e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(6); 27-33

Original Research Article

Evaluated Vitamin D_3 Levels and Dermatological Complications among Regular and Frequent Alcoholic Dependents: An Observational Study

Sathish K.S.[1], Monika. M. Gowda[2]

[1]Associate Professor, Department of Dermatology, Kempegowda Institute of Medical Science, Bangalore -560004, Karnataka, India.

[2]Senior Resident, Department of Dermatology, Kempegowda Institute of Medical Science, Bangalore-560004, Karnataka, India.

Received: 21-03-2023 / Revised: 15-04-2023 / Accepted: 02-05-2023

Corresponding author: Dr. Satish K.S.

Conflict of interest: Nil

Abstract

Background: The present study aims to determine Vitamin D_3 levels among regular and frequent alcoholic dependents in order to identify different health problems.

Methods: Study was carried out in Bangalore's tertiary health care hospitals. As per the WHO recommendation; the patients were divided in two groups *viz* Group 1 (n=153) and Group 2 (n=98). A total 251 patients of which chronic (64.44%) and frequent (35.55%) alcohol dependents were taken. The data were compiled by R-statistical tool; Z and chi-square tests were employed to prove the hypothesis.

Results: The group 1 shows significant correlation ($p<0.001$; Hz 3.61) between different diseases and health complications as compared with control population (Group 2). Health complications like alcoholic fatty liver diseases (12.95% hz 3.80%), cirrhosis (2.61% hz 1.69), acute kidney injury (1.31%,hz 1.22),bone nourishment (0.65%, hz 1.09), addictive behaviour (3.27%, hz 2.55), osteomalacia (1.96%,hz 3.30), osteoporosis and osteopenia (3.27%, hz 3.88), alcoholic myopathy (3.92%, hz 2.88), skin cancer (1.31%,hz <1.0).The body mass index (BMI) did not differ statistically ($P > 0.05$) between the two groups with mean age was 49.55 years with SD 2.33 (CI 95% 44.98-54.11years). The patients were assessed using both the prior and posterior data sets. According to the results, there are three income groups; low income (78.0%), mid income (12%) and high income (10%). According to the data, several diseases and illnesses were substantially more prevalent among the lower and middle class population, where regular alcohol dependents are more likely to experience health complications.

Conclusion: Since alcoholic addiction is now more prevalent in rural areas and among illiterates, the government must act rapidly and enforce the updated strategy to stop alcohol addictions into effect. This research will also help to the physicians in their clinical decisions about the patients.

Keywords: Vitamin D_3, Health Complications, Diseases, Chronic And Occasional Alcoholic Dependents, Liverfatty Acid.

Introduction

Due to the variety of sources that are available, Vitamin-D is special[1,2]. Ergosterol, a steroid mostly found in fungi but also found in some plants, is the source of ergocalciferol (Vitamin D2) [2]. In the skin of animals, Seven-dehydrocholesterol is converted to previtamin D3 by UVB light at 290–320 nm, and then further thermal isomerization occurs to produce cholecalciferol (Vitamin D3) [2]. Therefore, as part of a typical lifestyle, humans have access to a combination of Vitamins D2 and D3 from ambient UV exposure (Vitamin D3), habitual dietary intakes of Vitamin D3-rich foods (egg yolks and oily fish) and fortified foods (margarine and breakfast cereals, which typically have Vitamin D2 fortification)[3]. With the main difference between the two being the shape of their molecular side chains, Vitamins D2 and D3 function as prohormones (which have no biological effects) and are theoretically absorbed by the body in the same way[2]. Low Vitamin D3 levels have been linked to alcohol-associated diseases in the long term, as well as arteriosclerosis, bone nourishment, melancholy, and psychotic symptoms[3]. Some people get Vitamin D3 insufficiency as a result of chronic alcohol dependence [3]. Alcoholic myopathy, liver disease, and bone diseases are more likely to develop in people with low Vitamin D3 levels [3]. Mineral shortage, the prevention of alcohol-induced harm, and mental health protection may all benefit from Vitamin D3 supplementation[3]. While maintaining appropriate levels of Vitamin D3 might be regarded as one of the absolute minimum requirements for optimal health [3]. Vitamin D3 may not be a panacea for all diseases; alcohol intake interferes with the body's ability to absorb nutrients and D3 molecules. One such mineral whose insufficiency is common in alcoholic-dependent patients[3]. Numerous studies have shown that Vitamin D3 levels can act as a safeguard for better bone and liver health[3]. Supplementing with Vitamin D3 during alcohol withdrawal or abstinence may also safeguard cognition and mental health while preventing additional organ damage brought on by excessive alcohol consumption[3]. According to a recent study published in Environmental Health Insights in 2016, excessive alcohol consumption affects Vitamin D3 levels in people with alcohol use disorder, especially in lower and middle-income populations [4]. Chronically consuming too much alcohol impairs liver function and sets the stage for the onset of alcoholic liver disease [4]. The evaluation of Vitamin D3 in relation to complications in chronic alcoholic dependents is quite common in the Indian scenario [4]. In order to know the numerous factors to identify the diseases intervention, the present research paper intends to correlate the relationship between D3 levels among chronic and occasional alcohol dependents.

