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Home-Based Exercise, Health Education, and Dietary Control Improve Elderly Well-Being in Buriram, Thailand

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Abstract: Thailand has transitioned into an aging society, resulting in health challenges such as chronic diseases and malnutrition, which affect the quality of life of older adults. Therefore, promoting health through exercise programs, health education, and dietary control is crucial for enhancing the health status of older adults in communities. This quasi-experimental research aimed to investigate the effects of a home-based exercise program combined with health education and dietary control on older adults in Buriram Province. The sample comprised 194 older adults, selected through multi-stage sampling. Data were collected between April and November 2024 using a physical fitness assessment record, knowledge test, and quality-of-life questionnaire. The reliability coefficient was 0.72, and the content validity index (IOC) ranged from 0.60 to 1.00. The data were analyzed using an independent t-test. The experimental group exhibited statistically significant improvements ($p < .05$) in physical fitness indicators, such as arm curl strength, chair stand test, and back scratch test. These improvements persisted during the three-month follow-up period. Regarding health, nutrition, and exercise knowledge, the experimental group scored significantly higher than the control group. Additionally, the quality-of-life scores of the experimental group remained higher than those of the control group, both after the intervention and during the follow-up period. The home-based exercise program, combined with health education and dietary control, effectively enhanced the health and quality of life of older adults.

Keywords: *Dietary control, Community, Elderly, Exercise program, Health education.*

1. Introduction

Thailand is transitioning into a fully developed, aging society. According to data from the National Statistical Office, the proportion of the elderly population is steadily increasing. In 2022, the elderly population (aged 60 and above) accounts for 19.2% of the total population and is projected to increase to 28% by 2030 [1]. This demographic shift impacts the healthcare system, as older adults are at a higher risk of developing chronic diseases, such as diabetes, hypertension, and heart disease, which are prevalent health issues among the elderly [2]. Consequently, promoting the health of older adults is crucial for ensuring their quality of life and mitigating the burden on the public health systems.

Key factors that influence the health of older adults include physical exercise, proper nutrition, and health literacy. Research has demonstrated that appropriate physical exercise can reduce the risk of chronic diseases, enhance physical fitness, and improve quality of life among older adults [3]. However, in many areas, particularly in Buriram Province, a northeastern province of Thailand, where the majority of residents engage in agriculture, older adults often lack adequate knowledge, awareness, and resources to maintain health. Imbalanced lifestyles, including poor nutrition, insufficient physical activity, and limited health literacy, further exacerbate these challenges [4].

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Home-based exercise programs combined with health education and dietary management are promising approaches for promoting the health of older adults. Such programs address barriers related to time, location, and access to health care resources within communities. Moreover, they create opportunities for sustained self-care by being designed to align with the lifestyles and needs of older adults in specific areas. These programs are practical, adaptable, and facilitate continuous engagement in health promoting activities.

This study aimed to evaluate the effectiveness of a home-based exercise program combined with health education and dietary management in older adults in Buriram Province. The objective was to identify effective strategies for improving the health of older adults and to develop sustainable approaches that can be implemented in various community settings.

2. Methodology

2.1. Research Design

This study used a quasi-experimental research design. The objective of this study was to compare the mean scores in three domains: 1) physical fitness; 2) health knowledge pertaining to self-care, nutrition, and exercise; and 3) quality of life among older adults in Buriram Province. These comparisons were conducted at three time points: pre-intervention, post-intervention, and three months post-intervention, between the experimental group (those who received the program) and the control group (those who did not). The researchers implemented the Elderly Exercise Program for Health 75 years (E75) (Division of Physical Activity and Health, 2015) as a component of the intervention.

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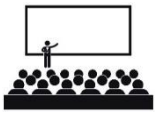
Table 1.
Home exercise, health education, and dietary control program.

Month	Health Education	Exercise	Dietary Control	Notes
1	*Pre-test*  - Self-care - Nutrition - Exercise	Physical Fitness Test 1  - Engag e exercises (E75) with an instructor biweekly.	*Pre-test*  - C uls at home in accordance with the prescribed program or an equivalent alternative.	- Supervised and monitored by the researchers and community health volunteers (CHVs).
2		Physical Fitness Test 2  -Practice home exercises (E75) twice a week.	 - Consume meals at home in accordance with the prescribed program or an equivalent alternative.	-Supervised and monitored by the researchers and community health volunteers (CHVs) through domiciliary visits and photographic documentation submitted via the group Line chat.
3		Physical Fitness Test 3 		- Supervised and monitored by the researchers and community health volunteers (CHVs).
4	*Post-test*	Physical Fitness Test 4 	*Post-test* 	- Supervised and monitored by the researchers and community health volunteers (CHVs).
5 - 6				- Supervised and monitored by the researchers and community health volunteers (CHVs).
7	Follow	Physical Fitness Test 5 	Follow 	- Supervised and monitored by the researchers and community health volunteers (CHVs).

