RELATION BETWEEN DEPRESSION AND NUTRITIONAL STATUS AMONG ELDERLY AND IMPLEMENTATION OF GERIATRIC PROMOTIVE SERVICES IN PRIMARY HEALTH CARE

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Abstract

There is accelerating growth in elderly population worldwide. Depression and malnutrition are main problems among elderly. They are strongly related.The study aimed firstly, to determine prevalence of depression among elderly. Secondly, find out the relation between depression and malnutrition. Thirdly introduce geriatric promotive, preventative and curative unit in the family health center (FHC).In this experimental study conducted in a FHC included 356 elderly considering the inclusion and exclusion criteria. The data was collected using geriatric depression scale 15 (GDS-15) questionnaire , mini nutritional assessment (MNA) and anthropometric measurement took place .Then introduction of geriatric services unit in the FHC .It was shown that 59% had moderate depression, 62% were malnourished and 75.8% had VIT D deficiency.Nutritional status significantly associated with depression (P<0.01).The GDS-15 score significantly correlated with both MNA-15 and VIT D (p<0.01) Elderly individuals suffer from depressive symptoms and malnutrition with high prevalence. Depression is correlated with malnutrition and VIT D status**.** There is a need for enhancement of geriatric health services.

Key words: Depression, Nutritional status, Vitamin D, Elderly

Introduction

Aging is inescapable event *(Arslantas et al., 2014).*There is accelerating growth in elderly population worldwide. According to *United Nations World Population Ageing, (2015*) 12.3% of the world population were 60 years old and above and it is projected to reach 21.5%, by the year 2050. In Egypt, 7.2% of the population aged above 60 and expected to increase by 10.9% by the year 2026 *(El-Sherbiny et al., 2015)*. Elderly suffer from age related illness. Depression is considered one of the most common diseases *(Taheri Tanjanai et al., 2016)*. *World Health Organization (WHO),(2017)* estimated the world wide prevalence of depression among elderly was between 10 and 20%. In Western countries the estimated prevalence of major depression among persons above 50 years old was 16.5% *(Prashanth et al., 2015)*. Depression among elderly is a significant public health problem. It leads to harmful consequences especially in developing low income countries *(Pilania et al., 2017).*Depression is considered an important reason of decreasing quality of life and the second main cause of disability*(Taheri Tanjanai et al., 2017)*. It accelerates functional impairment and interferes with rehabilitation therapies*(Nicholson, 2011)*. Depression leads to impairment thinking, loss of concentration and cognitive impairment. Elderly with depression can have suicidal attempts, and   self-destructive thoughts *(Prashanth et al., 2015)*. Depression also increases medical burden and has negative economic consequences *(Mcintyre et al., 2020)*. Depression and malnutrition including VIT D deficiency are highly prevalent among elderly and were shown to be strongly related. The relation between them is intuitive and till now causal relationship is still unclear. Depression comes up with loss

of appetite, decreases nutrient intake and changes in weight. It was indicated that neurotransmitters and changes in hormonal profile occurring in depression are responsible for appetite loss. On the other hand poor nutrition and low serum level of VIT D induces psychiatric problems including depression *(Cuomo et al., 2019)*. Dietary supplements are essential for emotional control and can be protective against depression. Moreover the risk factors of depression and malnutrition are common for example living lonely, absence of social support, functional and endocrinal impairment *(Al-Rasheed et al., 2018)*.

The increased number of elderly accompanied with illness creates a growing need for adopting new strategies and promoting specialized geriatrics healthcare services especially for mental health. This can help in protecting elderly, monitoring of their health status, screening of deficiency, applying corrective actions and ensuring better quality of life.Elderly in Egypt are economically dependent*(Khafajy, 2010).*The health care system is facing a challenge of provision of cost effective health care with high quality for the elderly. The current health care services either preventative or curative are suboptimal and can lead to undesired outcomes and being elderly will suffer from negligence*(Aly et al., 2018).*In Egypt the data on the prevalence of depression and malnutrition among elderly are limited and haven't been well studied*(Aly et al., 2018).*

The aim of the current study firstly, to determine prevalence of depression among elderly in the catchment area of the family Health Center (FHC). Secondly, find out the relation between depression and malnutrition. Thirdly introduce geriatric promotive, preventative and curative unit in the FHC.

