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Prevalence of Depression, Stress and Anxiety and Impact of Exercise on Mental Health and Physical Performance among Institutionalised Older Adults of Northern Malaysia

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Abstract

Ageing population around the world is increasing dramatically and mental health is the second biggest health problem in Malaysia. Avoiding sedentary lifestyle and regular physical activity were important for healthy ageing. This study aimed to determine the exercise and mental health among Malaysian elderly in old age homes. Single group pre-test and post-test design was chosen. Status of mental health was assessed before and after exercise programme by using DASS-21 questionnaire. Single group pre-test and post-test study was conducted among old age homes of northern Malaysia and prevalence of mental health was assessed among 178 elderly and strengthening and aerobic exercises were introduced to 39 respondents with mild to moderate depression. The prevalence of depression was 23.6%, anxiety was 18.5% and stress was 7.9%. Significant improvement in physical performance was identified by the Short Physical Performance battery (SPBB) score at week1,6,9 and 12 of the exercise programmes (p=0.000). Depression, anxiety, and stress scores were significantly reduced after the exercise intervention as compared to scores before the exercise (p=0.000). Social support and emotional support are required to promote the better exercise habits among the elderly. Regular review of the elderly home facilities and exercise activities will help to support healthy aging and active lifestyle among Malaysian elderly residing in old age homes.

Keywords : Exercise, Mental Health, Elderly, Old age home

I. INTRODUCTION

Proportion of older people, those aged 60 or above, around the world is increasing dramatically and 30% of population in many countries will be occupied by aging population by the middle of the century. Issues related to elderly were often overlooked although they made important contribution to the society. Many of them were vulnerable to different types of abuse, negligence and they were at risk of developing mental disorders. According to WHO, mental or neurological disorder was noticed in 20% of elderly which could account for 17.4% of Years Lived with Disability (YLDs). Experiencing different life stressors, functional disabilities, and reduced capacities

among elderly can lead to physical injuries as well as psychological problems like depression and anxiety.(*Mental Health of Older Adults*, n.d.)

Mental health was the second biggest health problem after heart diseases in Malaysia. Based on the national survey, it was found that one in three Malaysian adults had a mental health condition in 2020. (Hassan et al., 2018) Moreover, Malaysia can be regarded as "ageing nation" and aging population can be projected to double to 14% by 2044 and 20% by 2056.(*"Super-Aged" Malaysia by 2056: What We Need to Do*, n.d.) Healthy aging was prioritised by the Malaysian government in National Health Policy by improving facilities and providing health care for older people.(Aziz & Ahmad, 2019)

Increasing demands of old age homes were noticed in urban areas like Kuala Lumpur, Selangor, Johor, and Penang from working adults who are unable to provide caregiving to their elderly parents.(JKM, 2014) However, the quality of life in home dwelling elderly was better than those who stayed in nursing home. (Olsen et al., 2016) The empty nest syndrome was a common trigger for depression and anxiety among elderly when children left home and migrated to other places for their future. Those in nursing homes might have a higher risk of mental health problems compared to those who stayed with the family.(*The Invisible Mental Health Issues Of Older Malaysians - CodeBlue*, n.d.)

Research showed that regular exercise was good for better mental health, and it could be as effective as cognitive behavioural therapy or antidepressants in mild to moderate depressive cases. The valuable advantages of doing exercise were releasing endorphins in the brain, improving sense of control and self-esteem, and reduced in muscle tension. People with mental health issues were associated with more chronic physical problems like heart disease and arthritis and physical benefit of exercise could improve their overall health.(*Exercise and Mental Health - Better Health Channel*, n.d.) Stress release, memory improvement and better sleep were positive impact of regular exercise.(*The Mental Health Benefits of Exercise - HelpGuide.Org*, n.d.)