2.2. Participants and Samples

The study population comprised adults aged 60 years and above residing in the Buriram Province. The inclusion criteria were as follows: 1) older adults capable of effective communication in Thai; 2) older adults with satisfactory physical health, able to perform activities of daily living independently (categorized as socially active and homebound groups); 3) older adults capable of engaging in physical exercise, meeting the following two criteria: 3.1) exercise frequency of ≥ 2 times per week; 3.2) exercise duration of ≥ 30 minutes per session; and 4) willingness to participate in the research project.

The sample size was calculated using a power analysis with the G*power program for an independent *t*-test (two groups). The power of the test was set at 0.9, with a medium effect size of 0.5 and a significance level of .05. The calculated sample size was 86 participants, to which an additional 5%

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were added, resulting in a target of 97 participants. The total number of participants was 194 [5] divided into two groups: 97 in the experimental group and 97 in the control group.

The participants were selected through multi-stage sampling. At the district and sub-district levels, simple random sampling was employed using the lottery method. Purposive sampling was used to identify the participants at the village level.

2.3. Ethical Considerations

This study was approved by the Mahasarakham University Ethics Committee for Research Involving Human Subjects (approval number: 109-108/2024). The researchers elucidated the study's overall objectives, anticipated benefits, research timeline, research procedures, and data collection process. Participants were given the opportunity to voluntarily determine their participation in the study and provided written informed consent to confirm their willingness to participate. The researcher emphasized the maintenance of participant confidentiality, the safeguarding of their interests, and the prevention of any potential harm. Upon completion of the study, the data were presented comprehensively and in an aggregated format.

2.4. Data Collection

The researchers collected data from older adults in Buriram Province from April to November 2024. The data collection instruments comprised: A physical fitness assessment record for older adults aged 60–89 years [6], A health, nutrition, and exercise knowledge test and the Thai version of the World Health Organization Quality of Life Brief Questionnaire (WHOQOL-BREF-THAI) [7].

The content validity of the instruments were evaluated by five experts in the fields of physical education, food innovation and design, geriatric nursing, public health, and health sciences. The content validity index (CVI) ranged from 0.6 - 1.00. The instruments were subsequently pilot tested with older adults, comparable to the target sample in Surin Province. The instruments demonstrated a Cronbach's alpha reliability coefficient of 0.72, and the difficulty index ranged from 0.27 to 0.77.

2.5. Data Analysis

Data analysis was performed using SPSS version 23. An independent *t*-test was used to compare the mean scores of 1) physical fitness; 2) health, nutrition, and exercise knowledge; and 3) quality of life among older adults in Buriram Province at three time points: prior to the intervention, immediately following the intervention, and three months post-intervention.

3. Results

3.1. Comparison of Mean Physical Fitness Scores Among Older Adults

A comparison of physical fitness outcomes between the experimental and control groups yielded significant findings. The results indicated that the experimental group exhibited statistically significant improvements ($p < .05$) in several aspects of physical fitness, including arm curl strength, chair stand test, sit-and-reach flexibility, back scratch test, timed up-and-go test, and the two minutes step test. These improvements were sustained during the three months follow-up period.

Conversely, the control group did not demonstrate statistically significant changes in numerous indicators. Some indicators, such as the timed up-and-go test and the two minutes step test, exhibited a decline during the follow-up period.

In a comparative analysis of the two groups, the experimental group displayed greater improvements in physical fitness than the control group across several indicators, including chair stand test, back scratch test, agility course test and two minutes step test. These differences were statistically significant at the .05 level, as illustrated in Table 2.

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Table 2.
Physical fitness scores of elderly across five time points in two groups.

