

Active exercise outcome on health and disease of senior citizens in a Bangkok district during COVID-19 pandemic

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ABSTRACT

The research objective was to study the outcome of regular and active exercise on the health and disease of senior citizens who were the high-risk group during the coronavirus 2019 (COVID-19) pandemic. The target population was the retired seniors who lived in the Bangkok district. The samples were purposely selected from the members of the public and private recreation centers. They were divided into two groups, an active exercise group (AEG) with those who exercised at least 5 days or 150 minutes each week and a lesser exercise group (LEG). The research instruments were questionnaires and interviews. The data were analyzed by descriptive statistics and the independent sample t-test. The study revealed that AEG's top exercises were walking, running, and dancing, while that for LEG were walking, cycling, and housework. Both groups' usage and skills of the social networks were at a high level. AEG had an overall better health record with 43% without chronic disease, while LEG had 39%. AEG had non-communicable diseases; Hypertension, Diabetes, Heart disease & Stroke, and Cancer at 22, 10, 7, and 7 % respectively, whilst the LEG had a similar rate. As a result of exercise, AEG attributed to better physical health, mental health, and disease prevention with a higher score than LEG. Statistically, there was significant difference ($p < 0.05$) in physical health and socialization between the two groups i.e. AEG had significantly better physical health and socialization than LEG. Some of the participants believed that active exercise provided them relief from allergy, diabetes, bone & muscle pain, and prevented the return of the chronic diseases.

Key words: exercise, COVID-19 pandemic, high-risk group, non-communicable disease.

INTRODUCTION

COVID-19 emerged in China at the end of 2019 and spread all over the world in early 2020. At the end of 2020, the cumulative number of infected people reached 80 million and the death toll was

1.7 million globally¹. The seniors became the high-risk group from COVID-19 as the number of deaths in this age group being the highest, especially those who had chronic non-communicable diseases (NCD). World Health Organization reported that COVID-19 was most severe in the group of people

older than 60 years and those who had other health conditions like respiratory and heart system, diabetes, or conditions that affect their immune system². European Centre for Disease Prevention and Control also indicated the high-risk groups for COVID-19 consisted of people aged 60 years and older, and people with underlying health conditions such as hypertension, diabetes, cardiovascular disease, chronic respiratory disease, and weakened immune systems³.

The coronavirus disease not only affects persons in physical health, but also the mental health of the persons due to the quarantine and social distancing rules⁴. Exercise and physical activity are suggested as therapy to fight against the mental and physical consequences of COVID-19 quarantine in older people⁵. Exercise by the elderly had positively affected their physical and mental health during the quarantine time. Physical activity and exercise have shown to be effective therapy of chronic diseases with direct results on chronic diseases and mental and physical health⁶.

Exercise and physical activity are related to physiological functions of the main body systems including respiratory, circulatory, muscles, nerves, skeletal, digestive, endocrine, and immune systems which had a direct effect on NCD. Several indications showed that regular exercise is associated with good health and delays the onset of chronic diseases⁷. Health benefits were evident from exercise and physical activity^{8,9}. The impact of regular exercise on health consisted in maintaining good health, strengthening the immune system, decreasing the risk of diseases as well as its positive effect on the quality of life. Exercise maintained good health and boosted the body's immune system and also decreased the risk of disease. Furthermore, it will increase the performance of the individual, particularly work efficiency and

decrease the rehabilitation time and medical cost which will contribute directly to the national economy.

Exercise as medicine was stated by Pederson¹⁰ and he prescribed exercise as therapy for 26 different chronic diseases. There was also evidence of exercise as therapy in chronic disease, including metabolic syndrome-related disorder type 2 Diabetes, Cardiovascular diseases, Muscle, Bone, and Joint diseases and Cancer, Depression, Asthma, and type 1 Diabetes. Lack of exercise was a major cause of chronic diseases¹¹. Exercise therapy was suggested for the prevention and treatment of chronic diseases¹². The research proposed that modest exercise prevents the progressive deterioration brought about by disease associated with physical inactivity¹³.

Several pieces of research recommended applying exercise for the prevention of cardiovascular diseases as the sedentary lifestyle is the major risk factor of the disease^{14,15}. The physical workout had an impact on cardiac rehabilitation from an exercise training program¹⁶. Physical and resistance exercise training was suggested in the prevention of cardiovascular disease. Bello¹⁷ also studied the effects of aerobic exercise on selected physiological types and quality of life in patients with Type 2 diabetes mellitus.

