Investigation of the relationships between life satisfaction, optimism, happiness and blood lipid, Vitamin-D levels of individuals aged 55 and over

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Abstract

Aim: This study was carried out to investigate of the relationships between life satisfaction, optimism and happiness on blood lipid and Vitamin-D levels in people aged 55 and over.

Materials and Methods: This cross-sectional study was conducted on 283 individuals over the age of 55. The survey consisted of two main parts. In the first part, there are 19 questions about the socio-demographic characteristics of the patients, their chronic disease status, alcohol and smoking habits, physical activity and sunbathing duration. In the second part, Life Satisfaction Scale, Life Orientation Test and Subjective Happiness Scale were used. The lipid parameters and Vitamin D levels were investigated as dependent variables. Socio-demographic characteristics of individuals, physical activity status, and average scores of scales were investigated as independent variables.

Results: The results indicated that, LDL level was significantly and reverse associated with subjective happiness level. There was no significant relationship between other lipid parameters and subjective happiness level. It was determined that there was a significant and linear relationship between vitamin D level and life satisfaction and subjective happiness levels.

Conclusion: Understanding the psychological characteristics and the factors affecting their psychology of individuals aged 55 and over may play a key role for a healthy population, prevention of cardiovascular diseases and low vitamin D deficiency.

Introduction

Cardiovascular Diseases (CVDs) are the leading causes of mortality all over the world [1]. Previous studies argue that there are important associations between the health of the heart and psychological characteristics, which suggest that positive psychological characteristics such as optimism have protective effects for the health of the heart. Prospective studies show that optimism is attributed to a 50% decrease in CVD risk [2]. Some studies speculate that optimistic individuals are more successful in their schools, have healthy, long and happy marriages, attach to their children with love, and perhaps even live longer [3]. It was shown that the risk of developing coronary heart disease in patients diagnosed with depression [4]. It has also been speculated in the literature that Vitamin D deficiency is associated with some cardiovascular health problems [5]. There are studies in the literature showing that there are negative correlations between serum 25-OH D and lipid profile, which is one of the risk factors for CVS disease, and especially with cholesterol levels [6]. Reduced 25 (OH) D levels are independently associated with increased mortality in individuals with Cardiovascular Disease (CVD) [5]. Vitamin D deficiency was also found to be associated with elevated plasma triglyceride levels, high VLDL levels, and impaired insulin metabolism [7]. It was also found that reduced Vitamin D levels were associated with depression; and therefore, it was recommended that Vitamin D levels be evaluated in people whose history of depression was questioned [8]. Sufficient Vitamin D intake and maintaining optimum Vitamin D levels in serum are also very important for general health and well-being. It is inevitable that Vitamin D deficiency and inadequacy is a risk for acute and chronic diseases with broad spectra as a global health problem [9].

The present study was conducted to examine the hypothesis whether the life satisfaction levels, optimism, and sub-

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jective happiness levels have effects on lipid parameters and Vitamin D levels of individuals aged 55 and over.

Materials and Methods

Type of the study

The study had a cross-sectional design, and was planned to examine the effects of life satisfaction, optimism, and happiness status on blood lipid parameters and Vitamin D levels of individuals aged 55 and older admitting to a university hospital.

Location and cost of the study

The study was conducted in Internal Diseases Department (General Internal Medicine) and Surgical Department (Urology) in Turgut Ozal Medical Center in Malatya. This study was supported by Inonu University, Scientific Research Projects Coordination Unit (Project no: 201650).

Universe and sampling

As CVD increases in men aged 45 and over and in women aged 55 and over [10], it was planned that the study be conducted with individuals over 55 years of age admitting to internal diseases unit and surgical department in Turgut Ozal Medical Center for various reasons. A total of 48 people were reached in our preliminary study for power analysis based on correlation coefficient (r= 0.20) of cholesterol values and life satisfaction index. The sampling size to be reached with 90% power (beta=0.10) and 95% confidence interval (alpha= 0.05) was calculated as at least 258 people. It is reported in multi-variable statistical methods that, when the number of independent variables is 6 or more, 10 individuals are needed for each independent variable, or n > 104 + k (k: independent variable) equality can be used [11]. Since 21 independent variables were considered, the possible sampling size was calculated as 210 (21 x 10) or 125 (104 + 21) in this study. However, 283 individuals were included in this study to increase the strength and confidence of the study results. Individuals were selected at simple random using the probability sampling method. It was planned that individuals aged 55 and older, who volunteered to participate in the study, and who did not have any physical or mental disabilities that would interfere with communication, would be included in the study.