Variable	Experimental group (n=97)		Control group (n=97)		t-test	df	p-value
	Mean	SD.	Mean	SD.			
Physical Fitness Test 1 (Pre-test)							
Skinfold Thickness (mm.)	12.452	19.724	14.771	13.947	0.946	192	.346
30 Seconds Arm Curl (time)	11.659	2.410	10.056	2.683	-4.378	192	.000*
30 Seconds Chair Stand (time)	10.309	2.844	11.628	3.871	2.705	192	.007*
Sit and Reach (cm.)	7.711	6.416	7.139	7.385	-.576	192	.565
Back Scratch Test (cm.) hand right on	17.061	10.425	19.536	9.639	1.716	192	.088
Back Scratch Test (cm.) left hand on	19.597	10.827	21.670	8.833	1.461	192	.146
Agility Course (second)	23.783	6.221	32.445	8.513	8.090	192	.000*
2 Minutes Step (time)	101.371	30.971	84.752	34.493	-3.531		.001*
Physical Fitness Test 2							
Skinfold Thickness (mm.)	11.120	24.887	14.755	13.038	1.274	192	.204
30 Seconds Arm Curl (time)	12.268	2.973	10.154	2.355	-5.486	192	.000*
30 Seconds Chair Stand (time)	13.567	5.766	12.721	3.975	-1.189	192	.236
Sit and Reach (cm.)	7.948	6.660	7.732	7.525	-.212	192	.832
Back Scratch Test (cm.) right hand on	10.340	8.358	18.536	8.444	6.793	192	.000*
Back Scratch Test (cm.) left hand on	14.989	7.828	20.659	7.588	5.122	192	.000*
Agility Course (second)	20.179	4.581	31.018	8.308	11.251	192	.000*
2 Minutes Step (time)	110.257	27.069	94.288	36.760	-3.445		.001*
Physical Fitness Test 3							
Skinfold Thickness (mm.)	12.158	14.202	14.989	8.775	1.670	192	.097
30 Seconds Arm Curl (time)	12.628	2.948	10.762	2.609	-4.668	192	.000*
30 Seconds Chair Stand (time)	16.989	4.606	14.329	3.933	-4.325	192	.000*
Sit and Reach (cm.)	8.927	7.515	8.474	5.870	-.468	192	.640
Back Scratch Test (cm.) right hand on	9.185	8.522	15.866	9.310	5.213	192	.000*
Back Scratch Test (cm.) left hand on	12.659	8.655	19.979	9.049	5.757	192	.000*
Agility Course (second)	20.061	4.780	31.049	8.365	10.772	192	.000*
2 Minutes Step (time)	114.061	21.277	102.134	37.799	-2.708		.007*
Physical Fitness Test 4 (Post-test)							
Skinfold Thickness (mm.)	12.416	10.933	14.828	10.024	1.602	192	.111
30 Seconds Arm Curl (time)	13.020	2.711	11.092	2.437	-5.208	192	.000*
30 Seconds Chair Stand (time)	18.237	6.177	15.773	5.195	-3.006	192	.003*
Sit and Reach (cm.)	10.896	7.115	8.721	5.996	-2.302	192	.022*
Back Scratch Test (cm.) right hand on	8.206	7.361	14.257	8.174	5.418	192	.000*
Back Scratch Test (cm.) left hand on	11.278	7.904	20.329	8.303	7.776	192	.000*
Agility Course (second)	18.267	3.768	30.560	8.166	13.461	192	.000*
2 Minutes Step (time)	115.000	19.260	107.515	37.374	-1.753		.081
Physical Fitness Test 5 (Follow)							
Skinfold Thickness (mm.)	12.564	10.863	14.608	11.836	1.254	192	.212
30 Seconds Arm Curl (time)	12.886	2.605	12.567	2.423	-.885	192	.378
30 Seconds Chair Stand (time)	18.061	6.011	15.783	5.240	-2.814	192	.005*
Sit and Reach (cm.)	10.732	7.028	9.082	5.332	-1.841	192	.067
Back Scratch Test (cm.) right hand on	8.412	7.375	14.340	9.791	4.763	192	.000*
Back Scratch Test (cm.) left hand on	11.567	7.851	17.226	9.065	4.648	192	.000*
Agility Course (second)	18.424	3.720	30.335	8.900	12.161	192	.000*
2 Minutes Step (time)	114.422	19.276	105.670	34.092	-2.201		.029*

Note: * $p \leq .05$.