Physical exercise helped relieve Parkinson's disease¹⁸ and Alzheimer's disease^{19,20}. In addition, new research revealed that people who stay fit become young as a result of mitochondria movement²¹. The advanced mobile technologies can provide primary healthcare to the elderly and chronic disease patients²².

World Health Organization recommended that adults aged 18-64 years exercise at least 150-300 minutes of

moderate-intensity aerobic activity or at least 75-150 minutes of vigorous aerobic activity per week. WHO has advised that physical activity and exercise have health benefits for the heart, body, and mind and has contributed to preventing NCD diseases such as cardiovascular diseases, cancer, and diabetes. For moderate-intensity exercise, 40-50% heart rate reserve or 65-75% of the maximal heart rate, should be the ideal choice for older people. A variety of exercises can be conducted without the need for specific equipment for training such as walking, jogging, bicycling, swimming, dancing, or housework. These can be done at home during quarantine or at the public parks or fitness gyms in normal conditions.

The research objectives aimed firstly to study the outcome of the exercise and physical activity to help the seniors maintain their health and prevent chronic disease during the COVID-19 pandemic. Secondly, the research aimed to compare the outcome on health between the active exercise group and less-active exercise group.

METHODS

This research was designed to study the outcome of the exercise and physical activity to help the seniors maintain their health and prevent chronic disease during the COVID-19 pandemic and to compare the result on health between the active exercise group and less-active exercise group. The seniors became the high-risk group from COVID-19 as the number of deaths in this age group being the highest, especially those who had chronic diseases. WHO reported that COVID-19 was most severe in the group of people older than 60

years and those who had other health conditions like respiratory and heart system, diabetes, or conditions that affect their immune system

The target population was the senior citizens who were retired officers and employee from both public and private sectors living in the Taweewattana district in Bangkok. The sample was purposely drawn from Bangkok-Taweewattana Recreation Center and other similar centers in the district through social network groups by purposive selection and snowball sampling procedure. A total of 102 participants voluntarily joined and responded to an online questionnaire and interviews. LINE, Messenger, Facebook, and Email were used in the communications and for the interviews. Screening questions were applied in the questionnaire to separate the participants into intervention and control group. 1) How many days did you usually exercise per week? 2) How long did you exercise each day; less than 30 min., 30-60 min., 61-90 and more than 90 minute? They were divided into two groups. Those who did regular exercise 5 times or 150-300 hours a week as part of an Active exercise group (AEG) and those with less exercise as a Less exercise group (LEG). For moderate-intensity exercise, 40-50% heart rate reserve or 65-75% of the maximal heart rate, should be the ideal choice for older people. A variety of exercises can be conducted without the need for specific equipment for training such as walking, jogging, bicycling, swimming, dancing, or housework. These can be done at home during quarantine or at the public parks or fitness gyms in normal conditions.

Data were collected through an online questionnaire during the second half of 2020 while COVID-19 was still

spreading all over the world. The data were analyzed by descriptive statistics and the independent sample t-test method. The questionnaire was tested for reliability with a similar group of senior citizens²³. The Cronbach's Alpha coefficient was 0.92.

The research instruments were a set of questionnaires and interviews designed to collect data as follows:

1. Demographic data
2. Comparison of the favorite type of exercises between AEG and LEG
3. Usage and skills in IT and Social Networks
4. Health and sickness records [adapted from NRH ICD 10 - OM Questionnaire (Department of Mental Health, 2019²⁴)]
5. Comparison results of exercise between AEG and LEG.

This research had been approved by the Graduate School of Advanced Technology Management, Assumption University, and conducted with the subjects

who voluntarily participated. Their responses have been kept confidential and used for this research only.

RESULTS

The research results consisted of demographic information, comparison of their favorite types of exercise, comparison of usage and skill in IT, health and sickness records of both active exercise group and less exercise group, and comparison of the results of the exercise.

Table 1: showed that the average age of both AEG and LEG were not much different at 61 and 58 years, respectively. Most of the participants were educated and had a bachelor's degree or higher. It was obvious that AEG had a higher percentage of the normal body type than LEG with 66 against 52%. Besides, AEG had only 28% fat body while LEG had an extraordinarily high at 48%. Moreover, it was found that 7% of AEG was thin.