The method of data collection

The data were collected after the verbal consents of patients admitting to Turgut Ozal Medical Center, Urology and General Medicine Clinic were obtained to participate in the study by the researcher with face-to-face survey technique. Systolic and diastolic blood pressure measurements were made by the researcher from the right arm heart level in sitting position of the patients immediately after the survey application (after 10 minutes' resting time). Those who had systolic blood pressure $\geq$ 140 mmHg and diastolic blood pressure $\geq$90 mmHg were considered to have high blood pressure; and venous blood samples were taken in line with the specified protocols. The serum samples of the patients were taken for biochemical examinations after a fasting period in the morning.

The tools of data collection

The survey form consisted of two parts. In the first part, there were 19 questions on socio-demographic characteristics, chronic disease status, alcohol and smoking habits, physical activity and sunbathing time, and were developed by the researcher. Classification according to the Kidney Dialysis Outcomes Quality Initiative (K-DOQI) guidelines was used in the study. Accordingly, vitamin D levels; Values between < 5ng/ml are "severe vitamin D deficiency", values between 5 and < 15 ng/ml are "moderate vitamin D deficiency", values between 15 and < 30 ng/ml are "mild vitamin D deficiency", $\geq$ 30 ng /ml values were classified as "normal vitamin D level".In the second part, Life Satisfaction Scale (LSS), which consisted of 20 questions, Life Orientation Test (LOT), which consisted of 12 questions, and Subjective Happiness Scale (SHS), which consisted of 4 questions were used [12].

LSS was developed by Neugarten et al. in 1961 to understand how the elderly individuals perceive various aspects of life, themselves, and their environment [13]. The validity and reliability study of this scale was conducted by Karatas (1988), and its Cronbach Alpha Internal consistency was found to be 0.94 [14]. The statements of the scale consist of 20 questions, it is easy-to-use as a short, practical and single-rated scale, and is answered by using the "Yes" and "No" options. When the individual scores high in the responses, which are rated over 20 points, it is considered that the level of life satisfaction is high. Each option on the scale is scored with 1 point, and some of the statements (3, 5, 7, 10, 14, 17, 18, 20) are expected to be answered with "No".

The scoring of Neugarten Life Satisfaction Scale is scored as low if 7 and below points are received, moderate life satisfaction level is scored as 8-12, and high life satisfaction level is scored 13 and above [14].

LOT (Life Orientation Test) is a 12-point scale that was developed by Scheier and Carver (1985) to determine the optimism levels of individuals [15]. The scale was adapted into Turkish by Aydın and Tezer (1991), and the validity study was conducted [16]. In the scale, the scoring varies between 0-4 as "I absolutely disagree (0)", "I disagree (1)", "I am indecisive [2]", "I agree (3)", "I absolutely agree (4)". The highest score is 32, and the lowest score is 0. Since 4 items are filling questions in the scale (items 2, 6, 7 and 10), they are not included in the scoring of the scale. The remaining 4 items (3, 8, 9, 12) show the level of pessimism, and the other 4 items (1, 4, 5, 11) show the level of optimism. High scores show high levels of optimism [15, 16].

The "Subjective Happiness Scale" that was developed by Lyubomirsky and Lepper (1999) was used to measure the subjective happiness levels of individuals in the study. The scale consists of 4 items aimed at measuring the general subjective happiness of people; and is a 7-Type Likert measurement tool. The purpose of the scale is to evaluate the overall happiness people feel. The person evaluates himself/herself in terms of absolute happiness s/he feels and his/her own happiness according to peers in the two items in the scale. The characteristics of happy and unhappy individuals are briefly defined in the other two items, and participants are asked to express how much these charac-

teristics reflect them. The scores of the items are added after the 4th item on the scale is reverse-coded, and a total score is obtained. The range of possible scores varies between 4 and 28 in the scale. High scores express high subjective happiness, and low scores express low subjective happiness [17]. The adaptation of the SHS and the validity and reliability study of the Turkish form were conducted by Akin and Satici (2011). The internal consistency Cronbach α reliability coefficient was found as 0.86 in reliability analyses. Item-test correlations of the scale were listed between 0.55 and 0.76 [18].

Variables of the study

The primary output variable of the study is lipid parameters. The dependent variables of the study were the lipid parameters and Vitamin D levels. The independent variables of the study were socio-demographic characteristics of individuals (i.e. gender, age, marital status, height, weight, educational status, number of children, family types, family income levels, smoking status, alcohol use, occupation, presence of chronic disease, and presence of chronic disease in the family), physical activity status, and average scores of LSS, LOT and SHS.