Patients and Methods

Study design and settings

This experimental study was conducted at the catchment area of one of theurban family health centers located in Giza governorate in a low socioeconomic area. The center provides comprehensive integrated services for the whole family. The FHC supports continuity of care and integration of health services, by using the family files that includes demographic, medical information, earlier complaints, diagnosis, treatment or any other provided services for every member in the family. The study was done from June 2017 to January 2019.

Study phases
1-   Exploratory phase
Study population and sampling

According to the department of statistics in the district the number of residential buildings in the catchment area of the FHC was2920, and the estimated population was 30000 (28639) person as stated by the census conducted by national heath registration system 2016.
The sample size was calculated using the single population proportion formula. By assuming that the prevalence of depression among elderly was 62.7% according to a study done in Sohag governorate, Egypt *(Aly et al., 2018)*, with 95% confidence interval and 5% margin of error. Accordingly, the sample size was found to be 356 participants.

Residential buildings were selected by systematic random sampling (every tenth house) for recruitment of elderly (aged ≥ 60 years) to participate in the study. The researcher arranged with the district manager to perform outreach visits for the households. Arrangement of the teams took place.

The teams consisted of nurses and social services specialists. The researcher divided and trained the teams to perform the structured interview with the participants. Each team was assigned to three to four residential buildings each day**.** Any building with no elderly persons was passed over and the next houses were reviewed till finding a house with an elderly person.The process was continued as systematic random sampling from the last house that was reviewed.

Inclusion criteria

Elderly individuals (aged ≥ 60 years) who agreed about the participation in the study were included after explaining to them thepurpose of the study, ensuring confidentiality of data and receiving informed consent.

Exclusion criteria

Any individual with communication difficulties; having speaking or hearing problems, suffering from severe illness or mental problems affecting the cognitive function were excluded from the study.
None of the participants were taking VIT D supplement or anti-depressant drugs.

Data collection

Face to face interviews were conducted using structured questionnaires.

1- Socio- demographic characteristics of the participants*(Fahmy et al., 2015)*.

2- 15-item Geriatric Depression Scale (GDS-15)

Geriatric Depression Scale – GDS is a valid and reliable scale.The Arabic form of the questionnaire was used in this study. The questionnaire consists of 15 items answered with "Yes" and "No". .It took about 3 to 5 minutes to be completed .The minimum score 0 (normal) and max score 15 (severe depression). The severity is categorized as follows *(Sarkar et al., 2015).*

- 0-5 no depression (normal)
- 6-10 moderate depression
- 11-15 severe depression

3- Anthropometric measures: including weight,height, mid-arm circumference (MAC), waist circumference, calf circumference, and calculation of body mass index (BMI)*(Marfell-Jones et al., 2006)*.

4- Nutritional assessment by Mini Nutritional Assessment Short Form (MNA-SF)

It is a reliable, well validated, simple, noninvasive and easy tool for early detection of malnutrition among elderly people.
The minimum score is 0 and maximum score is 14 *(Chu et al., 2016).*

- Scores of below 8 showed malnutrition
- From 8 to 11 showing risk of malnutrition
- Above 11 showed normal nutritional status

5- Assessment of vitamin D

First it was agreed with a medical laboratory to conduct vitamin D analysis for the participants and taking the blood samples at their home. The lab technicians took the samples labeled tubes and deliver them to the lab according to the standardized protocols. The participants were informed about the results.

The individuals were categorized according to serum level of VIT D according to the lab references as follows:

$\leq$ 20 ng/ml deficiency

21-29 ng/ml insufficiency

> 29 ng/ml considered normal

2-   Experimental phase

Arrangement with the district manager took place to introduce geriatric promotive services unit .It included health education and increasing awareness of elderly including nutritional education session and personalized meal planning and preparation, screening for depression and malnutrition, sleeping disorders physical function and nutritional assessment, out- reach visits.The unit provided screening of chronic diseases among high risk individuals, management of mild common diseases and referral services. The health care in the unit is provided by family physicians and general practitioners. The center announced the launching of the unit. Then following up of the follow rate of the unit for a period of six months was done.

Three health education sessions were implemented in the FHC geriatric unit. Each session took about one and half hour. Topics discussed included importance of vitamin D, sources, symptoms of deficiency, and benefits of supplementation.