Table 1: Demographic information

Item	AEG, No. (%)	LEG, No. (%)	Total No. (%)
Participants	58 (56.86)	44 (43.14)	102 (100)
Average Age	60.47	57.52	59.20
Gender			
Female	31 (53.45)	22 (50.00)	53 (51.96)
Male	27 (46.55)	22 (50.00)	49 (48.04)
Body Type			
Normal	38 (65.52)	23 (52.27)	61 (59.80)
Fat	16 (27.59)	21 (47.73)	37 (36.27)
Thin	4 (6.90)	0	4 (3.92)

Table 2 demonstrated that AEG was more active with the top three activities indicated were walking at 64 percent, running at 24 %, and dancing 21 % compared with LEG's top activities which were walking at 77 %, cycling at 14 %, and housework at 14 % respectively. The LEG preferred less intense activities such as walking, cycling, and housework, and showed less interest in intensive activities like running, sports, and even dancing

Table 2 Comparison of the favorite type of exercises between AEG and LEG.

Activity	AEG, No. (%)	LEG, No. (%)	Total, No. (%)
Exercises and Sports			
Walking	37 (63.79)	34 (77.27)	71 (69.61)
Running	14 (24.14)	3 (6.82)	17 (16.67)
Dancing	12 (20.69)	3 (6.82)	15 (14.71)
Cycling	9 (15.52)	6 (13.64)	15 (14.71)
Aerobics	9 (15.52)	4 (9.09)	13 (12.75)
Sports	8 (13.79)	2 (4.55)	10 (9.80)
Housework	8 (13.79)	6 (13.64)	14 (13.73)

Table 3: Demonstrated that both groups had an overall high level of usage and skills regarding social networks with top scores indicated for: Future use of telehealth, Satisfaction, and Advantage respectively. There was no statistically significant difference between AEG and LEG. Almost all used LINE followed by Facebook and a few used Email. Most of them used a sports watch or mobile health device to monitor their exercise and health.

Table 3 Comparison of usage and skills in the social networks.

Description	AEG, Avg. Score, Level		LEG, Avg. Score, Level		p value
1 Satisfaction to social network	3.64	High	3.75	High	.537
2 Technology skill	3.12	Mod.	3.07	Mod.	.729
3 Use more SN during lockdown	3.59	High	3.52	High	.670
4 Advantage of social network	3.76	High	3.75	High	.950
5 Knowledge in new technology	2.62	Mod.	2.59	Low	.973
6 Future use of telehealth	4.10	High	4.18	High	.460
Overall Avg. Score	3.47	High	3.48	High	.951

Table 4 indicated that AEG had a slightly higher percentage of no disease than the LEG. Both groups had a similar trend of NCD diseases. The prevalence of the disease of AEG members: Hypertension at 22 percent, Diabetes at 10 %, Heart disease and Stroke at 7 %, Cancer at 7 %, and Kidney at 3 %, whereas the LEG members had 34, 9, 5, 5, and 2 %

respectively. Allergy had become a major threat followed Hypertension. Moreover, it was found that they had other symptoms of disease, i.e., Bone and muscle, Respiratory, Nervous, and Digestion systems. The top disease symptoms were Bone and muscle at 35-36 %, and the Respiratory system at 9-10 % respectively.

Table 4 Health and sickness records of Active and Less exercise groups.

Item	AEG, No. (%)	LEG, No. (%)	Total No. (%)
Health Record			
No disease	25 (43.10)	17 (38.63)	42 (41.18)
Heart diseases and Strokes	4 (6.90)	2 (4.55)	6 (5.88)
Diabetes	6 (10.34)	4 (9.09)	10 (9.80)
Hypertension	13 (22.41)	15 (34.09)	28 (27.45)
Cancer	4 (6.90)	2 (4.54)	6 (5.88)
Kidney	2 (3.45)	1 (2.27)	3 (2.94)
Allergy	12 (20.69)	7 (15.90)	19 (18.63)
Other Symptoms			
Bones and muscle	20 (34.48)	16 (36.36)	36 (35.29)
Respiratory system	6 (10.34)	4 (9.09)	10 (9.80)
Digestion system	2 (3.44)	1 (2.27)	3 (2.94)
Nervous system	3 (5.17)	2 (4.54)	5 (4.90)