Statistical analysis

After the data collection tools were applied as a survey in the study, each dataset was checked by the researcher, and was then transferred into computer medium. The data were analyzed by using the SPSS (version 21.0) package program. In statistical analyses, t-test (Unpaired Student t) and One-Way ANOVA tests were used in independent samples for the data that were distributed normal. ly in Kolmogorov-Smirnov Test (K-S) and Mann-Whitney U and Kruskal Wallis Test were used for the data that did not fit normal distribution. Multiple comparisons were made with Tukey Test after One-Way Variance Analysis, and with Mann-Whitney U-test with Bonferroni Correction after Kruskal Wallis Test. Also, Logistics Regression Analysis, which is one of the multi-variable statistical methods, was employed, and the genders, ages, occupations, smoking status, and BMI variables of the individuals were analyzed. $P < 0.05$ level was considered to be significant in all evaluations.

Study permission and ethics committee approval

After the written permission was obtained from Inonu University, Faculty of Medicine, Dean's Office and from Turgut Ozal Medical Center Urology and General Internal Diseases Department to conduct the study, written approval was also obtained from the Ethics Committee of Inonu University Faculty of Medicine (Research Protocol No: 2016103).

Results

The mean age of the individuals participating in the study was 66.23 ± 8.02. A total of 53.4% patients from Urology Clinic and 46.6% from Internal Diseases Clinic participated in the study; 36.7% of the participants were women, and 84.5% were married (Table 1).

Table 1. Socio-demographic characteristics of the participants

Socio-Demographic Characteristics	N	%
Gender		
Female	104	36.7
Male	179	63.3
Age		
55-59 years	64	22.6
60-64 years	69	24.4
65-69 years	59	20.8
70-74 years	40	14.1
75 $\geq$ years	51	18.0
Marital Status		
Married	239	84.5
Single	4	1.4
Divorced/Widowed	40	14.2
Education Status		
Primary School Dropout	104	36.7
Primary School	111	39.2
Middle School	26	9.2
High School And Above	42	14.8
Number of Children		
≤ 3	77	28.3
4-6	110	40.4
$7 \geq$	85	31.3
Family Income Status		
No Income	7	2.5
≤ 1000 TL	60	21.2
1001-2000 TL	166	58.7
$2001 \geq$	50	17.7
Occupation		
Working	39	13.8
Housewife	99	35.0
Unemplyoment	13	4.6
Retired	132	46.6

A total of 49.1% of participants said that they never smoked, 30.7% said that they did regular sports and walked more than 3 km per day; and 39.2% of participants were slightly fat with the highest percentage, 30.0% had normal weight, and 26.9% were fat. It was found that 39.9% of patients had mild Vitamin D deficiency, 29% had moderate deficiency, and 9.2% had severe deficiency. A total of 42.4% of the participants had high life satisfaction scores, 37.5% had moderate life satisfaction scores; 60.1% of them had a high life orientation, and 39.9% had low life orientation scores. When subjective happiness levels of individuals were evaluated, 52.3% had high happiness scores, and 47.7% had low scores in this respect (Table 2).

In the study 60.6% of women and 36.9% of men, who participated in the study, had cholesterol levels above 200 mg/dl ($p < 0.05$). A total of 64.1% of the employees who participated in the study, 40.4% of those who were housewives, and 61.5% of those who did not have jobs, and 61.4% of those who were retired, had cholesterol levels below 200 mg/dl ($p < 0.05$). When the relations between physical activity status and cholesterol levels were evaluated, 62.1% of those who did physical activity very much

Table 2. Comparison of happiness scales scores according to the socio-demographic characteristics and Vitamin D levels of the participants