Statistical analysis

Data was analyzed by the Statistical Package for the Social Science Version 22 (IBM Corp., Armonk, NY, USA) .Qualitative data were presented as numbers and percentages and quantitative data by means ± SDs. Chi-squared test was used for comparing the qualitative variables and independent sample t-test for quantitative variables. Calculation of Pearson correlation coefficients for the linear relations between GDS total scores MNA-SF and level of VIT D. Significance level was evaluated at $P \leq 0.05$.

Ethical considerations

All approvals were obtained .The researcher respected all the principles of ethics of the Helsinki declarations. The interviewer explained to the participants the purpose of the study and assured them about confidentiality of their responses and signed consent was obtained from them.

Results

A total of 356 elderly individuals participated in the study; More than half 58.7% were females. The mean age of the participants was 71.4 (SD ± 8.16) years. Nearly two third were illiterate, the majority of the married participants and those living with their spouse were females (76, 72 and 72 % respectively).Most of employed participants were males 74%.

Table 1.
Socio-demographic characteristics of the studied elderly persons (Total N=356)

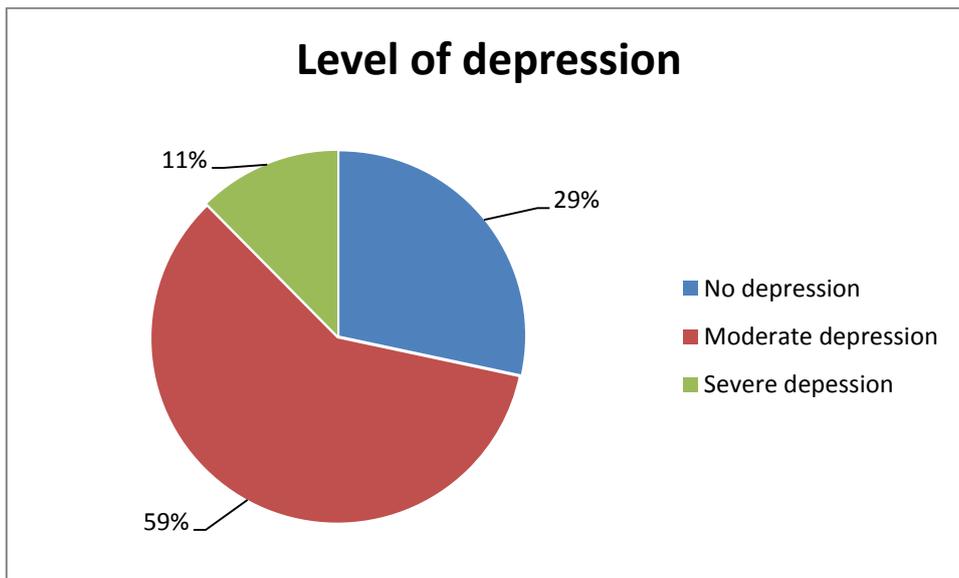| Demographic characteristics			Female (n=209)		Male (n=147)		otal
			NO.	%	NO	%	
Age		60–	109	55	88	45	197
		70-	61	65	33	35	94
		80-	39	60	26	40	65
Educational Status		Illiterate	130	76	41	24	171
		Primary	41	45	51	55	92
		Secondary & above	38	41	55	59	93
Marital status		Married	36	72	14	28	50
		Widowed	119	52	110	48	229
		Single	13	68	6	32	19
		Separated/ divorced	41	71	17	29	58
Occupation		Employed (in Private or governmental organization)	6	26	17	74	23
		Retired	12	44	15	56	27
		Self employed	19	40	28	60	47
		Not working	172	66	87	34	259
Living arrangement		Spouse	36	72	14	28	50
		Children	115	52	105	48	220
		Alone	39	63	23	37	62
		Others	19	79	5	21	24

Level of depression

Figure 1:

