Analysis of Influencing Factors for Depression in Parkinson's Disease Patients

Yanqiu Wang

Jiangyuan Hospital Affilited to Jiangsu Institute of Nuclear Medicine, Wuxi 214053, China

wangyanqiu@jsinm.org

Keywords: Parkinson's disease, Depression, Elderly, Family function, Social support.

Abstract: The incidence of depression in Parkinson's disease (PD) patients is not low and the depression can affect the physical health and quality of life for PD patients. Researchers had done a lot of studies on how to treat and interevent the depression of PD patients. But few researchers focus on the etiology of the depression of PD. In this study, we explored the influence factor of depression in elderly PD patients among demographic information, family function, social support, and motor and non-motor symptoms. 103 PD patients aging over 60 were recruited and invited to complete a questionnaire, which includes Demographic Information Questionnaire, Geriatric Depression Scale-15, Family APGAR index, Social Support Rating Scale and Barthel Index for Activities of Daily Living. The prevalence of depression among elder PD patients is 76.70%. The number of the comorbidities can increase the possibility of depression. Family function and social support also serve as important factors to depression in PD patients. The number of comorbidities, family function and social support are independent factors to the mental health of aging PD patients. Comorbidities, family function and social support greatly affects the prevalence of depression in PD patients. Medical staff should focus on more on patients with those features and take precautions against possible depression symptoms.

1. Introduction

Parkinson's disease (PD) is known as a neurodegenerative disease with a slow progression, which mainly involves some functions such as cognitive abilities, movement control, and balance [1]. Age is an important factor to PD, some surveys proved that the prevalence of PD increased by the age in the population above 60 [2]. Patient population of PD increase rapidly, reaching 6 million by the year 2015, which has doubled since 1990.

With the global aging trend, the number of PD patients will further increase in the next 20 years [3].

In general, the symptoms of PD can be divided into motor function related and non-motor function related. The non-motor symptoms include psychological or cognitive problems (eg, hyposmia, constipation, cognitive impairment, anxiety, and depression), and the characteristic symptoms of motor function includes movement difficulty such as tremor, stiffness or slowness. Movement difficulty can reduce the quality of life and cause mental stress, which may further induce psychology problems [4]. Depression is a common problem among PD patients, the incidence rate varies between 2.7% and 90% by different studies, and about 35% of the patients have typical symptoms of depression [5].

Previous research had proved that depression can reduce the quality of life of PD, and the psychological factors can inwardly influence the motor function of PD. PD patients with depression and anxiety disorders will have a higher mortality rate compared to the person without psychology abnormalities [6, 7]. But research on the etiology of PD depression is limited. Cui et al investigated the PD patients in China and found that female, rapid eye movement behavior disorder (RBD), tumor disease, no partner, motor function problems, dyskinesia and poor sleep quality are the risk factors of psychological problems of PD patients [8]. And another research found that unemployment, requiring support services, RBD (rapid eye movement sleep behavior disorder,

dyskinesias, decreased physical activity and pain can increase the risk of depression [9]. Research have proved that family function and social support play an important role in managing the depression symptoms, but we do not know how can they affect the psychological problem of PD.

In this research, we recruited PD patients and investigate their baseline profile demography, motor function, sleep quality, family function and social support to explore the risk factors to the depression for PD.

2. Methods

2.1 Participate and design

103 participants were recruited in this study from January 1,2021 to September 30, 2021 from the neurology department of the Jiang yuan hospital in southwest China. The patients were diagnosed to PD according to the United Kingdom Parkinson's Disease Society Brain Bank, aged between 65 to 85 years old and had no history of mental disease. Exclusion criteria includes unstable situation, cognitive disorder and difficulty understanding the contents of the questionnaires. Information was collected in the meeting room by a face-to-face interview.

The study was approved by the ethics committee of Jiang yuan hospital and informed consent was waived by all the participant before investigation.

2.2 Instruments

The questionnaire used in our study consisted of nine sections. The demographic information questionnaire was used to collect the personal information and the Geriatric Depression Scale-15 were used to access the degree of the depression. To explore the factors that may influence depression status, we collect the information about social support, Family Rating Scale, daily activities, motor function and non-motor function.

2.3 Demographic Information Questionnaire

The research team developed the demographic questionnaire which include twelve items, namely gender, age, occupation, education level, marital status, household income, have health insurance or not, family function, structure and have other disease or not.