	Life Satisfaction Scale Score					Life Orientation Scale Score				Subjective Happiness Scale Score			
	N	Min	Med	Max	p	Min	Med	Max	p	Min	Med	Max	p
Gender*													
Female	104	2	10	18		7	21	28		5	13	22	
Male	179	1	12	18	0.005	4	23	31	0.019	6	16	28	0.001
Age**													
55-59 years	64	3	12	18		7	23	27		5	13	22a	
60-64 years	69	2	11	18		6	22	28		7	16	28	
65-69 years	59	2	12	18	0.576	8	22	29	0.965	6	15	25	0.008
70-74 years	40	2	11	18		9	22	31		7	16	23	
75 ≥ years	51	1	12	18		4	22	28		6	14	21	
Marital Status**													
Married	299	2	12	18		4	22	31		5	15	28a	
Single	4	8	9	10	0.069	9	16	23	0.043	9	15	22	0.013
Other	40	1	10	18		7	21	28		7	12	25b	
Number of Children**													
≤3	7	3	12	18		8	24	31a		5	15	26	
4-6	110	1	11	18	0.184	4	21	29b	0.011	7	15	25	0.725
7≥	85	2	11	18		6	22	28b		6	15	28	
Educational Status**													
Primary School Dropout	104	2	10	18a		7	21	28		5	13	28a	
Primary School	111	1	13	18b	0.006	6	23	31	0.070	6	16	25b	0.001
Middle School	26	3	12	18		4	23	29		9	15	21	
High School and Above	42	4	13	18b		9	23	29		9	16	26b	
Occupation**													
Employee	39	2	13a	18		4	24	28		9	16	26a	
Housewife	99	2	10b	18	0.012	7	21	28	0.080	5	13	22b	0.001
Unemployed	13	2	11	17		12	20	25		7	16	20	
Retired	132	1	12	18		6	23	31		6	16	28a	
Income(TL)**													
No Income	7	2	12	15		10	24	28		11	14	22	
≤1000	60	2	11	18	0.868	10	21	28	0.422	7	13	25	0.643
1001-2000	166	1	11	18		6	23	31		5	15	28	
2001≥	50	4	12	18		4	22	27		6	15	21	
Vitamin D Levels**													
Severe deficiency	26	1	10	18		7	20	25		6	14	22	
Moderate deficiency	82	2	10a	18	0.001	4	22	28	0.159	6	14	28	0.359
Mild deficiency	113	2	13b	18		8	23	29		5	15	26	
Normal level	62	3	13b	18		8	22	31		8	15	22	

* Mann-Whitney U test; ** Kruskal Wallis test; a, b: different from each other (Mann-Whitney U test with Bonferroni correction; p <0.05)

Table 3. The relationship between blood lipid levels and Vitamin D of the participants and life satisfaction, life orientation, and subjective happiness scales

	Life Satisfaction		Life Orientation		Subjective Happiness	
	Rho	p	Rho	p	Rho	p
Cholesterol	-0.017	0.772	-0.20	0.736	-0.102	0.860
HDL	-0.027	0.657	0.008	0.888	0.018	0.767
LDL	-0.049	0.409	-0.038	0.529	-0.137	0.022
TG	0.006	0.923	0.046	0.444	-0.035	0.555
Vitamin D	0.212	0.001	0.023	0.694	0.130	0.028

Table 4. Comparison of lipid profiles according to their happiness statust

	N	Cholesterol(mg/dl)			HDL(mg/dl)			LDL(mg/dl)			TG(mg/dl)		
		Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max
Life Satisfaction**													
Low	57	104	187	313	17	42	75	56	141	201	32	128	340
Moderate	106	118	199	348	26	43	69	58	125	265	46	135	415
High	120	95	195	405	30	42	79	24	118	347	36	134	544
p		0.225			0.905			0.111			0.942		
Life Orientation*													
High	170	95	192	405	17	42	79	24	119	347	36	134	544
Low	113	109	199	348	30	43	66	47	122	265	32	137	340
p		0.523			0.560			0.415			0.529		
Subjective Happiness Status*													
High	148	97	192	405	30	43	79	24	115	347	46	131	544
Low	135	95	197	348	22	42	78	52	125	265	32	137	371
p		0.238			0.845			0.075			0.562		

* Mann-Whitney U test **Kruskall Wallis tes

Table 5. Comparison of vitamin D levels of the participants according to some basic characteristics

Socio-Demographic Characteristics	25-OH-D3≥30 ng/ml			25-OH-D3<30 ng/ml		p
	N	%		N	%	
Gender						
Female	23	22.1		81	77.9	
Male	39	21.8		140	78.2	0.949
Age						
55-59 years	13	20.3		51	79.7	
60-64 years	12	17.4		57	82.6	
65-69 years	12	20.3		47	79.7	0.144
70-74 years	15	37.5		25	67.5	
75≥ years	10	19.6		41	80.4	
Marital Status						
Married	53	22.2		186	77.8	
Single/Divorced/Widowed	9	20.5		35	79.5	0.943
Educational Status						
Primary School Dropout	17	16.3*	16.3*	87	83.7	
Primary School	20	18.0*	18.0*	91	82.0	
Middle School	6	23.1	23.1	20	76.9	0.001
High School and Above	19	45.2	45.2	23	54.8	
Number of Children						
≤3	19	24.7	24.7	58	75.3	
4-6	28	25.5	25.5	82	74.5	0.123
7≥	12	14.1	14.1	73	85.9	
Family Income Status						
No Income/≤1000 TL	13	19.4	19.4	54	80.6	
1001-2000 TL	31	18.7	18.7	135	81.3	0.029
2001≥	18	36.0	36.0	32	64.0	
Occupation						
Employee	8		20.5	31	79.5	
Housewife	23		23.2	76	76.8	0.919
Unemployed/Retired	31		21.4	114	78.6	