Elderly should avoid the sedentary lifestyle and regular physical activity was important for healthy aging. It was well established that overall quality of life and general health of elderly were improved by doing any amount of aerobic exercise, strength, or resistance training, stretching exercise and balance training. (Lee et al., 2017) Strengthening exercises were recommended to elderly people by focusing on balance, mobility, and posture. Weight-bearing exercise was one form of strengthening exercise and respondents needed to bear their own weight. Both bone health and general health could be benefited by doing weight-bearing exercises like brisk walking, stair walking and jogging.(*Strengthening Exercises for Bones and Health for Seniors | Australian Seniors*, n.d.)

Special needs for the aging population are prioritized by the Malaysia government for ageing country status by 2030. Very limited research has been done concerning mental health among institutionalised elderly Malaysians and there was no structured exercise programme in most of the old age homes in northern Malaysia.To seal the considerable research gap and in line with the government policy, this study aimed to determine the exercise and mental health among Malaysian elderly in old age homes.

II. MATERIAL AND METHODS

Older adults who are residing at 1 government home and 9 private homes in Northern Malaysia (Penang and Kedah) were screened using DAS scale. Two homes from Penang and 8 homes from Kedah State were involved in our study. The study participants were recruited using convenience sampling, The adopted study design was single group pre-test and post-test design. The status of physical performance and mental health among the respondents was assessed before and after exercise programme. Informed consent was distributed and explained in detail to the participants. The privacy and confidentiality of the collected data were maintained. The study was conducted in

accordance with the standard of deceleration of Helsinki and AIMST university human and animal ethics committee (Ref: AUHEC/FOM/2020/03).

Phase I of this study was to find out the prevalence of depression, anxiety, and stress among the respondents. Mental health was assessed among consented 178 inmates, aged 60 and above from homes. Those who were younger than 60, respondents from homes other than northern Malaysia, those who were suffering from Psychosis, Dementia, severe decompensation and those on any psychotic medication were excluded from the study. Two researchers had undergone training in administering questionnaire to avoid the observer bias.

Phase II of the study was to assess the mental health status of the selected participants before and after exercise programme. In this phase, strengthening and aerobic exercises were introduced to 39 respondents with mild to moderate degree of depression. Two researchers from the team were trained by geriatric physiotherapist for a period of two weeks to assess the mental health and implementation of exercise training among study participants. The assessors were competent in data collection and implementing the exercise training. The Short Physical Performance Battery (SPPB) scores were assessed at week 1, week 6, week 9 and week 12. Mental health reassessment was done at week 12 of exercise intervention.

Table 1. *Exercise protocol for elderly respondents*

<table>
<tr><th></th><th>Exercise</th><th>Protocol</th><th>Duration</th></tr>
<tr><td>1</td><td>Warm up
Marching and brisk walking for 2 minutes at very low intensity of Borg scale (7-8 in scale)</td><td rowspan="3">Strengthening exercise
4 sets per day, each set consists of 10 repetitions, 1 minute rest between each set and 3 days per week.
Aerobic exercise
Intensity of exercise: somewhat hard in borg scale (13 in scale), 3 days per week
Progression of exercise:
Strengthening and aerobic exercise will be progressed to every 2 weeks by varying the intensity of exercise.</td><td rowspan="3">12 weeks</td></tr>
<tr><td>2</td><td>Strengthening exercise
Stepping on stool (14 inch stool) in forward and sideways direction
Basic chair squat
Heel rising by holding a stable object
Heel walking
Aerobic exercise
Brisk walking</td></tr>
<tr><td>3</td><td>Cool down
Marching and brisk walking for 2 minutes at very low intensity of Borg scale (7-8 in scale)</td></tr>
</table>

III. MENTAL HEALTH ASSESSMENT

Depression, Anxiety and Stress Scale (DASS-21) was used to assess the mental health among the inmates which consisted of 21 questions.(*Depression Anxiety Stress Scale (DASS 21) Form*, n.d.) It was recognised as an effective screening tool and scoring criteria were described in Figure 1.(*Depression Anxiety and Stress Scale 21 (DASS-21) – Healthfocus Clinical Psychology Services*, n.d.) It was a reliable tool with good internal consistency and validity especially for screening of depression among the elderly.(Gloster et al., 2008)