Percent distribution of the studied elderly persons according to the level of depression
Regarding levels of depression as shown in figure 1 most of the participants 211 (59%) had
moderate depression and 44 (11%) participants suffered from severe depression.
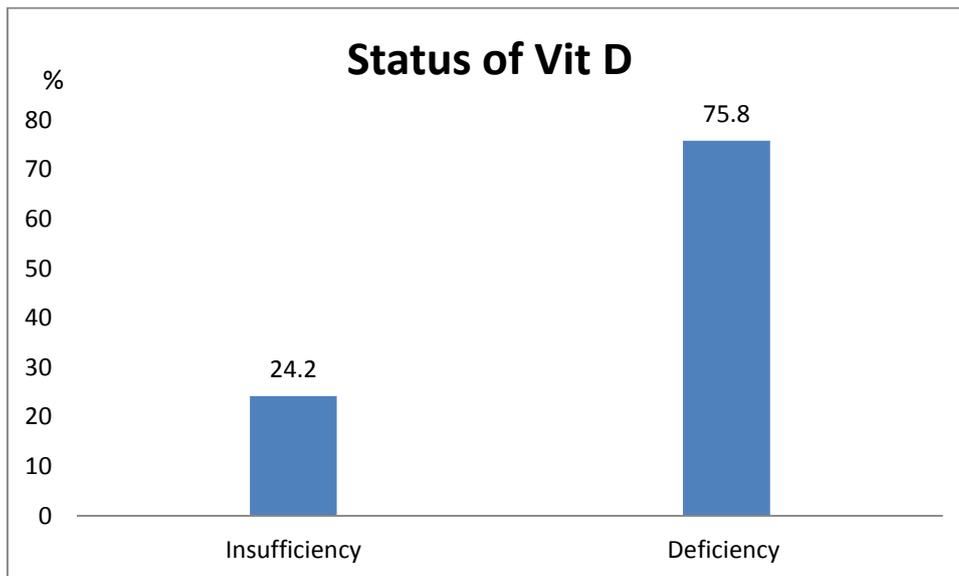
Status of Vit D

Figure 2:

Percent distribution of the studied elderly individuals according to their VIT D status
As shown in Figure 2 nearly three quarters of the participants (270) 75.8% had VIT D deficiency
and (86)24.2% had VIT D insufficiency.

The Comparison between the nutritional status among elderly individuals with depressive and
without depressive symptoms is shown in table 2. The majority of elderly individuals who had
depressive symptoms were malnourished 77.6% based on MNA-SF. Nearly half of those with
no depressive sysmptoms47.5% were in a normal nutritional status .The difference between
groups were significant p<0.01.

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Table 2:

Nutritional status in elderly individuals with depressive symptoms compared to elderly individuals with no depressive symptoms

Nutritional status [a]	Depressive symptoms(n=255)		No depressive symptoms (n=101)		P value †
	NO.	%	NO.	%	
Malnutrition(n=221)	198	77.6	23	22.8	
Risk of malnutrition(n=75)	45	17.6	30	29.7	<0.01*
Normal nutritional status(n=60)	12	4.7	48	47.5	

[a]Nutritional assessment by Mini Nutritional Assessment Short Form (MNA-SF)The minimum score is 0 and maximum score is 14,Scores of below 8 showed malnutrition ,From 8 to 11 showing risk of malnutrition, Above 11 showed normal nutritional status [8]

† Chi square test

*P value <0.05 considered significant

      Anthropometric variables in elderly participants. with depressive symptoms compared to elderly with no depressive symptoms are listed in **table 3 .** Elderly with depressive symptoms have significantly higher Body Mass Index (BMI) and Triceps Skin Fold thickness (TSF) than those with no depressive symptoms (p<0.01). Depression was higher among obese, over weight and underweight elderly individuals while lower depression was among participants with normal weight and the difference between groups were significant (P<0.01).

Table 3:

Anthropometric variables in elderly patients with depressive symptoms compared to elderly patients with no depressive symptoms

	Depressive symptoms(n=255)		No depressive symptoms (n=101)		P value *
BMI [a] category	No	%	No	%	
Normal weigh	23	(9%)	39	(38.6%)	
Under weight	60	(23.5%)	29	(28.7%)	
Over weight	77	(30.2%)	14	(13.9%)	<0.01
Obese	95	(37.3%)	19	(18.8%)	
	m±SD		m±SD		
TSF[b]	19.6±2.01		17.9±3.2		<0.01
MAC[c] (cm)	27.1±5.3		26.8±6.6		0.6
Waist circumference(cm)	86.9±7.36		85.4±8.93		0.1
Calf circumference(cm)	31.3±2.8		31.9±3.33		0.08