Materials and Methods

The patient's data were collected from tertiary care hospitals in Bengaluru city. A total 153 regular (Group 1) and 98 cases of frequent alcoholic (Group 2) dependents were taken into consideration. As per the WHO recommendation; the patients were grouped in two subgroups *viz* Group 1 (> 15-20 years with alcohol frequency 1-3 times per day) and Group 2 (10 years- with frequency of alcohol consumption once in 3 months). All patients were provided their consent for the study. Serological markers and demographic information were methodically gathered from pretested questionnaires. D_3 levels were estimated based on the following traits like length of alcohol addiction, health complications, duration of alcoholism, regional divergence, customs, traditions, rituals, prior history of diabetes related illness and co-morbidity conditions were

systematically collected, it was analyzed by using free and open source R-statistical software. The fictitious results were tested by using the univariate and multivariate analysis (paired t-test, ANOVA and chi-square test etc).

Results

Table 1: Descriptive statistics of Chronic and Occasional alcohol dependents.

Variable	Group 1 (n=153)	Group 2 (n=98)	t-value	Ci-95%	P-value
FBS (mg/dl)	91.22 ± 10.02	90.63 ± 26.22	- 0.25	-5.21 to 4.03	0.8017
TG (mg/dl)	160.00 ± 46.63	115.31 ± 55.40	-6.87	-57.48 to -31.89	< 0.0001
Cholesterol (mg/dl)	142.02 ± 30.68	112.48 ± 30.61	-7.44	-37.35 to -21.72	< 0.0001
LDL (mg/dl)	193.02 ± 13.09	93 ± 26.33	-39.93	-104.95 to -95.08	< 0.0001
Cr (mg/dl)	1.08± 0.01	0.76 ± 0.32	-12.37	-0.37 to -0.26	< 0.0001
Ca (mg/dl)	8.378 ± 0.21	7.63± 0.26	-24.78	-0.79 to -0.68	< 0.0001