DASS-21 Scoring	Depression	Anxiety	Stress
Normal	0-4	0-3	0-7
Mild	5-6	4-5	8-9
Moderate	7-10	6-7	10-12
Severe	11-13	8-9	13-16
Extremely Severe	14+	10+	17+

Figure 1. *Scoring criteria for DASS-21*

The Short Physical Performance Battery (SPPB)

SPBB consisted of the combined results of the gait speed, chair stand and balance tests. The lowest score was 0 (worst performance) and the highest was 12 (best performance). The SPBB was reliable and valid tool to assess the physical performance of elderly people, showing high test-retest reliability value of 0.87.(Gómez Montes et al., 2013) It was used to assess the lower extremity function in the respondents by checking at week 1,6,9 and 12 after introducing exercise programme.(Guralnik et al., 1995)

IV. STATISTICAL ANALYSIS

Data entry and data analysis were done by SPSS version 23. Descriptive statistics was used to identify the prevalence of DASS among study participants. Repeated measures ANOVA was used to identify the SPBB score differences among different exercise sessions. Paired sample t test was performed to compare the mental health status before and after exercise programme. P-value<0.05 was considered as significant difference.

V. RESULTS

The sample comprised of 178 inmates from old age homes and general characteristics of them were shown in Table 2. Majority of the respondents were males (51.1%), Chinese (62.9%), unmarried (41.6%), those with primary education level (36.5%), those who stayed alone (64.6%), income less than or equal RM 600, those without disability (65.7%), those who did not get visit by friends (61.8%), no role in family decision (73.6%), those having no caretaker (61.8%) and those residing in private homes (85.4%).

Table 2. *Characteristics of the respondents*

No.	Variables	Frequency (n=178)	Percent
1	Gender		
	Females	87	48.9
	Males	91	51.1
2	Race		
	Malay	31	17.4
	Indian	35	19.7
	Chinese	112	62.9
3	Marital status		
	Unmarried	74	41.6
	Married	46	25.8
	Single/Divorce /Widow	58	32.6
4	Education		
	Primary	65	36.5
	Secondary	54	30.3
	Tertiary	16	9.0
	No formal education	43	24.2
7	Living condition		
	Alone	115	64.6
	With family	63	35.4
8	Income		
	Less than or equal RM 600	93	52.2
	More than RM 600	85	47.8
9	Disability		
	Present	61	34.3
	Absent	117	65.7

10	Visit by friends & relatives		
	Present	68	38.2
	Absent	110	61.8
11	Role in family decision		
	Present	47	26.4
	Absent	131	73.6
12	Caretaker		
	Present	68	38.2
	Absent	110	61.8
13	Type of home for aged		
	Government	26	14.6
	Private	152	85.4

Mental well-being was assessed by DASS-21 questionnaire and results can be seen in Table 3. Findings indicated that 27(15.2%) respondents had mild depression and 15(8.4%) had moderate depression. In addition, 31(17.4%) had mild anxiety and 2(1.1%) had moderate anxiety. Moreover, 14(7.9%) respondents had mild stress.

Table 3. *Prevalence of depression, anxiety, and stress among elderly in old age homes*

Severity level	Total (N=178)					
	Depression		Anxiety		Stress	
	N	%	N	%	N	%
Normal	136	76.4	145	81.5	164	92.1
Mild	27	15.2	31	17.4	14	7.9
Moderate	15	8.4	2	1.1	0	0
Severe	0	0	0	0	0	0
Extremely severe	0	0	0	0	0	0

The exercise was introduced to the respondents with mild to moderate depression. Out of 42 respondents with depression, 39 elderly compliance with exercise and 2 respondents dropped out of study. SPBB was assessed by balance test, chair stand test, gait speed test and combined total score at week1, week 6, week 9 and week 12. The improvement in physical performance can be noticed in Figure 2 to 5.