*P value <0.05 considered significant

a BMI: Body Mass Index

b TSF: Triceps Skin Fold thickness
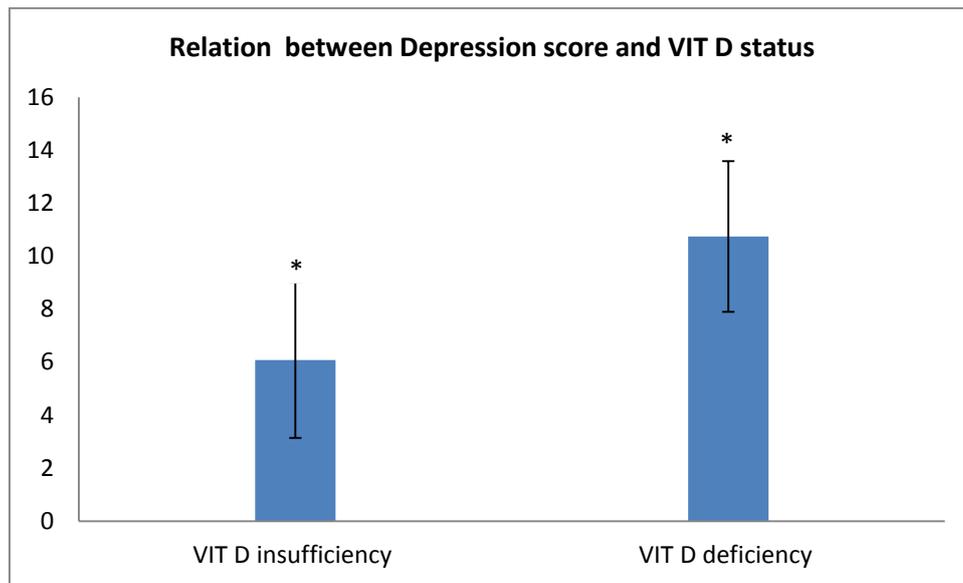
c MAC: Mid Arm Circumference

Figure 3:

Relation between mean depression score and Vit D status

As shown in **figure 3** the mean score of GDS -15 in elderly individuals with VIT D insufficiency was 6(SD ± 2.9) .Elderly individuals who had VIT D deficiency had higher mean GDS-15 score 11 (SD ± 2.8),and the difference between the groups was significant $p<0.01$

Table 4 shows the correlation analysis, there's a statistically negative correlation between GDS-15 with both MNA-SF (r= 0.632) and VIT D(r= -0.565), $p<0.01$.

Table 4:

Correlation between Depression scores and VIT D nutritional status

	MNA-SF [b]	VIT D
Pearson Correlation (r)	-0.632	-0.565[**]
P value	<0.01	<0.01

aGDS-15 Geriatric Depression Scale**,**

b MNA-SF Mini Nutritional Assessment Short Form

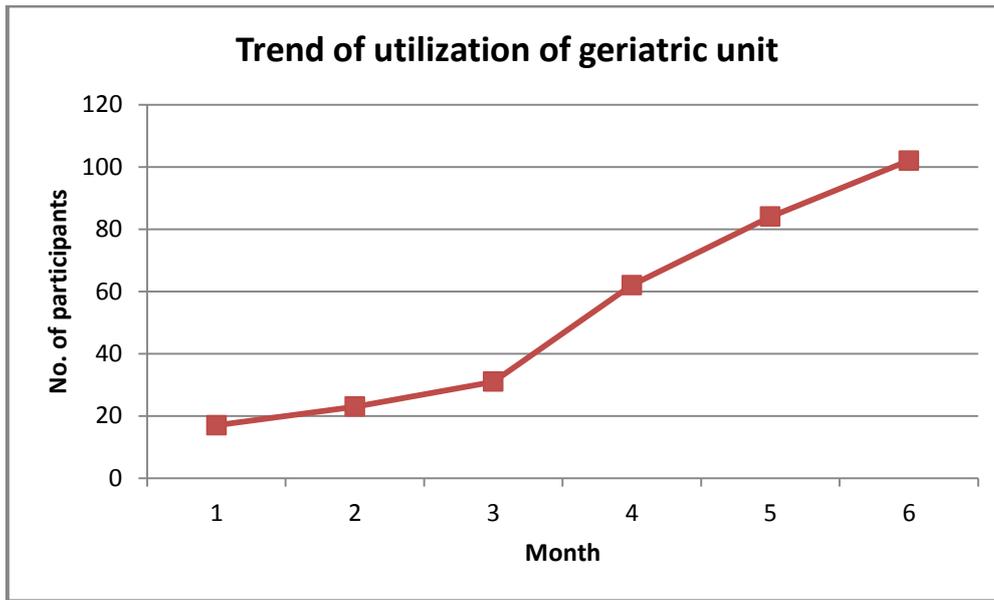**Correlation is significant at the 0.01 level (2-tailed).

