




Factors Related to the Depression Score in the Elderly at the Social Service of the Dharma Asri Binjai Nursing Home

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Abstract

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BACKGROUND: Depression is the most common psychiatric problem in the elderly. Suicidal thoughts or recurring thoughts of death are common in people suffering from depression. Depression in the elderly has a very poor prognosis compared to people in other age groups because they have a relatively higher risk of suicide and death. Elderly people in nursing homes is a condition that significantly affects the quality of life and survival and harms the psychology of the elderly, cause stress is due to elderly people in nursing homes associated with medical and psychosocial problems such as divorce/widows, poverty, and social isolation.

AIM: We aimed to find out the factors that affect the Geriatric Depression Scale (GDS 15) score in elderly people at the Social Service of the Dharma Asri Binjai Nursing Home.

METHODS: This study used a cross-sectional approach to 91 subjects at the Dharma Asri Binjai Nursing Home Social Service starting from June to July 2020 utilizing sampling, namely, simple random sampling. The tests conducted in this study consisted of a bivariate test and a multivariate linear regression test to determine which factors are associated with depression. The measuring instrument used was the GDS 15.

RESULTS: After the multivariate test was carried out, the variables that were statistically significant to the total score of depression in the elderly at the Binjai Dharma Asri nursing home were Gender ($p < 0.001$) and activity of daily living (ADL) Score ($p < 0.001$).

CONCLUSION: The factors associated with the GDS score of 15 and the occurrence of depression in the elderly were found in the gender variable and the ADL score variable.

Introduction

Depression is the most common psychological problem in the elderly, so it needs further management in the elderly population [1]. Suicidal thought or recurring thoughts of death are common in people suffering from depression. Elderly people with depression have a very poor prognosis than other age groups because they have a relatively higher risk of suicide and death [2].

In a study conducted by Pramesona and Taneepanichskul in 2018 in Thailand, which assessed the prevalence and risk factors for depression in the elderly with a cross-sectional study, using multivariate logistic regression analysis on 181 elderly people obtained significant results [3]. Study conducted by Charoensakulcha *et al.*, in 2019 in Japan, which shows demographic characteristics can influence depression in the elderly [4]. Another study by Padayachey *et al.* in 2017 in South Africa, on demographic and socioeconomic characteristics, is strongly associated with GDS scores in the elderly [5]. Based on this background, through a literature review, the researcher wanted to know what factors were related to the GDS

score of elderly people at the Dharma Asri Binjai Nursing Home Social Service.

Methods

This study used a cross-sectional approach to 91 subjects in the social service of the Binjai Dharma Asri nursing home from June to July 2020 utilizing sampling, namely, simple random sampling. The tests conducted in this study consisted of a bivariate test and a multivariate linear regression test to determine what factors were associated with depression. The measuring instrument used is the GDS 15.

Results

Of the total 91 elderly people at the Social Service of the Dharma Asri Binjai Nursing Home, it is shown in the following table.

In Table 1, the most gender variable is women, namely, 50 subjects (55%). The most variable of marital status was unmarried with 69 subjects (76%). The most variable of prior history of depression was no previous history of depression in 84 subjects (92%). The variable of reasons for living in a nursing home was mostly family requests, namely 59 subjects (65%). The variable for the highest number of chronic disease comorbidities was <3, namely, 67 subjects (74%). It is also seen that the median value of the age variable is 67 with a mean \pm SD value of 61 and a mean \pm SD value of 78. The median value of the length of the education variable is 12 with a mean \pm SD value of 6 and a mean \pm SD value of 16. The median value of the nursing care variable is 65 with a mean \pm SD of 6 months and mean \pm SD 96 months. The median value of the variable score is 16 with a mean \pm SD value of 5 and a mean \pm SD of 20. In this study, because the independent variables were numerical in scale, linear regression was selected for the multivariate analysis.

Table 1: Demographic characteristics

Variables	n (%)	Mean \pm SD
Age		
Median (min-max)		67 (61–78)
Gender		
Male	41 (45)	
Female	50 (56)	
Marital status		
Married	22 (24)	
Unmarried	69 (76)	
Causative reason in Nursing home		
Family request	59 (65)	
Personal request	32 (35)	
History of depression		
Present	7 (8)	
Absent	84 (92)	
Comorbidities		
<3	67 (74)	
\geq 3	24 (26)	
Length of education (in years)		
Median (Min-Max)		12 (6–16)
ADL score		
Median (Min-Max)		16 (5–20)
Length of stay (in months)		
Median (Min-Max)		65 (6–96)

ADL: Activity of daily living.

The requirement for an independent variable to be included in the multivariate regression analysis is the bivariate analysis, the $p < 0.25$. As for this study, there are nine independent variables, including five free variables on a categorical scale, and four independent variables on a numerical scale [6].