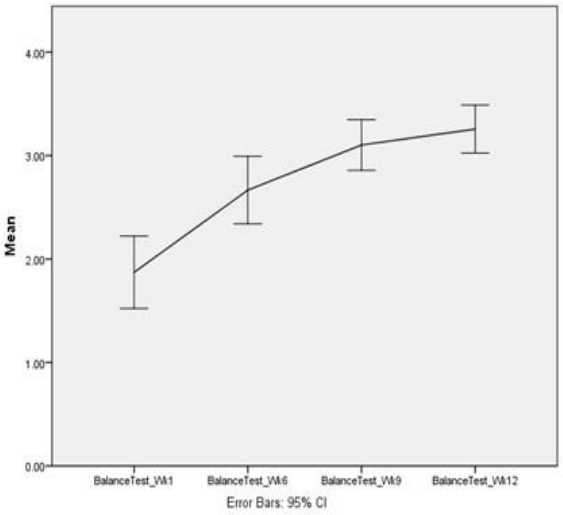

Figure 2: *Mean score differences of balance test in week 1,6,9 and 12*

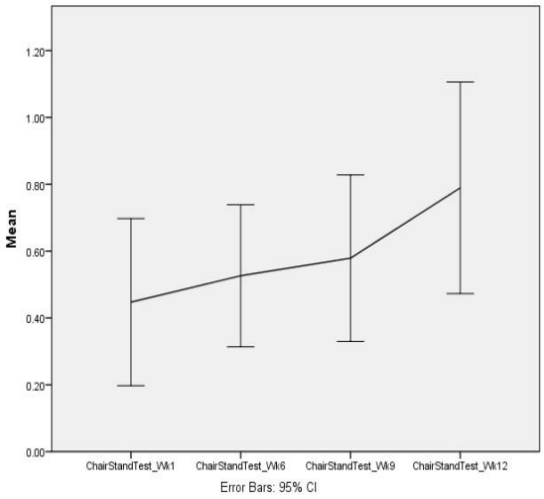

Figure 3: *Mean score differences of chair stand test in week 1,6,9 and 12*

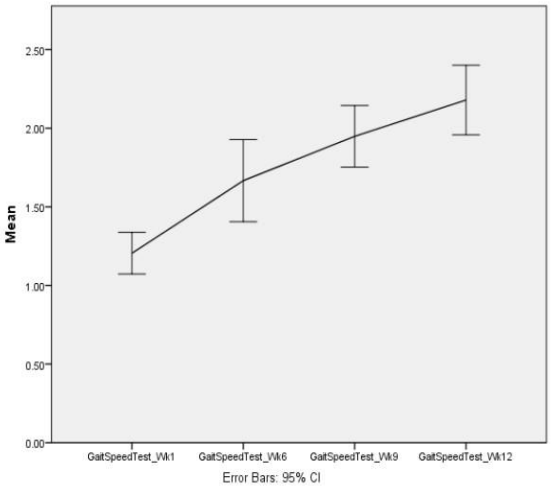

Figure 4: *Mean score differences of gait speed test in week 1,6,9 and 12*

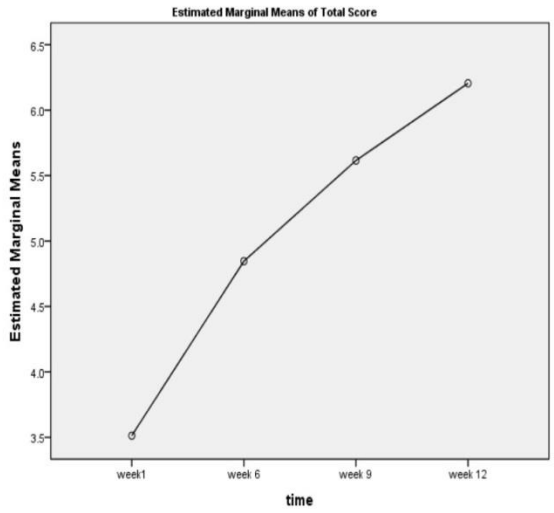

Figure 5: *Estimated means of SPPB total score in week1,6,9 and 12*

Table 4. *Distribution of mean and standard deviation of different SPBB total scores*

SPBB Total Score	Mean	Std. Deviation	N
Week 1	3.512	2.126	39
Week 6	4.846	2.084	39
Week 9	5.615	1.786	39
Week12	6.205	2.117	39