had cholesterol levels below 200 mg/dl (p < 0.05) .
HDL cholesterol levels of 20.2% of women and 47.5% of men were below 40 mgdl (p < 0.05); 56.5% of individuals who smoked had HDL cholesterol levels below 40 mg/dl, and HDL cholesterol levels of 4.3% were above 60 mg/dl in the study (p < 0.05).
When the relation between gender and LDL levels was evaluated, 81.7% of women and 65.4% of men had LDL cholesterol levels above 100 mg/dl (p < 0.05). The relations between LDL levels, occupational groups, physical activity levels, and BMI scores were found to be at statistically significant levels (p < 0.05).

When the happiness scores were compared according to socio-demographic characteristics of the participants and

Table 6. The relationship between Vitamin D3 levels of the participants and cardiovascular risk factors

Rho (Corr. Coeff.)	Rho (Corr. Coeff.)	p
Age	0.041	0.041
Systolic Blood Pressure	0.017	0.781
Diastolic Blood Pressure	0.051	0.391
Cholesterol	-0.089	0.137
HDL	0.031	0.598
LDL	-0.050	0.405
TG	-0.133	0.025
BMI	-0.096	0.107

their Vitamin D levels, the Life Satisfaction, Life Orientation, and Subjective Happiness Scale scores of male patients were 12 (1-18), 23 (4-31) and 16 (6-28), respectively (p < 0.05). When evaluated according to age groups, the scale median score of individuals who were between the ages of 60 and 64 was 16 (7-28), and the median score of individuals who were between the ages of 55 and 59 was 13 (5-22) according to SHS (p < 0.05). When the scale scores were evaluated according to the number of children the participants had, Life Orientation Scale median score of those with 3 and fewer children was found to be 24 (8-31), those with 4-6 children had a median score of 21 (4-29), and those with at least 7 children had a median score of 22 (6-28) (p < 0.05). It was found that Life Satisfaction Scale median score of individuals who did not finish primary school was 10 (2-18) (p < 0.05), and Life Orientation median score was 21 (7-28) (p > 0.05), and SHS median score was 13 (5-28) (p < 0.05) (Table 3).

The Life Satisfaction Scale median scores of the individuals who participated in the study and who worked (i.e. employees, civil servants, self-employed, etc.) and who were housewives were 13 (2-18), and 10 (2-18) (p < 0.05) (Table 3).

When LSS scores were evaluated according to Vitamin D levels, the median score of those with moderate Vitamin D deficiency was 10 (2-18), the median score of those with mild deficiency was 13 (2-18), and the median score of normal ones were 13 (3-18) (p < 0.05) (Table 3).

When the correlation analysis results between SHS and blood lipid levels of the individuals who participated in the study were evaluated, the correlation coefficients between cholesterol, HDL, TG levels, and subjective happiness scores were -0.102, 0.018, and -0.035, respectively (p > 0.05); and the correlation with LDL levels was found to be -0.137 (p < 0.05). The correlation coefficients of the individuals' Vitamin D levels and their life satisfaction, life orientation, and subjective happiness scale scores were 0.212 (p < 0.05), 0.023 (p > 0.05), 0.130 (p < 0.05), respectively (Table 4).

When lipid profiles of individuals who participated in the study were compared based on their happiness status, LDL level median score of individuals with high life satisfaction levels was 118(24-347), and LDL level median score of those with low life satisfaction levels was found to be 141 (56-201) (p > 0.05) (Table 5).

The cholesterol level median score of participants with low life orientation was 199(109-348), and that of participants with high life orientation scores was found to be 192 (95-405) (p > 0.05) (Table 5).

As shown in Table 5, the total median cholesterol level score of individuals with low subjective happiness was 197(95-348), HDL median score was 42 (22-78), LDL median score was 125(52-265), and TG median score was 137 (32-371) (p > 0.05) (Table 5).

When Vitamin D levels were compared according to the educational status of the individuals who participated in the study, it was found that 83.7% of those who did not complete primary school had Vitamin D levels below 30 ng/ml (p < 0.05) (Table 6).

According to the correlation analysis given in Table 7, the correlation coefficient for TG level was -0.133 (p < 0.05).

Discussion

It was found in the present study that 78.1% of the participants had Vitamin D levels below 30 ng/mL and had deficiency in this respect. In another study that was similar to ours, it was reported that Vitamin D levels were below 20 ng/mL in 92.2% of the participants [19]. A similar study conducted by Ucar et al. in Ankara reported that 51.8% of patients admitting to hospital had Vitamin D deficiency, and 20.7% had inadequate Vitamin D levels [20]. In the study of Alkan et al., it was reported that Vitamin D deficiency was at 78% when they accepted 20 ng/ml as the threshold value in patients aged 65 and over [21].