Figure 4:
Trend of utilization of geriatric unit by elderly at the FHC

As shown in **figure 4** by following up the introduced geriatric unit for a period of 6 months there was increase in the number of visitors from 17 visitors at the first month reaching 102 at the end of the sixth month.

Discussion

The relation between depression and Malnutrition is complicated. Depression can cause loss of appetite and malnutrition. Also malnutrition can negatively impact depression. There is not a firm conclusion regarding the causal relationship between depression and nutritional status *(Al-Rasheed et al., 2018).*

Prevalence of depression among elderly individuals

Depression in geriatric is a frequently occurring problem that is seldom detected and treated. It has adverse consequences and can result in disability. So, it is necessary to study the disease and its associated factors*(Al-Rasheed et al., 2018).*

In the current study, the prevalence of depression among elder individuals was 70% (59% moderate depression and 11% with severe depression). The finding was nearly similar to other findings in numerous previous studies in Egypt. For instance, A study done in Alexandria showed the prevalence of depression was 74.5%*(El-Sherbiny et al., 2016)*, Also the prevalence of depression among elderly attending Zagazig University Hospital in Egypt was 72% *(Esmayel et al., 2013)*, Additionally the study finding was higher another study done Cairo which depicted that the prevalence of depression among elderly attending primary care clinics was 54.3%*(EL Kady et al., 2013)*. Finally 62.7% of participated elderly were suffering from depression in a community-based study in Sohag *(Aly et al., 2018)*. These differences can be attributed to variations in the areas of study and the socioeconomic level of the participants.

The current study findings were lower than that of *Ahmed et al, (2014)* who found that 80% of geriatric homes residents in Cairo were suffering from depression, anxiety, or both of them. This

elevated prevalence may be due to living alone without family members who provide support and can buffer stressors *(El-Sherbiny et al., 2016).*

The prevalence of depression among elderly in the current study was much higher than that reported in previous studies done in other countries as it was 32.8% in china*(Zou et al., 2018),*and 16.5% in Malysia *(Vanoh et al., 2016).* These differences can be attributed to the different methods used and living conditions in varies studies.

Depression and nutritional status
In the present study the nutritional status and level of VIT D were assessed and analyzed in relation to depression among the elderly.

It was shown in the current study that that the prevalence of malnutrition was worrying as 62% of the elderly were malnourished and 21 % were at risk of malnutrition that was higher than what was reported in previous studies. For example *El desouky and Abed, (2016)*found the prevalence of malnutrition among elderly in Qalyobeya Governorate was 35% while *Abdelrahman and Elawam,(2012)*found that it was14.5% in their study in Cairo.*Boulos et al.,(2013*) found in a cross sectional study that only 8 % of Lebanese elderly were malnourished. Additionally *Agarwalla et al., (2015*) found a prevalence of 15% in India. This high level in the current study can be explained by the low socio economic level of the studied group as that most of them were illiterate and not working that may affect their ability to buy nutritious food.

Depression and malnutrition have become an important problem among elderly. In the present study Depression was shown to be significantly correlated with Malnutrition. Other studies found independent association between depression and malnutrition .Depression can impair eating behavior, decrease appetite and hence weight reduction *(Al-Rasheed et al., 2018, and Vafaei et al., 2013).* On the other hand malnutrition can lead to depressive symptoms among elderly as they are psychologically vulnerable *(Parke et al., 2018)* and deficiency of nutrients and minerals can alter the release of neurotransmitter *(Demelash, 2017).*

Comparison of the anthropometric variables in individuals with depressive symptoms and those without depressive symptoms was done in the current study. It was shown that depression was higher among obese, over weight and underweight elderly individuals while lower depression was among participants with normal weight, these findings were similar to the study done by Ahmadi and his colleagues *(Ahmadi et al., 2013).* It was reported in a cross-sectional Korean study that obesity is significantly related with depression and underweight significantly increase the risk of depression than normal weight *(Hong and Hur, 2017)* .Triceps skin fold thickness was significantly higher in individuals with depressive symptoms which was observed in a previous study*(Ahmadi et al., 2013).*