The average total scores of SPBB were described in Table 4, showing 3.512, 4.846,5.615 and 6.205 at week 1,6,9 and 12 respectively. A repeated measures ANOVA was performed to compare the effect of exercise on SPBB total score. According to table 5, our data had not met the assumption of sphericity and Greenhouse-Geisser showed F=85.953, *p*=0. 000.Bonferroni test was carried out in Table 6 for pairwise comparisons based on the average total score of SPBB in week 1,6,9 and 12. There was a statistically significant difference in SPBB total score between each pair of exercise sessions. Highest score of SPBB was noticeable at week 12 of exercise intervention compared to week 1,3 and 6 and significant improvement of physical performance was noticed among the respondents (*p*=0.000).

Table 5. *ANOVA test based on the different total scores of SPBB among elderly inmates*

Tests of Within-Subjects Effects						
Measure: MEASURE_1						
Source		Type III Sum of Squares	df	Mean Square	F	*p*-value
factor1	Sphericity Assumed	158.276	3	52.759	85.953	0.000
	Greenhouse-Geisser	158.276	1.840	86.035	85.953	0.000
	Huynh-Feldt	158.276	1.929	82.058	85.953	0.000
	Lower-bound	158.276	1.000	158.276	85.953	0.000
Error (factor1)	Sphericity Assumed	69.974	114	.614		
	Greenhouse-Geisser	69.974	69.908	1.001		
	Huynh-Feldt	69.974	73.296	.955		
	Lower-bound	69.974	38.000	1.841		

Table 6. *Pairwise comparisons of different SPBB total scores*

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-1.333*	0.185	.000	-1.848	-0.819
	3	-2.103*	0.204	.000	-2.670	-1.535
	4	-2.692*	0.244	.000	-3.372	-2.013
2	1	1.333*	0.185	.000	.8190	1.848
	3	-0.769*	0.124	.000	-1.115	-0.423
	4	-1.359*	0.166	.000	-1.822	-0.896
3	1	2.103*	0.204	.000	1.535	2.670
	2	0.769*	0.124	.000	0.423	1.115
	4	-0.590*	0.102	.000	-0.874	-0.306
4	1	2.692*	0.244	.000	2.013	3.372
	2	1.359*	0.166	.000	0.896	1.822
	3	0.590*	0.102	.000	0.306	0.874

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Paired sample t test was performed to identify the impact of exercise on depression, anxiety, and stress (Table 7). The average score related to mental health were assessed at week1 and week 12 of exercise programme. The results revealed the significant decrease in depression scores before exercise (M=6.179, SD=1.121) to after exercise (M=4.359, SD=1.459), t (38) =12.439, *p*=0.000. Significant decrease in anxiety scores before exercise (M=3.461, SD=1.393) to after exercise (M=2.205, SD=1.174), t (38) =7.023, *p*=0.000 and decrease in stress scores before exercise (M=4.589, SD=2.863) to after exercise (M=2.846, SD=1.785), t (38) = 6.944, *p*=0.000. Table 7. Results of paired differences in depression, anxiety, and stress scores before and after exercise intervention

Table 7. *Results of paired differences in depression, anxiety, and stress scores before and after exercise intervention*

Mental Health variables	Exercise	Mean	Std. Dev.	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	*p*-value
							Lower	Upper			
Depression	Before	6.174	1.121	1.821	0.914	0.146	1.524	2.117	12.439	38	0.000
	After	4.359	1.459								
Anxiety	Before	3.461	1.393	1.256	1.117	0.179	0.894	1.619	7.023	38	0.000
	After	2.205	1.174								
Stress	Before	4.589	2.863	1.744	1.570	0.251	1.235	2.252	6.944	38	0.000
	After	2.846	1.785								