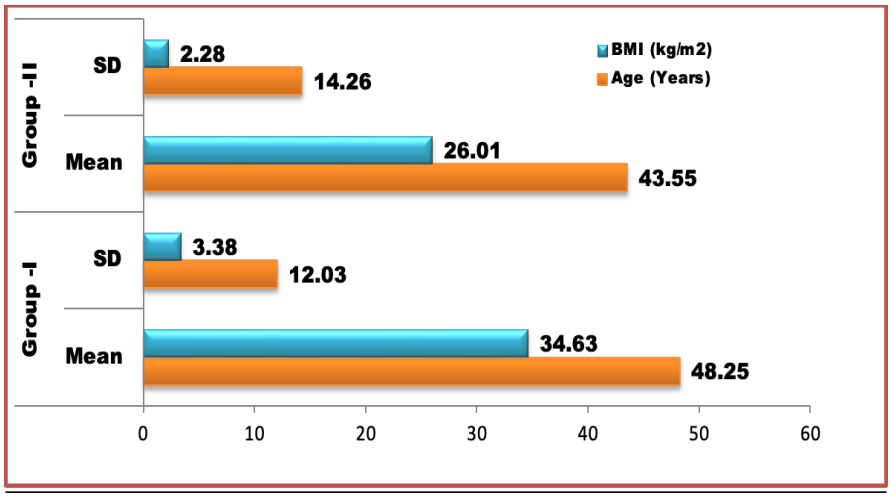

Figure 1: Age and BMI averages for the patients

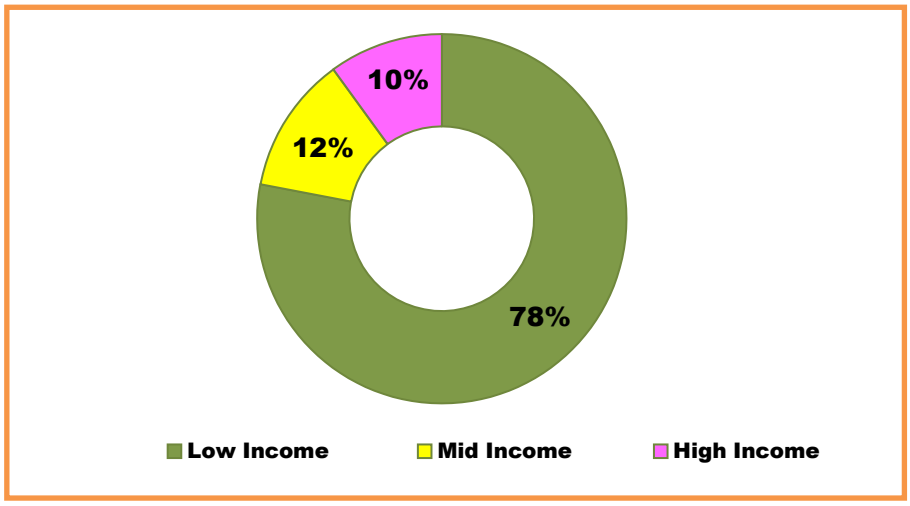

Figure 2: Patients' income distribution

Table 2: Income, geographic region, and education levels are correlated with D3

Attributes	Co efficient	SE	Z -test	CI-95%	P-value
Income Groups					
Low	5.03	0.09	7.47	3.4-6.42	<0.001
Medium	2.18	0.01	1.38	1.75-3.22	<0.001
High	-0.09	0.12	-0.737	-0.347-0.157	>0.001
Geographical Region					
Rural	5.339	0.00	3.10	2.5.9-6.36	<0.001
Urban	2.22	0.070	1.5	0.141-3.08	<0.001
Education Level					
Literate	3.14	0.00	1.88	0.50-4.11	<0.001
Illiterate	6.85	0.101	2.77	0.207-7.22	<0.001

R square (%) =0.88, chi-square 6.55

A total of 251 patients were included for the study which can comprises chronic (n=153) and occasional (n=98) alcoholic dependents (divided into two sub group). The patients were assessed using both the prior and posterior data sets. The mean body mass index (BMI) was 34.63± 3.38 kg/m^2 for habitual drinkers 48.25 ±12.03 years and 43.55 ±14.26 years for occasional alcohol dependents respectively. With the exception of FBS (P> 0.01), all traits of Group 1 & 2 were found to be statistically 1% levels of significant.

According to the results, there are three income groups; low income (78.0%), mid income (12%) and high income (10%). Low (β =15.03±0.09, Z-7.47 CI 95% 3.4-6.42) and medium income (β = 2.18±0.01, Z-1.38 CI 95% 1.75 -63.22) groups were significantly correlated to the alcoholic addictions. Rural population with low-income groups and illiterate (β = 3.14±0.00, Z-1.88 CI 95% 0.50 -4.11) were found to be more addiction of alcohol as compared with urban (β = 5.33±0.00, Z-3.10 CI 95% 2.56 -6.36).

Table 3: Haematological characteristics of Group 1 & 2 before and after treatment

Traits	Group 1 (n=153) Mean±SD	t - value	Group 2 Mean±SD (n=98)	CI-95%	P-Value
Vitamin-D_3 (mg/dl)	35.48±3.01	-41.49±0.320	22.22±1.21	-13.88 to 12.63	< .001
BMI (kg/m^2)	20.99±3.48	15.257±0.477	28.26±3.98	6.33 to 8.20	< .001
AST (I_U/L)	30.81±8.08	-4.626±0.927	26.52±5.44	-6.11 to -.463	≤.000
ALT (I_U/L)	41.68±17.28	-1.554±0.021	38.73±9.22	-6.6899 to 0.7899	≤.000
ALP (I_U/L)	199.88±39.82	-4.473±0.462	179.01±29.22	30.0598 to -11.6802	≤.000

The hypothesis was tested by paired t- test; the patients on Group 1& 2 were received different treatments depending on their sign and symptoms. The overall mean of Vitamin D_3 (28.85±2.11 mg/dl; CI95% -13.88 to 12.63 mg/dl) it was found to be positively associated with all parameters (p< 0.001). At the 1% levels, the significant results were found in AST (44.01±10.80 I_U/L, -CI95%-6.11 to -.463 I_U/L), ALT (40.23±13.25 I_U/L, CI95%-6.6899 to 0.7899 I_U/L) and ALP (189.88±34.42 I_U/L; CI 95% 179.01±29.22 I_U/L). The marginal differences of Vitamin D_3 for both group was 13.26 mg/dl .p<0.01.