2.4 Geriatric Depression Scale-15

The depression was measured by the Geriatric Depression Scale-15 (GDS-15). It is a 15-question short scale, participants can choose ‘yes’ or ‘no’ for each question, the range of the score is 0 to 15 ,8 is the cutoff score, and the higher values indicate the respondents is more depressive. The scale had been used among different countries and it had been proved the validity and reliability of the scale is acceptable in different versions [10, 11]. Blair had used the GDS-15 to assess the depression degree in PD patients [12]. Meanwhile, Hong Zhang had proved that GDS-15 is ease to use for Chinese older adult [13].

2.5 Family APGAR index

Family APGAR index was used to evaluate the degree of family care. Family APGAR index Scale was used to measure the family function of PD patients. It was developed by Smilkstein and contain 5 questions (adaptation, partnership, growth, affection and resolve). Participants can choose one answer from three possible answers (“almost always”, “sometimes”, “hardly ever”) and the score is 0 to 2, respectively. The higher score of the scale respect that the family function is better. This scale is a brief and effective tool which had been confirmed reliable (Mayorga-Muñoz, Gallardo-Peralta, & Galvez-Nieto, 2019). It had been used in different countries and different population and have been established well reliability and validity [14].

2.6 Social Support Rating Scale

Social Support Rating Scale (SSRS) was developed by Xiao Shuiyuan for the Chinese population and had been proved to have good validity and reliability to assess the social support for different communities. The scale includes 3 dimensions (objective support, subjective support, and support utilization) and 10 items. The items were quantitative by 1 to 4 Likert scales and the higher total score respect that the social support stranger [15].

2.7 Barthel Index for Activities of Daily Living

The Barthel Index is a classical scale which is used to assess the activities of Daily Living (ADL). It is developed by Barthel and Mahoney in 1965 to measure the ability of self-care. It includes 10 items (feeding, bathing, grooming, dressing, bladder control, toilet use, transfers, mobility on level surfaces, stairs and bowel control). The scale was used 5-piont increments to evaluate the ability of the different ability in physical function, the range of the total score is 0-100, the higher score is mean that the person has greater ability to take of himself. The Barthel index has been used widely used and has been demonstrated that it is scientific and effectiveness in different populations [16].

2.8 Hoehn and Yahr Scale

The Hoehn and Yahr (H&Y) scale was developed in 1967 to evaluate the extent of the functional disability of PD patients. The score of 1 to 5 respect various stages of the disease, the patients in stage 1 is means that they have the minimally disability and the person who is in stage 5 is considered to be the most severely disability [17].

2.9 Data collection and Statistics

All the questionnaires were accomplished by trained investigators, and all the questionnaire were checked after the investigation to conform that data were accuracy and completed. Then they were entered into SPSS 21.0 statistical software package. All statistical tests were two-sided (($p<0.05$). All demographic data were analyzed and presented as number (N) and percentage (%).

3. Results

3.1 The demographic information of the participants

Among the 103 participant who were recruited in our study, 50 (48.5) was male and 53 (51.5) were female. The range of age is 60 to 82 (M=70.80, SD=5.49). Table 1 shows the demographic information. The prevalence of depression among aging PD patients is 76.70% (score＞5) and the mean score is 9.48±4.25.

Table.1. The risk factors for depression in chinese patients with parkinson disease

Characteristic	N (%)
gander	
Male	50 (48.5)
female	53 (51.5)
Age, years,	
60 to 74	80 (77.67)
75 to 89	23 (22.33)
occupation	
retired	98 (95.1)
unemployed	5 (4.9)
Marital status	
unmarried	1 (1.0)
married	96 (93.2)
divorced	0 (1.9)
widowed	(3.9)
Education Level	

Primary school	22 (21.4)
Junior school	52 (50.5)
Senior school	20 (19.4)
University level or above	9 (8.7)
Family structure	
Live alone	1 (1.0)
a couple	65 (63.1)
A couple with children	13 (12.6)
extended family	20 (19.4)
other	4 (3.9)
Income	
Below 1000	5 (4.9)
1000~3000	43 (41.7)
3000~5000	39 (37.9)
Above 5000	16 (15.5)
Type of PD	
Grade 1	14 (13.6)
Grade 2	28 (27.2)
Grade 3	43 (41.7)
Grade 4	12 (11.7)
Grade 5	5 (4.9)
Insurance	
Have health insurance	101 (98.1)
Have no health insurance	2 (1.9)
Number of diagnosis disease	
1	11 (10.68)
2-3	43 (41.75)
4-5	42 (40.78)
Sick time (years)	
Below 5	44 (41.72)
5 to 10	40 (38.83)
Above 10	19 (18.45)