VI. DISCUSSION

The prevalence of depression, anxiety and stress can be assessed by different measurements definitions and socio-economic backgrounds. In the current study, assessment was done by DASS-21 survey and 23.6% of the respondents had depression, 18.5% had anxiety and 7.9% had stress. The prevalence of depression was ranging from 11% to 35.5% based on the findings from the different studies.(Syed, 2018)The prevalence of depressive symptoms among institutionalised elderly Malaysians was noticed as 16.5% in the studies done by Vanoh et al.in 2016 and the prevalence was high in the current study.(Vanoh et al., 2016)COVID-19 pandemic affected the mental health of elderly population and it was reported by Okruszek et al. and Clair et.al. that many elderly experienced psychological burdens because of less social contact and loneliness during pandemic. Fear of contracting COVID-19 and death also contributed to decompensation.(Clair et al., 2021; Okruszek et al., 2020) The prevalence of anxiety in this study was 18.5% and majority of them were mild conditions which was in concordance with the study by Yong et al in which it was found that 15.2% of the admitted cases in Hospital Tapah, Malaysia were mild condition in anxiety.(Yong et al., 2022) In this study, 7.9% of elderly experienced stress and similar finding was noticed among Malay elderly in rural community of Perak State.(Abdul Manaf et al., 2016)

According to Centre of Disease Control and Prevention (CDC), it was recommended minimum 150 minutes per week for moderate intensity and 2 days per week for strengthening exercise for those 65 years and older. Strengthening exercise and brisk walking were introduced to elderly inmates 3 days per week for 12 weeks and significant improvement in physical activity was noticed in the current study. Physical activity was essential for healthy aging by preventing health problems and making muscles stronger.(*How Much Physical Activity Do Older Adults Need? | Physical Activity | CDC*, n.d.)

Significant reduction in depression score was identified after 12 weeks of exercise programme in our study. A study done by Blumenthal *et al.* found that 16 weeks of aerobic exercise was equally effective as antidepressant among patients with major depressive disorder.(Blumenthal et al., 1999)Anxiety score was significantly reduced after the exercise programme among elderly in old age homes. Our findings supported findings from the systematic review in which anxiety score was reduced after exercise intervention based on 19 studies.(Kazeminia et al., 2020) According to Boston University, lower anxiety in older adults was noticed after regular leisure time exercise 30 minutes for three time per week.(Aguiñaga et al., 2018)One study in Brazil by de Oliveira *et al.* had revealed that physical activity was a protective factor for anxiety and depression among elderly.(de Oliveira et al., 2019) It was interesting to find that exercise was associated with lower score of perceived stress in the studies done among the older population by Krause *et al.* and McHugh and Lawlor.(Krause et al., 1993; McHugh & Lawlor, 2012) It was found that aerobic exercise could reduce the stress hormone and stimulate the endorphin production which can create the feeling of relaxation and optimism. Stress reduction could be benefited by strengthening and stretching exercise two to three times per week as reported by Havard Medical School.(*Exercising to Relax - Harvard Health Publishing - Harvard Health*, n.d.) It was supported by reduction in stress score after 12 weeks of aerobic and strengthening exercise in our study.

VII. LIMITATIONS

Due to the travel restriction and infection among the elderly at the old age homes during COVID-19 pandemic, we could not get the required sample during the limited time frame. Convenience sampling was used as the sample obtained was only from the homes that gave permission and only one government home took part in the current study. The sample may not reflect the overall inmates at the old age home

of northern Malaysia and there can be possibility of selection bias.

VIII. CONCLUSION

The mental health situation among the elderly inmates in old age homes were quite alarming and depression was identified in approximately one forth of the elderly inmates. Regular screening of mental health should be done among institutionalised elderly to get the early diagnosis and timely referral. Our study found that severity of depression, anxiety, and stress were significantly reduced after 12 weeks of strengthening and aerobic exercises. Social support and emotional support are required to promote the better exercise habits among the elderly. Moreover, the close cooperation among government, NGOs, health personal, physiotherapist, caretaker and elderly is important for the better understanding of their requirements and constraints. Regular review of the elderly home facilities and exercise activities will help to support healthy aging and active lifestyle among Malaysian elderly residing in old age homes.

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X. DECLARATION OF CONFLICTING INTERESTS

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