3.2. Comparison of Average Scores on Health Care Knowledge, Nutrition, and Exercise among the Elderly

A comparative analysis between the experimental group and the control group regarding knowledge of health care, nutrition, and exercise among the elderly revealed that the mean scores for 1) health care knowledge, 2) nutrition, and 3) exercise among the elderly—prior to the intervention, post-

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intervention, and at the three-month follow-up—were significantly higher in the experimental group compared to the control group at the .05 level of statistical significance, as illustrated in Table 3.

Table 3.
Experimental group scored higher on health care, nutrition, and exercise than control group.

Variable	Experimental group (n=97)		Control group (n=97)		*t*-test	*df*	*p*-value
	Mean	*SD*	*Mean*	*SD*			
Health Care							
Pre-test	6.907	2.259	4.659	1.978	7.370	192	.000*
Post-test	8.773	1.698	6.701	1.780	8.293	192	.000*
Follow	8.793	1.638	6.567	1.606	9.556	192	.000*
Nutrition							
Pre-test	7.175	2.649	4.061	1.891	9.418	192	.000*
Post-test	8.721	1.846	6.247	1.639	9.867	192	.000*
Follow	8.690	1.833	6.134	1.447	10.778	192	.000*
Exercise							
Pre-test	7.917	2.644	4.381	2.138	10.241	192	.000*
Post-test	8.711	1.836	6.164	1.404	10.846	192	.000*
Follow	8.670	1.777	6.092	1.182	11.889	192	.000*

Note: *p ≤ .05.

3.3. Comparison of Average Quality of Life Scores among the Elderly

A comparative analysis of the experimental group and the control group regarding the quality of life of the elderly revealed that the mean post-experiment quality of life scores of the experimental group had been significantly higher than those of the control group at the .05 level of statistical significance. Moreover, at the three months follow-up, the experimental group had maintained significantly higher mean quality of life scores than the control group at the .05 level of statistical significance, as presented in Table 4.

Table 4.
Quality of life scores of elderly before, after, and three months follow-up.

Variable	Experimental group (n=97)		Control group (n=97)		*t*-test	*df*	*p*-value
	Mean	*SD*	*Mean*	*SD*			
Quality of life							
Pre-test	84.391	7.308	82.597	7.940	1.637	192	0.103
Post-test	110.072	11.588	85.299	7.818	17.453	192	.000*
Follow	110.123	11.571	85.237	7.807	17.559	192	.000*

Note: *p ≤ .05.

4. Discussion

This investigation aimed to evaluate and compare physical fitness, healthcare knowledge, nutrition, exercise, and quality of life among older adults in the experimental and control groups. The findings indicated that the experimental group demonstrated statistically significant improvements at the .05 level across multiple domains. These results align with previous research underscoring the importance of exercise and health-promoting activities in the elderly population as follows:

4.1. Physical Fitness

The experimental group exhibited significant improvements in multiple indicators, including arm curls, chair stands, forward bends, back scratches, rapid walking around a marker, and the number of

knee lifts within two minutes. These improvements were maintained at the 3-month follow-up, whereas the control group demonstrated no significant changes. These findings are consistent with studies highlighting the positive impact of exercise on physical fitness in the elderly population [8-18].

4.2. Health Care Knowledge, Nutrition, and Exercise

The experimental group attained significantly higher scores than the control group. This finding aligns with studies indicating that the promotion of health knowledge is associated with enhanced physical fitness [19-25].

4.3. Quality of Life

The experimental group demonstrated higher scores than the control group both post-intervention and at the three months follow-up. This result is consistent with studies illustrating that improved physical fitness positively influences quality of life in the elderly population [21, 26-33].

5. Conclusion

Comparative analysis of physical fitness outcomes between the experimental and control groups among older adults demonstrated that the experimental group exhibited statistically significant improvements in several indicators, including arm curl strength, chair stand test performance, sit-and-reach flexibility, and back scratch test results. These enhancements were maintained throughout the three months follow-up period. Conversely, the control group displayed no significant changes in these key indicators.

With respect to health, nutrition, and exercise knowledge, the experimental group achieved significantly higher scores than the control group. Regarding quality of life measures, the experimental group demonstrated significantly elevated scores following the intervention relative to the control group, and these higher scores were sustained throughout the three months follow-up period.

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Institutional Review Board Statement:

Not applicable.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:

The authors declare that they have no competing interests.

Authors' Contributions:

All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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