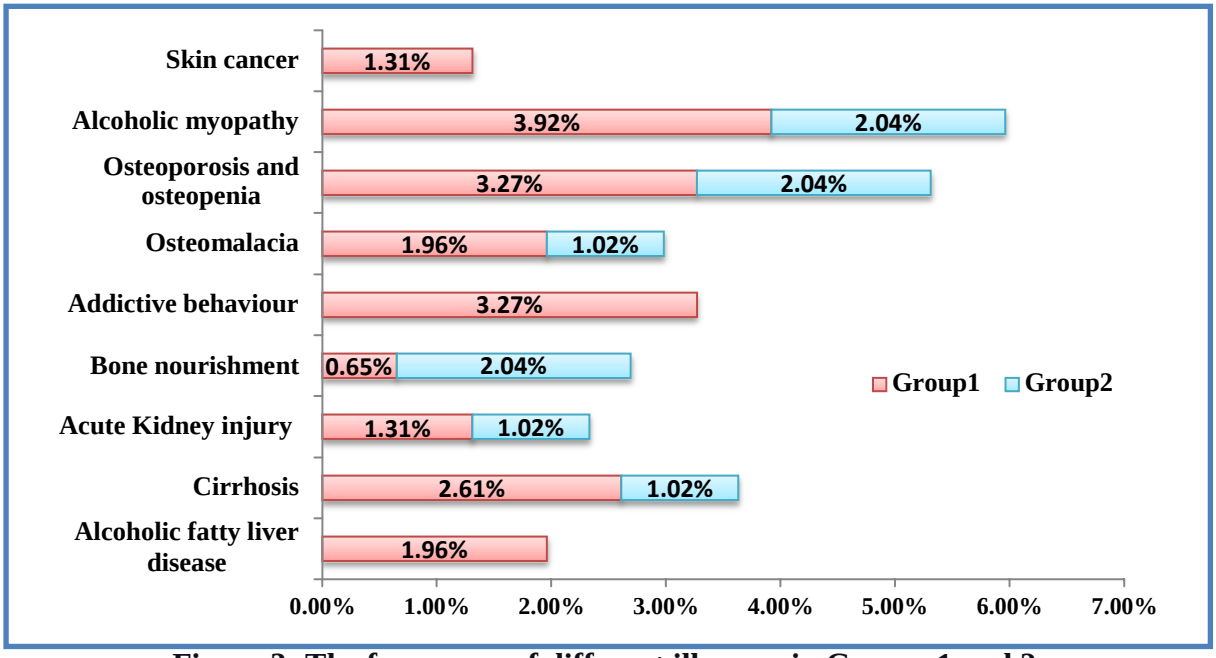

Figure 3: The frequency of different illnesses in Groups 1 and 2

The chronic alcoholic dependents were statistically tested by analysis of variance (ANOVA) and Receiver Operating Characteristics analysis (ROC) at 1% levels of significance, the two groups were (with and without dependents) found to be multiple illnesses with distinct diseases conditions like alcoholic fatty liver disease (3; p=0.1642), osteomalacia (3; p= 0.56), skin cancer (2; p=0.25), osteoporosis (5;p=0.56), addictive behaviour (5; p=0.07), osteopenia (5; p=0.57), cirrhosis (4; p=0.37), CMV retinitis -3 cases (p=0.01), Diabetes -7 cases (p=0.001) and alcoholic myopathy (6; p=0.40) all diseases were shows statistically significant (Fig 3).