Although there is not a full consensus on the ideal Vitamin D level, when the 25-OH D level that is measured in serum is < 20 ng/mL, many experts consider it as Vitamin D deficiency [22]. In a study conducted by Hussain et al., vitamin D levels were found to be insufficient or deficient 76.14% of 117 people who were participants with an average age of 44.13±15.777 [23].

Studies have shown that approximately 53% of Europeans have vitamin D deficiency or severe deficiency [24]. The findings of our study show that Vitamin D deficiency is a common problem in the population included in our study. Our finding is similar to that of other studies, and it is believed that small differences occurred because of the fact that a complete consensus has not yet been reached in terms of the ideal level or threshold value for Vitamin D. Our Study Group included individuals aged 55 and over, which is a group that has the risk of low Vitamin D levels, and this was considered as the reason why high Vitamin D deficiency prevalence was detected. It is also considered that the months in which the study was conducted required that the majority of women in the population wore closed clothes, the elderly went out less; and therefore, were less exposed to sun rays, and had reduced synthesis of Vitamin D in the skin with aging.

It was found that 42.4% of the participants had high life satisfaction scores, 37.5% had moderate, and 20.1% had low scores. Also, the average Life Satisfaction Scale score in the group aged 65 and over was 10.88±4.19 at a moderate level. It is considered that life satisfaction is one of the important factors affecting the mental health of people [25]. In the study of Softa et al., the "life satisfaction"

level of the elderly was detected to be (7.900 ± 4.024) [26]. When the studies conducted in the literature were evaluated, life satisfaction levels were reported to be similar to those found in our study at a moderate level. More than half of the individuals who participated in the study had above-the-average scores (20.33 ± 5.12), and the life orientation or optimism levels were high. It is considered that the high levels of optimism found in our study, which is different from other studies in the literature, was due to the fact that the population consisted of individuals aged 55 and over, i.e. the elderly population. It was observed that the individuals who participated in the study evaluated their environments and living conditions with a remarkably optimistic and thankful attitude. When the subjective happiness levels of individuals were evaluated, more than half (52.3%) had high happiness scores (14.76 ± 4.08).

In the comparison of the socio-demographic characteristics of the participants and their happiness scales scores, the median scores in Life Satisfaction, Life Orientation, and Subjective Happiness Scales of male patients were higher at statistically significant levels than those of the females (p < 0.05). In the study of Yildirim et al., the life-satisfaction average scores of women were lower at statistically significant levels than the average scores of men [27]. In the study of Kilic et al. conducted with individuals who were aged 65 and older of a Family Healthcare Center, they found that the life satisfaction scores of male individuals were higher than those of female individuals [28].

In line with the findings of our study, there are findings favoring males in terms of gender and optimism or life orientation concepts in the literature. In a study conducted by Cepni et al., when the difference between the optimism score averages of students was evaluated according to gender, the optimism score averages of male students were found to be higher than the optimism score averages of female students [29]. When the literature was reviewed, the findings of many previous studies conducted on similar subjects support our study [30].

When the relations between age groups and subjective happiness scores were examined in our study, it was seen that happiness scores varied at significant levels according to age groups. According to the SHS, it was found that the group that caused the difference between the age groups was the 55-59-year-old group. When similar studies conducted on the subject were examined, it was found that different findings were reported. Some studies reported no statistically significant relations between age and happiness levels [31], while some others reported that age had positive effects on subjective happiness levels [32, 33].

It was found that the optimism levels of individuals with 3 and fewer children were higher at statistically significant levels than in other groups regarding the relation between Life Orientation Scale median score according to the number of children. This can be interpreted as having many children might have caused economic anxiety and stress on parents.

When educational status and scale median scores were compared, life satisfaction and subjective happiness levels of those, who did not complete primary school, which

is the lowest level in terms of education, were lower. Educational level was detected to be an important factor in terms of life satisfaction and happiness. In a study conducted by Altiparmak, the life satisfaction of the elderly with educational levels at and below primary school were found to be lower than those with education levels above primary school [34]. Since educational status provides improvements in the social and economic conditions of individuals, it positively affects the physical and spiritual conditions of individuals, contributing to wider relations in social terms; and it can be argued that it positively affects life satisfaction and happiness.