3.2 Factors that contribute to the depression of PD patients

Table 2 shows the comparison of clinicopathological factors, together with ADL, APGAR and SSRA scores between the depressed and non-depressed groups. Elder PD patients with more comorbidities had more tendency to appear in the depression group ($P<0.05$). Patients with higher PD grades are more likely to be depressed ($P<0.05$). From the APGAR score perspective, we can identify that the patients with better family function and more family support have smaller possibility to be depressed ($P<0.01$). Social support is another factor that significant influence depression status of aging PD patients, the more social support patients report to have, the less likely are them to exhibit the symptoms of depression ($P<0.01$). But the age, gender, insurance, marital status, education level, family structure, income, disease course and ADL have no significant difference between depression group and no depression group ($P>0.05$).

Table. 2. The correlation between the score of geriatric depression scale-15 and the other variable

Characteristic	No Depression group (**GDS-15 below 5) N=24**	Depression group (**GDS-15 above 5) N=79**	P value
gander			
Male (%)	41 (28.0)	36 (72.0)	0.352
Female (%)	10 (18.9)	43 (81.1)	
Age			
50 to74	18 (22.5)	62 (77.5)	0.781
75 to 89	6 (26.1)	17 (73.9)	
Insurance			
Have no health insurance			
Have health insurance	24 (23.8)	77 (76.2)	0.999

Have no health insurance	0 (0.0)		2 (100.0)	
Marital status				
unmarried	0 (0.0)		1 (100.0)	
married	23 (24.0)		73 (76.0)	0.505
divorced	1 (50.0)		1 (50.0)	
widowed	0 (0.0)		4 (100.0)	
Education Level				
Primary school	5 (22.7)		17 (77.3)	
Junior school	10 (19.2)		42 (80.8)	
Senior school	7 (35.0)		13 (65.0)	0.568
University level and above	2 (22.2)		7 (77.8)	
Family structure				
Live alone	0 (0.0)		1 (100.0)	
a couple	14 (21.5)		51 (78.5)	
A couple with children	3 (23.1)		10 (76.9)	0.921
extended family	6 (30.0)		14 (70.0)	
others	1 (25.0)		3 (75.0)	
Income				
Below 1000	0 (0.0)		5 (100.0)	
1000 to 3000	12 (27.9)		31 (72.1)	0.527
3000 to 5000	8 (20.5)		31 (79.5)	
Above 5000	4 (25.0)		12 (75.0)	
Number of diagnosis disease				
1	6 (54.5)		5 (45.5)	
2 to 3	11 (25.6)		32 (74.4)	<0.05
4 to 5	7 (16.7)		35 (83.3)	
Above 5	0 (0.0)		7 (100.0)	
Disease course (years)				
Below 5	9 (20.5)		35 (79.5)	0.723
5 to 10	11 (27.5)		29 (72.5)	
Above 10	4 (21.1)		15 (78.9)	
Type of PD				
Grade 1	6 (42.9)		8 (57.1)	<0.05
Grade 2		10 (35.7)		
Grade 3	7 (15.9)		37 (84.1)	0.999
Grade 4	1 (8.3)		11 (91.7)	
Grade 5		0 (0.0)		
ADL				
Below 40	0 (0.0)		7 (100.0)	
41 to 60	1 (20.0)		4 (80.0)	0.308
61 to 100	23 (25.3)		68 (74.7)	
APGAR				
0 to 3	0 (0.0)		9 (100.0)	
4 to 6	3 (6.7)		42 (93.3)	<0.001
7 to 10	21 (42.9)		28 (57.1)	
SSRS				
Below 20	0 (0.0)	8 (100.0)	<0.001	
20 to 30	4 (7.4)		50 (92.6)	
30 to 40	20 (48.8)		21 (51.2)	

Table 3 shown the bivariate correlations between the depression status and other scores. Depression has significant negative correlation with APGAR (r=--0.657, $P < 0.01$) and ADL (r=-0.503, $P < 0.01$). The data also proved that the correlation between the GDS-15 and SSRS and the dimensions of it are negative (r ranged -0.536 to -0.679, $P < 0.05$). Nonmotor symptoms and depression is positive correlated (r=0.434, $P < 0.01$) with depression.