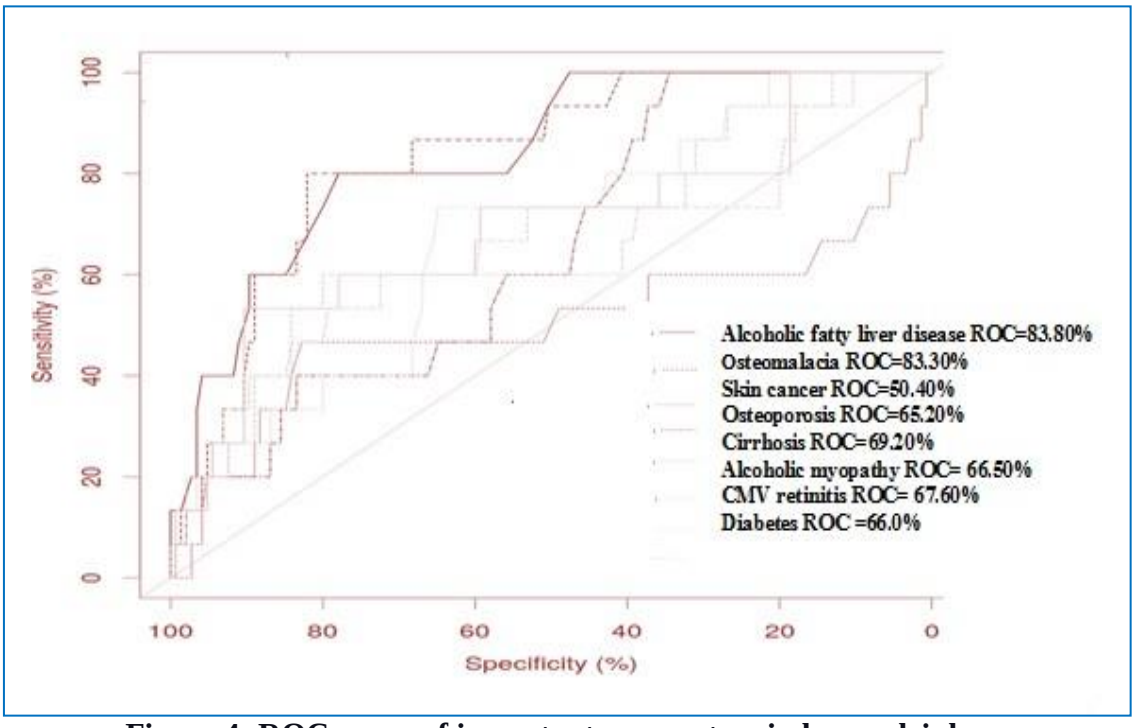

Figure 4: ROC curve of important parameters in heavy drinkers

Discussion

The following recent reviews are relevant to the current study and are simultaneously examined in respect to important research findings.[8] Vitamin D_3 is very important to maintain the homeostatic functions in the human body, lower levels of Vitamin D_3 that had become more in Western populations. Concomitantly, non-alcoholic fatty liver disease (NAFLD) has become the most common cause of chronic liver disease; it is more closely correlated with obesity and sedentary lifestyle. However, a growing body of evidence points to a closely linked and potentially causative relationship between the Vitamin D_3 deficiency (VDD) and NAFLD. [6] Vitamin D is a crucial nutrient with many pleotropic effects on health and various chronic disease, lower levels of Vitamin D (pathophysiologically) patients suffering from underlying chronic liver diseases, cirrhosis with its associated complications. Vitor Soares Tardelli et al. conducted meta-analysis on Vitamin D evaluation on alcoholic and non-alcoholic patients in Brazil.[10] As per in his findings, Vitamin D were closely associated with bone mineral density and its deficiency at the worldwide. The low Vitamin D levels have been positively correlated with schizophrenia, depression, psychotic symptoms and more recently alcohol use disorders. Alcohol use disorders are among the most prevalent mental disorders worldwide. This finding is real impact on alcohol consumption on Vitamin D serum levels as well as on the health status of alcohol users. Visnja Banjac Baljak et al.2022 investigated the correlation between serum vitamin D and cognitive impairment in alcohol dependent individuals.[11] A case control study conducted with a total 132 respondents with past history of alcoholism. Significant difference ($p = 0.022$) was seen in Vitamin D levels in the alcohol-dependent sample with cognitive deficiency 13.7 ± 9.4 (ng/mL), alcohol-dependent group without cognitive deficiency 19.5 ± 11.2 (ng/mL) and healthy controls 19.9 ± 11.1 (ng/mL) respectively. Ten Haaf et al. explained that an elderly who were physically active had very good Vitamin D levels during the summer seasons and few Vitamin D deficiency cases were found it is indicated that they might not be always need Vitamin D supplements during the summer.[9] Age, BMI, alcohol consumption and amount of outdoor exercise all significantly correlated with Vitamin D levels. [9] Archana Jayan et al., 2021 opined that alcohol consumption reduces 12 serum concentrations of Vitamin D&B concentration was positively associated with liver enzymes and other 12 parameters of liver function.[5] Primary and secondary malnutrition are two distinct types of chronic heavy drinking that can result in both. Both have negative effects on Vitamin D levels and other minerals.[5] Alcohol abuse overwhelms the liver that can develop in cirrhosis, fatty liver, and alcoholic hepatitis among other liver diseases. Sampson adds that alcohol interferes with normal liver function by impairing the conversion of dietary and endogenously generated Vitamin D into active metabolites.[12] Heavy drinkers consequently had low levels of active Vitamin D; numerous crucial tasks for Vitamin D are involved in health. It promotes the absorption of calcium paving the path for stronger and healthier bones. Additionally, it lessens inflammatory responses within the body and supports healthy immunological function, experience muscle weakness, brittle bones and bone pain if Vitamin D levels are low. Long-term alcohol use can impede bone growth and the replacement of bone tissue (also known as remodelling) which increases the risk of fracture and lowers bone density. The numerous cell types, hormones and growth factors that control bone metabolism may have these effects either directly or indirectly.[12] Age has been considered a risk factor for Vitamin D deficiency; however, our results revealed that as age increased, the likelihood of