It was determined that the life-satisfaction, optimism, and subjective happiness status scores of the individuals who participated in the study were different according to their income status; however, this difference was not at a statistically significant level. Similar to the finding of our study, Softa et al. conducted a study with elderly, and reported that they detected no statistically significant differences between income levels and life satisfaction scores [26]. Although old age is generally considered to be a difficult period for individuals with low income levels because of lack of sufficient income, it was found in our study that income status did not affect happiness, life orientation, and life satisfaction scores of older individuals.

When the life satisfaction scores of the individuals who participated in the study were evaluated according to Vitamin D levels, it was found that the scores varied according to Vitamin D levels, and this change was at statistically significant levels. It was found in further analysis that the statistical difference was between "moderate deficiency and normal" and between "those with moderate deficiency and those with mild deficiency". It was also found that the life satisfaction scores decreased as Vitamin D deficiency scores increased. In the study conducted by Devrimsel et al., positive correlations were detected between Vitamin D levels and quality of life short form-36 physical, social and mental function sub-scale scores. Again in the same study, negative correlations were detected between Vitamin D levels and Beck Depression Scale scores [35]. There are several studies in the literature arguing that there is a relationship between Vitamin D deficiency and depression [36, 37]. In the study of Hoang et al., they also found that low Vitamin D levels were associated with depression; and for this reason, it was recommended to evaluate Vitamin D levels in people when history of depression is questioned [8].

When the correlation analysis results between the life satisfaction, optimism, and happiness status and blood lipid levels of the individuals who participated in the study were evaluated, no statistically significant relations were detected between cholesterol, HDL, TG levels and the scores obtained in the scale used; and the correlation between LDL levels and subjective happiness status scores was statistically significant and inverse. In the study "Optimism and Cardiovascular Diseases" conducted by Hernandez et al., statistically significant relations were detected between total cholesterol levels and optimism scores [38]. In a study conducted by Boehm et al., which was similar to our study, it was found that high HDL cholesterol and low TG levels were associated with optimism scores [39].

When lipid profiles of the individuals participating in the study were compared with life satisfaction, life orientation (optimism), and subjective happiness scores, no statistically significant differences were detected between life satisfaction, optimism, and happiness and lipid parameters. This finding informs us that life satisfaction, optimism, and subjective happiness do not affect cholesterol, HDL, LDL and TG levels. In a study conducted by Boehm et al. to examine the relations between optimism and lipid levels in middle-aged individuals, it was found that optimism was not associated with total cholesterol and LDL cholesterol, but was associated with HDL cholesterol and TG in expected direction [39]. A study conducted by Vilibic et al. examining the relations between lipid parameters and depression, aggression, and intention for suicide found that high levels of total cholesterol and LDL cholesterol were associated with moderate depressive symptoms. In the same study, HDL cholesterol and TG levels were not found to be associated with depressive symptoms [40]. A study conducted in the USA found that there were no significant associations between total cholesterol levels and depressive symptoms [41].

In the study, no statistically significant difference was found between the genders of the individuals and their vitamin D levels. The study, which was conducted to determine the differences among varying levels of Vitamin D according to age and gender, supported the findings of our study, and found no significant differences according to gender [20]. In the study of by Varkal et al., which investigated Vitamin D deficiency among healthcare employees, no differences were detected between men and women in terms of 25-OH D levels [42]. In the study conducted by Bachhel et al., they also found no differences between male and female individuals when the cut-off point was taken 30 ng/ml for vitamin D levels [43]. All these findings support the findings of our study.

When the relations between age groups and Vitamin D levels were evaluated, no statistically significant relations were detected between age groups and Vitamin D levels. In the study conducted by Kim et al., Vitamin D deficiency was at the lowest level in the 30-39 age group among men, and was similar in all age groups among women [44]. In another study, no statistically significant differences were detected between the mean ages of the three groups with different Vitamin D levels [45]. In the study conducted by Durmaz et al. to determine Vitamin D levels in hospitalized individuals, it was found that there were no statistically significant differences between age groups in terms of Vitamin D levels [46]. All these study findings support the finding of our study, and it was found that Vitamin D levels were inadequate with high percentages in all groups without significant differences among the age groups in our study.

When Vitamin D levels were compared according to the educational status of the individuals participating in the study, it was found that the Vitamin D levels vary at significant levels according to the educational status. In further analyses, it was found that the groups that made this significant difference were those who did not finish primary school and had Vitamin D levels of 30 and above (adequate levels) and elementary school graduates who had Vitamin D levels of 30 and above (adequate level). In the study conducted by Yildirim et al., similar to our study, it was found that Vitamin D levels of individuals changed at significant levels according to educational status [47]. In another study, it was found that Vitamin D deficiency was detected more in those who had low educational status [48]. It is considered that as the level of education increased, the levels of consciousness of individuals also increased, and they know more about Vitamin D.