Other independent variables with a numerical scale are age, length of education, activity of Daily Living

Table 2: Bivariate analysis of independent variables with a categorical scale

Variables	Mean \pm SD	Median (Min-Max)	p
Gender			
Male	6.12 \pm 3.39		<0.001 ^a
Female	9.52 \pm 3.47		
Causative reason in Nursing home			
Family request	8.71 \pm 3.63		0.013 ^a
Personal request	6.66 \pm 3.84		
History of depression			
Present		10 (7–4)	0.061 ^b
Absent		8 (1–14)	
Comorbidities			
<3	7.63 \pm 3.85		0.113 ^a
\geq 3	9.00 \pm 3.62		
Marital status			
Married		6 (1–13)	0.090 ^b
Unmarried		8 (1–14)	

^aT Independent test, ^bMann Whitney U test.

(ADL) score, and length of stay. The Pearson test was carried out because it fulfilled the requirements for the Pearson test, which is one of the normally distributed variables (with the Kolmogorov–Smirnov test) $p > 0.05$ and the linearity test was met with a scatter graph [7].

Because all the independent variables on a numerical scale have linearity with depression scores, so it can be continued with the Pearson test. From Table 3, it can be seen that the independent variables that have $p < 0.25$ are age, length of education, and ADL score. From the bivariate analysis, it was concluded that these variables were associated with depression scores. Therefore, all of these variables have met the requirements to be continued with multivariate linear regression analysis with a predictive conceptual framework [8].

Table 3: Bivariate analysis of independent variables with the numerical scale

Variables	Depression score
Age	$r = 0.778$
	$p < 0.001$
Length of education	$r = -0.304$
	$p = 0.003$
ADL score	$r = -0.826$
	$p < 0.001$
Length of stay	$r = -0.903$
	$p < 0.001$

Pearson test. ADL: Activity of daily living.

In Table 4, it can be seen that model 6 is the model with the highest coefficient of determination, namely 86%. So to obtain a fit multivariate linear regression model, it is advisable to discard the independent variables which have a tolerance test value < 0.4 and to obtain a fit model. Based on statistical considerations, it was decided to make a new linear regression analysis, removing the length of the treatment variable because it had a tolerance value < 0.4 . Therefore, model 6 is not yet a fit model, this is because there is still multicollinearity between the independent variables. Thus, multivariate linear regression analysis must be continued by removing one of these variables [6].

Table 4: Depression scores

Model summary					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.932 ^a	0.868	0.854	1.460	
2	0.932 ^b	0.868	0.855	1.452	
3	0.932 ^c	0.868	0.857	1.443	
4	0.932 ^d	0.868	0.858	1.436	
5	0.931 ^e	0.867	0.859	1.433	
6	0.931 ^f	0.866	0.860	1.428	
7	0.929 ^g	0.864	0.859	1.434	1.487

After the multivariate linear regression analysis was repeated by removing the age variable, it is shown from Table 5 that model 3 is a model with a high coefficient of determination, namely, 85.1%. Then, in this second multivariate linear regression analysis, we again check the collinearity assumption which can be seen in collinearity statistics and the results show that all independent variables have a tolerance value > 0.4 (there is no multicollinearity between the independent variables).

After repeated linear regression multivariate analysis by removing the variable of marital status, Table 6 shows that model 3 is a model with a high coefficient of determination, namely, 85.1%. Then, in this third linear

Table 5: Summary model of depression score in the second multivariate

Model summary					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.928 ^a	0.861	0.848	1.490	
2	0.928 ^b	0.861	0.849	1.482	
3	0.928 ^c	0.860	0.851	1.476	
4	0.927 ^d	0.859	0.851	1.473	
5	0.926 ^e	0.858	0.851	1.473	
6	0.925 ^f	0.855	0.850	1.477	1.646

regression multivariate analysis, we again check the collinearity assumption which can be seen in collinearity statistics and the results show that all independent variables have a tolerance value >0.4 (there is no multicollinearity between the independent variables).

Table 6: Model summary of depression score in the third multivariate

Model Summary ^g					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.928 ^a	0.860	0.849	1.485	
2	0.927 ^b	0.860	0.850	1.478	
3	0.927 ^c	0.859	0.851	1.473	
4	0.926 ^d	0.857	0.851	1.474	
5	0.925 ^e	0.855	0.850	1.477	1.646

After repeated linear regression multivariate analysis by removing the previous history of depression variable, it is shown from Table 7 that model 3 is a model with a high coefficient of determination, namely, 85.1%. Then, in this fourth multivariate linear regression analysis, we again check the collinearity assumption which can be seen in collinearity statistics and the results show that all independent variables have a tolerance value >0.4 (there is no multicollinearity between the independent variables).

Table 7: Model summary of depression scores in the fourth multivariate

Model summary ^h					
Model	R	R Square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.926 ^a	0.857	0.847	1.492	
2	0.926 ^b	0.857	0.849	1.485	
3	0.925 ^c	0.856	0.849	1.482	
4	0.925 ^d	0.855	0.850	1.477	1.646

After repeated linear regression multivariate analysis by removing the length of education variable, it is shown from Table 8 that model 3 is a model with a high coefficient of determination, namely, 85%. Then, in this fifth linear regression multivariate analysis, we again check the collinearity assumption which can be seen in collinearity statistics and the results show that all independent variables have a tolerance value >0.4 (there is no multicollinearity between the independent variables).