deficiency somewhat decreased. Despite this, the average age of the patients in our study was 56.5 years, and age-related Vitamin D insufficiency is more likely to show symptoms as people get older.[7]

Conclusion

According to this study, Vitamin D_3 deficiency was found to be statistically relevant for an elevated trend in liver transaminases in chronic alcohol dependents. An overall conceptual frame of the research "If one day alcohol kills me, does not cry because I was smiling in the heaven". A separate policy implementation would be required for the exposed population given these findings. Interventions in the form of awareness-raising and sensitization campaigns will also help to reduce alcohol addiction to a greater extent especially in lower and mid income populations.

Limitations

The current study was conducted using secondary data, and for the purpose of testing the hypothesis, certain haematological markers were taken into consideration. Another restriction was that only male patients were taken into account. For an assessment of D_3 levels in diverse populations, more research will be required.

Acknowledgements:

We convey our heartfelt thanks to the Dean and all officers of the Government Medical College B&LCH and Victoria, Bangalore for providing information's pertinent to the laboratory.

References

1. Holick M.F. Vitamin D deficiency. The New England Journal of Medicine, 2007;357(3): 266-281.
2. Tripkovic L., Lambert H., Hart K., Smith C. P., Bucca G., Penson S., Chope G., Hyppönen E., & Berry J. L. Comparison of vitamin D2 and vitamin D3 supplementation in raising serum 25-hydroxyvitamin D status: a systematic review and meta-analysis. The American Journal of Clinical Nutrition, 2012;95(6): 1357-1364.
3. Arteh J., Narra S., & Nair S. Prevalence of vitamin D deficiency in chronic liver disease. Digestive Diseases and Sciences, 2010;55(9): 2624-2628.
4. Singh A., Kukreti R., & Saso L. Alcohol-induced chronic pancreatitis: Systematic review and a proposed model. Digestive Diseases and Sciences, 2016;61(11): 3245-3253.
5. Archana Jayan et al. Serum Vitamin D and B levels in alcoholic Male Patients: A cross Sectional study. Journal of Universal College of Medical Sciences 2021; 9(23):47-51.
6. Federico Ravaioli et al.Role of Vitamin D in Liver Disease and Complications of Advanced Chronic Liver Disease. Int J Mol Sci. 2022;12;23(16):9016.
7. Lin L Y, Smeeth L, Langan S et al. Distribution of Vitamin D status in the UK: A cross-sectional analysis of UK Biobank. BMJ Open 2021; 11: e-038503.
8. Ryan M Kwok et al. Vitamin D and nonalcoholic fatty liver disease (NAFLD): is it more than just an association Hepatology 2013; 58(3): 1166-74.
9. Ten Haaf DSM et al. Determinants of Vitamin D status in physically active elderly in the Netherlands. European Journal of Nutrition. 2019; 58:3121–3128.
10. Vitor Soares Tardelli et al. Vitamin D and alcohol; A review of the current literature Psychiatry Res; 2017; 248:83-86.
11. Visnja Banjac Baljak et al. Association between Vitamin D and Cognitive Deficiency in Alcohol Dependence Healthcare (Basel). 2022;10(9):1772.
12. Wayne Sampson H. Alcohol's Harmful Effects on Bone. Alcohol Health & Research World. 1994; 190-194.