Table.3. The correlation between gds-15 and adl, apgar, and ssrs

Variable	ADL	APGAR	SSRS	Objective support	Subjective support	Support utilization	GDS-15
DL	1						
APGAR	0.309**	1					
SSRS	0.328**	0.708**	1				
Objective support	0.196*	0.599**	0.810**	1			
Subjective support	0.292**	0.627**	0.898**	0.564**	1		
Support utilization	0.330**	0.528**	0.761**	0.547**	0.500**	1	
GDS-15	-0.503**	-0.657**	-0.679**	-0.568**	-0.589**	-0.536**	1

**. P＜0.01 *. P＜0.05

Table 4 indicates the result of the hierarchical regression of the depression for elderly PD patients. After we adjusted the demographic variables, we can find that APGAR and SSRS were negatively correlated with depression (β=−0.515 and -0.913, $p<0.05$, respectively). But the number of comorbidities of the elderly PD patients was positive correlation with depression (β=1.466, $p<0.05$).

Table.4. The hierarchical linear regression analysis between depression and independent factors

variable	model1 (β)	model 2 (β)	model 3 (β)	model 4 (β)
Gender-male (female)	1.092	1.105	0.493	0.607
Age	0.025	0.018	0.011	0.034
Education Level-Junior school (Primary school)	0.130	0.100	0.566	0.754
Education Level- Senior school	-0.656	-0.636	-0.243	0.115
Education Level-University level and above	-0.744	-0.644	-1.594	-0.981
Income-3000 to5000 (below 3000)	0.231	0.290	0.307	0.192
Income-above5000 (below 3000)	0.292	0.331	1.347	0.354
Sick time (years)	-0.003	-0.011	-0.005	0.043
Type of PD	0.696*	0.522	0.100	-0.154
Number of diagnosis disease	0.931*	0.897*	1.297**	1.466*
Model 2				
ADL		-.028	-0.035	0.0001
Model 3				
APGAR			-0.743**	-0.515*
Model 4				
SSRS				-0.193*

4. Discussion

4.1 The result of the investigate and incidence rate of the depression for old PD patients

As the number of aging populations is increased rapidly recently, the scientists pay more and more attention on the physical and mental health of senior citizen. Some research had proved that depression is a frequent psychological condition for PD and management towards the depression of PD is necessary. PD could cause the depression emotion and the depression also can aggravate the motor and non-motor performances of PD patients [18]. To investigate the influencing factors of depression for ageing PD patients, 103 PD patients were recruited, and demography information were collected. In addition, we collected the ADL, family function and social support of the participants. In the survey, the depression population account for 76%, thus we can infer that most of

the Chinese older PD patients is in risk of depression. A system review of Jennifer et al. proved that the prevalence rate of depression ranges from 2.7% to 90% [19]. Another research proved that the incidence of depression increased with age [20]. In this study, the participants are old PD patients, who often suffer from various comorbidities and often express that they are uncomfortable. Consequently, the depression of old PD patients is common, and we should pay our attention on those patients and give them more support.

4.2 The number of diagnosis diseases can influence the depression of the old PD patients

In this research, we find that the number of comorbidities can influence the psychological status of the elder PD patients. For patients who suffer more illness can acquire depression more easily. For patients with solely PD and none other comorbidities, the rate of depression is much lower. But as the population were diagnosed with 2 or 3 comorbidities, the rate of depression (74.4%) is significant greater. When the number is above 5, the rate of the depression in elderly PD patients is 100 percentage. Zis et. al. concluded that the depression was highly associated with the number of medical problems in the elderly [21]. Physical condition can influence one's psychological condition, thus comorbidities act as great influcing factors to the patients' mental health. Jeong et.al. concluded that patients with depression have higher risk of PD [22], and another research had proved that the depression in PD patients has negative impact to their motor function [23].

In conclusion, medical staff and community workers should focus on the management of the elderly patients, especially those with comorbidities.

4.3 Family function is important to the mood of the aging PD patients

The elderly always chooses to live with their relatives in China and they always need help from the families. In this research, we found that family function is an important factor to the depression of aging PD patients. The patients who had a score of 0 to 3 in APGAR had the rate of 100% to be depressed. But when the score is 7 to 10, the proportion of depression patients decline to 57.1%. So, we can conclude better family function and communication significantly reduce the probability of depression. Currently, the studies on different population and different chronic disease all proved that the depression was significant correlated with one's family support and function [24-26]. Furthermore, Wahyuningsih et. al. had concluded that depression of the elderly increases with weaker family function [27]. Overall, we should not only pay our attention on the disease of the elderly PD patients, but we should also do our best to better the function of their families. We can guide patients to communicate with relatives and tell their families to pay more love and support to them.