After the multivariate linear regression analysis was repeated by removing the reason for staying at the nursing home, it is shown from Table 9 that model 2 is a model with a high coefficient of determination, namely, 85.2%. Then, in this sixth linear regression multivariate analysis, we again check the collinearity assumption which

Table 8: Model summary of depression score in the fifth multivariate

Model summary ⁱ					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.925 ^a	0.856	0.848	1.490	
2	0.925 ^b	0.856	0.849	1.482	
3	0.925 ^c	0.855	0.850	1.477	1.574

can be seen in collinearity statistics and the results show that all independent variables have a tolerance value >0.4 (there is no multicollinearity between the independent variables).

Table 9: Model summary of depression score in the sixth multivariate

Model summary ^j					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.923 ^a	0.852	0.845	1.505	
2	0.923 ^b	0.852	0.846	1.496	
3	0.922 ^c	0.850	0.846	1.495	1.574

After repeated linear regression multivariate analysis excluded insignificant variables, then from Table 10, it can be seen that model 2 is a model with a high coefficient of determination, namely, 84.6%. Then, the results show that model 2 is a fit model because there is no multicollinearity where the tolerance value is >0.4 and all independent variables have $p < 0.05$ [6].

Table 10: Model summary of depression score in the seventh multivariate

Model summary ^k					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.922 ^a	0.850	0.845	1.504	
2	0.922 ^b	0.850	0.846	1.495	1.574

Table 11 shows that the residual mean is 0; therefore, the residual average requirement of 0 has been fulfilled. From Table 11, it can also be seen that the minimum value is -2.005 and the maximum value is 2.250; therefore, the condition for no outliers is also fulfilled, namely, the range value is not less than -3-3. Besides, it is also seen that the Durbin Watson value in Table 10 is 1.574, so that the independent conditions of the residue are met, which is around the numbers 0-4. Also seen from the scatter graph between the residue and the independent variable is constant/homoscedasticity, that is, it does not form a certain pattern [6].

Table 11: Residual statistic of depression

Residuals statistics ^a	Minimum	Maximum	Mean	Std. deviation	n
Predicted value	2.87	14.97	7.99	3.519	91
Residual	-2.998	3.364	.000	1.479	91
Std. predicted value	-1.455	1.983	.000	1.000	91
Std. residual	-2.005	2.250	.000	.989	91

^aDependent variable: Skor GDS. GDS: Geriatric depression scale.

By analyzing the backward method, a linear regression equation was obtained based in Table 12, namely, the GDS score of 15 = 15.70-0.64 * ADL score + 3.12* gender. All linear regression assumptions such as linearity, normality, zero residues, no outliers residue, independent, and constant (homoscedasticity) have been met [6].

Table 13 is presented to answer the hypothesis about the depression score. Therefore, from the results of the table, it can be concluded that the variable ADL score, and gender in elderly people in nursing homes ($p < 0.05$) [6].

Discussion

The study, which was conducted at the Dharma Asri Binjai Nursing Home, North Sumatra Province,

Table 12: Resume linear analysis of factors associated with depression scores in elderly people

Multivariate	Analysis	Interpretation
Model	Obtained a model consisting of ADL score and gender	This model is obtained after the variables are gradually removed using the backward method
Assumption testing	Linearity: Fulfilled	Scatter gives a linear impression
	Normality: Fulfilled	Histogram and plot charts give a normal impression (appendix)
	Residual mean zero: Fulfilled	Average = 0
	Residual of no outliers: Fulfilled	The range of residual values is between -3 standard deviations and 3 standard deviations
	Residual constant: Fulfilled	Graphics do not form a certain pattern (attachment)
	Independent: Fulfilled	The Durbin-Watson value is around the number 2
There is no multicollinearity: Fulfilled	Tolerance > 0.4	
Regression equation	GDS score 15 = 15.70-0.64 *ADL score + 3.12 *gender	
Adjusted R	85%	The ability of the relationship between gender and depression score to explain with a depression score of 85%
Correlation coefficient	ADL score = -0.81	The power of negative correlation is very strong
	Gender = 0.41	Strength of moderate positive correlation

ADL: Activity of daily living.

totalled 91 subjects. This study aims to determine the factors that affect the GDS 15 score [6].

Table 13: Multivariate analysis between factors associated with GDS score of 15 in elderly people in a nursing home at Dharma Asri

Variables	Correlation coefficients	Regresi multivariat β	p
Constant		15.70	<0.001
ADL score	-0.81	-0.64	<0.001
Gender	0.41	3.12	<0.001

Adjusted R² = 85%. ADL: Activity of daily living.

Conclusion

Of the 91 subjects with factors related to GDS scores in elderly people at the Social Service of Dharma Asri Binjai Nursing Home in June-July 2020. Based on the results of this study, some factors affect depression scores in elderly people.

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