Gobbi G. (2019). Trace elements among a sample of prisoners with mental and personality disorders and aggression: correlation with impulsivity and ADHD indices. Journal of Trace Elements in Medicine and Biology, 51, 123-129.

[17] Li Z, Wang W, Xin X, Song X and Zhang D. (2018). Association of total zinc, iron, copper and selenium intakes with depression in the US adults. Journal of Affective Disorders, 228, 68-74.

[18] Anton-Paduraru DT, Oltean C, Trandafir LM and Mineata AM. (2014). Vegetarian diet in children. Revista Romana de Pediatrie, LXIII, 4, 357-361.

[19] Konrade I, Kalere I, Strçle I, Makrecka-Kuka M., Veisa V, Gavars D, Rezeberga D, Pirags V, Lejnieks A, Gruntmanis U, Neimane L, Liepins E and Dambrova M. (2017). Iodine deficiency in Latvia: current status and need for national recommendations. Proceedings of the Latvian Academy of Sciences, 71, 6(711), 401–407.

[20] Biban BG and Lichiardopol C. (2017). Iodine deficiency, still a global problem? Current Health Sciences Journal, 43(2), 103-111.

[21] Kapil U. (2007). Health consequences of iodine deficiency. Sultan Qaboos University Medical Journal, 7(3), 267-272.

[22] McGarel C, Pentieva K and McNulty H. (2015). Emerging roles for folate and related B-vitamins in brain health across the lifecycle. Proceedings of Nutrition Society, 74(1), 46-55.

[23] Sechi GP, Sechi E, Fois C and Kumar N. (2016). Advances in clinical determinants and neurological manifestations of B vitamin deficiency in adults. Nutrition Review, 74(5), 281-300.

[24] McCue RE, Charles RA, Orendain GCM, Joseph MD and Abanishe JO. (2012). Vitamin D deficiency among psychiatric inpatients. The Primary Care Companion for CNS Disorders, 14(2).

How to cite this article

Beitane I and Marisheva A. (2020). Micronutrient content in the diet of patients in psycho-neurological hospitals in Latvia. World Journal of Advanced Research and Reviews, 6(1), 01-05.