4.4 Social support is a non-neglectful factor to the depression of aging PD patients

Social support can also lead the aging PD patients to be depressed. From the result of our study, patients with a poor social support (the SSAS score below 20) was absolutely to be depressed, but the patient who can access a better social support had half possibility to be depressed. Further analysis showed that the three dimensions of the SSAR (objective support, subjective support and support utilization) were all significantly inversely correlated with the depression of elderly PD patients. Wahyuningsih et. al. also found that stronger social interaction and less social isolation can reduce the depression of elderly [27]. And in a study of the older adult about the depression and social support have proved that the association between them [28]. As the aging population will increase rapidly, we must realize the importance of the social support in elderly PD patients. Further research should not be solely focused on the intervention of individuals, family and community support should be addressed.

5. Conclusion

In this research, we found that the number of comorbidities, family function and social support are all independent factors to the depression of PD patients. The result inferred that we should pay

more attention to patients with comorbidities and strengthen the family function and social support provided for them.

References

[1] Khan, A.U., Akram, M., Daniyal, M., and Zainab, R.J.I.J.o.N.: 'Awareness and current knowledge of Parkinson's disease: a neurodegenerative disorder', 2019, 129, (1), pp. 55-93.

[2] Tysnes, O.-B., and Storstein, A.: 'Epidemiology of Parkinson's disease', Journal of Neural Transmission, 2017, 124, (8), pp. 901-905.

[3] Dorsey, E.R., Sherer, T., Okun, M.S., and Bloem, B.R.: 'The Emerging Evidence of the Parkinson Pandemic', Journal of Parkinson's Disease, 2018, 8, pp. S3-S8.

[4] Armstrong, M.J., and Okun, M.S.: 'Diagnosis and Treatment of Parkinson Disease: A Review', Jama, 2020, 323, (6), pp. 548-560.

[5] Timmer, M.H., van Beek, M.H., Bloem, B.R., and Esselink, R.A.J.P.n.: 'What a neurologist should know about depression in Parkinson's disease', 2017, 17, (5), pp. 359-368.

[6] Upneja, A., Paul, B.S., Jain, D., Choudhary, R., and Paul, G.: 'Anxiety in Parkinson's Disease: Correlation with Depression and Quality of Life', Journal of neurosciences in rural practice, 2021, 12, (2), pp. 323-328.

[7] Chuquilín-Arista, F., Álvarez-Avellón, T., and Menéndez-González, M.: 'Prevalence of Depression and Anxiety in Parkinson Disease and Impact on Quality of Life: A Community-Based Study in Spain', Journal of geriatric psychiatry and neurology, 2020, 33, (4), pp. 207-213.

[8] Cui, S.-S., Du, J.-J., Fu, R., Lin, Y.-Q., Huang, P., He, Y.-C., Gao, C., Wang, H.-L., and Chen, S.-D.: 'Prevalence and risk factors for depression and anxiety in Chinese patients with Parkinson disease', BMC Geriatrics, 2017, 17, (1), pp. 270.

[9] Lubomski, M., Davis, R.L., and Sue, C.M.: 'Depression in Parkinson's disease: Perspectives from an Australian cohort', Journal of affective disorders, 2020, 277, pp. 1038-1044.

[10] Durmaz, B., Soysal, P., Ellidokuz, H., and Isik, A.T.J.N.c.o.I.: 'Validity and reliability of geriatric depression scale-15 (short form) in Turkish older adults', 2018, 5, (3), pp. 216.

[11] Park, S.-H., and Kwak, M.-J.J.C.G.: 'Performance of the Geriatric Depression Scale-15 with Older Adults Aged over 65 Years: An Updated Review 2000-2019', 2021, 44, (2), pp. 83-96.

[12] Honsey, B.N., Erickson, L.O., and Wyman-Chick, K.A.: 'Neuropsychological Test Performances and Depression in Early-Stage De Novo Parkinson's Disease', Archives of Clinical Neuropsychology, 2019, 36, (1), pp. 112-116.