The relations between Vitamin D levels of individuals and cardiovascular risk factors were examined in the correlation analysis. The correlation between the ages, blood pressure levels, total cholesterol, HDL cholesterol, LDL cholesterol levels and BMI and Vitamin D levels of individuals was not statistically significant. The correlation between the TG levels, sun exposure times, and Vitamin D levels of individuals was found to be statistically significant. Negative and significant relations were detected between TG and Vitamin D levels of individuals participating in the study (r= -0.133, p=0.025). It can be speculated that this relation is low and, as the TG level increases, the level of Vitamin D decreases. A statistically significant relation was detected between sun exposure duration and Vitamin D levels (r= 0.174, p=0.003). As the exposure of individuals to the sun increases, their Vitamin D levels also increase. It was found that there is a relation between sun exposure duration and Vitamin D levels at a statistically low and significant level. In the NHANES III study, it was shown that there is a negative correlation between 25-OH D levels and hypertriglyceridemia, DM, hypertension and obesity. Again in the same study, it was found that the mean systolic blood pressure was lower in those with high Vitamin D levels than in those with low levels [49].

Previous studies showed that there are negative relations between 25-OH D levels and total cholesterol, LDL, and triglycerides [50]. In a meta-analysis of Jorde et al., 12 cross-sectional and 10 placebo-controlled interventional studies were evaluated, and positive relations were detected between serum Vitamin D levels and HDL cholesterol, and negative relations were found with TG in all cross-sectional studies [51]. Vitamin D deficiency was associated with high plasma triglycerides and high levels of VLDL in previous studies [7].

In a study conducted by Glueck et al., which examined the relation between serum Vitamin D levels, lipids and homocysteine, serum Vitamin D levels were found to be associated positively with HDL cholesterol; and negatively associated with BMI, total cholesterol, LDL cholesterol, and TG [52]. In the study of Wang et al., after the confusing factors, such as age and Body Mass Index were adjusted in male participants, serum 25(OH)D concentrations were found to be strongly associated with TG and LDL cholesterol in a negative direction [53]. Previous studies also reported that serum lipids were correlated with Vitamin D levels [54, 55].

In the study conducted by Wang et al., it was found that elevated TG and decreased HDL cholesterol incidences were associated with low Vitamin D levels in male individuals [53]. Jungert et al. found that Vitamin D levels were positively correlated with HDL cholesterol in elderly females

in Germany, and that total cholesterol, LDL cholesterol, LDL:HDL cholesterol, total cholesterol:HDL cholesterol were negatively correlated [55]. According to the study results of Skaaby et al., the increase in serum 25(OH)D levels in Danish adults with more than 10 nmol/l was found to be associated with a decrease in TG (0.52%) and VLDL cholesterol (0.66%) [56]. As a result, in the correlation analysis made to examine the relation between participants' Vitamin D levels and cardiovascular risk factors, a negative and significant relation was detected between the TG levels and Vitamin D. However, no statistically significant differences were detected in terms of other risk factors. It is considered that this finding, which was reported differently by previous studies, was caused by confusing third factors.

Studies should be conducted to ensure that the elderly remain healthy and economically active to increase the life satisfaction of individuals aged 65 and over, which is now at a moderate level. In these studies, female individuals with lower levels of life satisfaction, optimism and happiness and individuals with low levels of education should be prioritized. For this purpose, programs and policies should be adopted, and it should be aimed to add life to the years rather than adding years to life. It is important that individuals are supported with specially developed care policies for elderly individuals, in line with their needs to improve their quality of life. Especially nurses, who serve in the field of elderly healthcare, have great responsibilities in determining the needs of this population and providing nursing care for these needs. It should be ensured that healthcare professionals, especially nurses, are included in future studies that will be planned in line with this goal. Also in this process, it is recommended to question the Vitamin D levels of people after it is determined that Vitamin D levels are associated with life satisfaction and subjective happiness level. It is considered that this relation has developed secondarily. It is also recommended to conduct new studies on different sampling groups questioning life satisfaction with Vitamin D.

Limitations

The limitation of the study was that the study was conducted with patients admitting to Turgut Ozal Medical Center Hospital; and therefore, the results cannot be generalized to the entire society.

Acknowledgments

Ethical approval

In order to carry out the study, written permission was obtained from the Inonu University Faculty of Medicine Dean's Office and Turgut Ozal Medical Center Urology and General Internal Medicine Departments and written permission was obtained from the Inonu University Faculty of Medicine Ethics Committee (Research protocol number: 2016103).

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