The current study showed that 78.8% of the elderly individuals had VIT D deficiency. Similarly Kweder and Eidi found in their study that only 15% of elderly people had normal serum level of VIT D *(Kweder and Eidi,2018).*A study done among elderly in Singapore showed that 44.0% were vitamin D deficient and 41.8% were vitamin D insufficient*(Neo and Kong, 2016).*Elder individuals had no proper sun light exposure, insufficient VIT D intake in diet and Lack of physical activities *(Wyskida et al., 2017).*

There was significant negative correlation between VIT D and depression scores in the current study. Previous studies showed associations between VIT D and depression and its

supplementation improved depression scores among elderly *(Alavi et al., 2017)*. In 2016, Okereke reviewed 20 observational (cross-sectional and prospective) studies and 10 randomized trials. It was depicted in 13 observational studies an inverse relation between level of VIT D in blood and depression *(Okereke and Singh, 2016).*

The current study has novelty in evaluation of the association between nutritional status and VIT D with depression among elderly and introduction of geriatric unit in FHC which has not been done before in previous studies in Egypt. The unit succeeded in increasing the numbers of utilizers from 20 in the first month of its implantation reaching 120 in the sixth month. The utilizers were receiving physical function and nutritional assessment in addition to screening for malnutrition, depression, sleeping disorders, and chronic diseases. The unit provided management of mild common diseases and referral services in addition to out- reach visits for health education and screening.The unit had registration system that can support provision of data on the functional status of elderly and underlying risk factors .This will be beneficial in placing aging population in the Egyptian policy-map which was considered as challenge due to lack of relevant and reliable data*(Badr and Shaheen,2017)*. The study has advantage as its methods were simple and was acceptable by the studied individuals.

Conclusion

It is concluded from the current study that elderly individuals suffer from depressive symptoms with high prevalence. Depression is correlated with malnutrition and VIT D status.

Recommendations

The results of the study proved that there is a need for enhancement and frequent evaluation of the geriatric program. There have to be frequent assessment of their nutritional status, VIT D level in addition to health education. It is recommended to save their data in a properly well-established information system with regular updating. That can help to identify and prioritize elderly individuals with greatest risk of depression and malnutrition as well as program evaluation. The government can provide subsidiary meals by cooperating with non-profit organizations.Primary health care is the first line of care and enhancement of geriatric services can be through wider implementation of geriatric units in primary health care centers in all governorates.

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العلاقه بين الإكتئاب والحاله الغذائيه لكبار السن وتطبيق خدمه تعزيز صحه المسنين في الرعاية الصحية الاولية

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الملخص العربى

توجد زياده كبيره في عدد المسنين في انحاء العالم. فالإكتئاب وسوء التغذيه من المشاكل الأساسيه لديهم.و توجد علاقه قويه بين الإكتئاب وسوء التغذيه. يهدف هذا البحث الي دراسه معدل إنتشار الإكتئاب لدي المسنين وإيجاد العلاقه بينه وبين سوء التغذيه. وكذلك عمل وحده وقائيه و علاجيه مع تعزيز صحه المسنين في مركز طب الاسرة. إحتوت هذه الدراسه التجريبيه علي ٣٥٦ شخصا مسن مع الأخذ في الإعتبار معاير الاحتواء و الإقصاء.استخدم في هذه الدراسه مقياس اكتئاب المسنين ومقياس التغذيه المصغر وتم عمل المقايس الانثروبومتريه وبعد ذلك تم إدخال وحده تعزيز صحه المسنين بالمركز . وجد ان ٩٥٪ من العينه لديهم اكتئاب متوسط ٦٢٪ يعانون من سوء التغذيه و ٧٥٪ لديهم نقص في فيتامين د. و أن الإكتئاب مرتبط إرتباط معنوي بالحاله الغذائيه وفيتامين د، و إستنتجت الدراسه انه توجد حاجه الي إنشاء وحدات لتعزيز صحه المسنين.

الكلمات المفتاحيه:الإكتئاب ، الحاله الغذائيه ، فيتامين د ، المسنين