[13] Zhang, H., Wang, S., Wang, L., Yi, X., Jia, X., Jia, C.J.G., and international, g.: 'Comparison of the Geriatric Depression Scale-15 and the Patient Health Questionnaire-9 for screening depression in older adults', 2020, 20, (2), pp. 138-143.

[14] Hai, S., Wang, H., Cao, L., Liu, P., Zhou, J., Yang, Y., and Dong, B.: 'Association between sarcopenia with lifestyle and family function among community-dwelling Chinese aged 60 years and older', BMC Geriatrics, 2017, 17, (1), pp. 187.

[15] Shao, R., He, P., Ling, B., Tan, L., Xu, L., Hou, Y., Kong, L., and Yang, Y.J.B.p.: 'Prevalence of depression and anxiety and correlations between depression, anxiety, family functioning, social support and coping styles among Chinese medical students', 2020, 8, (1), pp. 1-19.

[16] Wojtusiak, J., Asadzadehzanjani, N., Levy, C., Alemi, F., Williams, A.E.J.B.m.i., and making, d.: 'Computational Barthel Index: an automated tool for assessing and predicting activities of daily living among nursing home patients', 2021, 21, (1), pp. 1-15.

[17] Modestino, E.J., Reinhofer, A., Blum, K., Amenechi, C., and O'Toole, P.: ‘Hoehn and Yahr staging of Parkinson's disease in relation to neuropsychological measures’, Frontiers in bioscience (Landmark edition), 2018, 23, pp. 1370-1379.

[18] Rutten, S., Vriend, C., Berendse, H.W., Van der Werf, Y.D., and van den Heuvel, O.A.: ‘[Anxiety, depression and sleep disorders in Parkinson's disease: a complex interaction between body and mind]’, Tijdschr Psychiatr, 2020, 62, (1), pp. 62-72.

[19] Reijnders, J.S., Ehrt, U., Weber, W.E., Aarsland, D., and Leentjens, A.F.: ‘A systematic review of prevalence studies of depression in Parkinson's disease’, Movement disorders : official journal of the Movement Disorder Society, 2008, 23, (2), pp. 183-189; quiz 313.

[20] Solhaug, H.I., Romuld, E.B., Romild, U., and Stordal, E.J.I.P.: ‘Increased prevalence of depression in cohorts of the elderly: an 11-year follow-up in the general population–the HUNT study’, 2012, 24, (1), pp. 151-158.

[21] Zis, P., Daskalaki, A., Bountouni, I., Sykioti, P., Varrassi, G., and Paladini, A.J.C.i.i.a.: ‘Depression and chronic pain in the elderly: links and management challenges’, 2017, 12, pp. 709.

[22] Jeong, W., Kim, H., Joo, J.H., Jang, S.-I., and Park, E.-C.: ‘Association between depression and risk of Parkinson's disease in South Korean adults’, Journal of affective disorders, 2021, 292, pp. 75-80.

[23] Papapetropoulos, S., Ellul, J., Argyriou, A.A., Chroni, E., and Lekka, N.P.: ‘The effect of depression on motor function and disease severity of Parkinson's disease’, Clinical neurology and neurosurgery, 2006, 108, (5), pp. 465-469.

[24] Amani, R.J.C.P., and Personality: ‘The role of family function in teenagers anxiety and depression’, 2020, 13, (2), pp. 77-84.

[25] Su, J.-A., Yeh, D.-C., Chang, C.-C., Lin, T.-C., Lai, C.-H., Hu, P.-Y., Ho, Y.-F., Chen, V.C.-H., Wang, T.-N., Gossop, M.J.N.d., and treatment: ‘Depression and family support in breast cancer patients’, 2017, 13, pp. 2389.

[26] ORJI, E.J.J.F.o.F.M.: ‘INFLUENCE OF FAMILY FUNCTION AND STRUCTURE ON DEPRESSION IN MIDDLE AGED WOMEN ATTENDING FEDERAL MEDICAL CENTRE, OWO’, 2017.

[27] Wahyuningsih, C.S., Subijanto, A.A., Murti, B.J.J.o.E., and Health, P.: ‘Logistic regression on factors affecting depression among the elderly’, 2019, 4, (3), pp. 171-179.

[28] Tengku Mohd, T.A.M., Yunus, R.M., Hairi, F., Hairi, N.N., and Choo, W.Y.: ‘Social support and depression among community dwelling older adults in Asia: a systematic review’, BMJ Open, 2019, 9, (7), pp. e026667.