Table 5 Illustrated that AEG's top 3 benefits of exercise led to Good physical health (stronger), Good mental health (Stress relief), and Prevent of diseases at 86, 64 and 52 % whereas LEG were for Good physical health, Prevent of diseases, and Good mental health at 66, 66 and 57% respectively. The other reasons indicated by both groups were: Staying younger, Socialize, and Relief from sickness. Statistically, there were significant differences in Good physical health and

Socialization between both groups as the AEG showed a higher percentage of Good physical health and Socialization than LEG significantly. Moreover, it was found that some of the participants believed that the exercise helped them relief from their sickness particularly allergy, diabetes, hypertension, and bone & muscle symptoms. From the individual interviews, those who had received medical treatment for NCD and cancer kept exercising to prevent the return of the disease.

Table 5 Comparison results of exercise between AEG and LEG.

Description	AEG, Mean (%)	LEG, Mean (%)	p value
1 Good physical health (Stronger)	0.8621 (86.21)	0.6591 (65.91)	.020*
2 Good mental health (Stress Relief)	0.6379 (63.79)	0.5682 (56.82)	.482
3 Prevent of diseases	0.5172 (51.72)	0.6591 (65.91)	.151
4 Stay younger	0.4828 (48.28)	0.3409 (34.09)	.151
5 Socialize	0.4655 (46.55)	0.2045 (20.45)	.005*
6 Relief from sickness	0.4310 (43.10)	0.2727 (27.27)	.097

*Notes: *p-value < 0.05, if statistically significant at $\alpha = 0.05$*

DISCUSSION

In the research study, AEG were more active with the top three activities being walking at 64 %, running at 24 %, and dancing at 21 % compared with LEG's walking at 77 %, cycling at 14 %, and housework at 14 % respectively. The LEG preferred less intense activities and not high-intensity activities like running and sports. In addition, both groups had a high level of usage and skills in IT technology with the top scores were for the future use of telehealth. Almost all used LINE followed by Facebook and a few used Email. Hence, the social network was suggested as a media to promote exercise and physical activity during the COVID-19 pandemic²⁵. The usage of sports watch or mobile health devices were also recommended to monitor their exercise and health²⁶⁻²⁷.

The research revealed that AEG had averaged better body figure and health than LEG with 43 % without disease while LEG only 39 %. AEG had Hypertension at 22 %, Diabetes at 10 %, Heart disease & Stroke at 7 %, Cancer at 7 %, and Kidney at 3 %, whereas LEG had a similar trend but a higher rate of hypertension at 34 %. Allergy had become a major threat followed Hypertension. It was also found that both groups exhibited other symptoms; 35-36 % with Bone & muscle and 9-10 % with Respiratory system, and with a few with Nervous and Digestion systems. The health record results of both groups demonstrated that chronic non-communicable diseases were still the highest rate of disease among the seniors. Besides, it showed that other sicknesses, particularly allergy, bone & muscle, and respiratory symptoms were

also at a high rate of sickness. The results conformed with Pedersen and Saltin¹⁰ stated that exercise as medicine - evidence for prescribing exercise as therapy in 26 different chronic diseases. Several other researches that regular exercise and physical activity helped people, particularly the seniors, maintain their physical and mental health and prevent and protect them from chronic non-communicable diseases, e.g., cardiovascular diseases, stroke, Type 2 diabetes, hypertension, cancers, and also bones, muscle, respiration systems. According to WHO, the COVID-19 was more severe in groups of people older than 60 years and those who have health conditions like respiratory and heart system, diabetes, or conditions that affect their immune system². Exercise and physical activity were suggested as a therapy to fight against COVID-19 quarantine among older people⁵. Several indications showed that regular exercise is associated with good health and delays the onset of chronic diseases⁷.

As a result of exercise, AEG had better physical health (stronger than before) at a higher rate of 86 %, better mental health (stress relief) at 64 %, and disease prevention at 52 %, compared with LEG which had good health and disease prevention at 66 %, and stress relief at 57 %. Statistically, there was significant difference ($p < 0.05$) seen in physical health and socialization between the two groups i.e. AEG had better physical health and socialization than LEG significantly. The results complied with Jiménez-Pavón et.al.,⁵ that exercise and physical activity were suggested as a therapy to fight against the mental and physical consequences of COVID-19 quarantine in older people. In addition, physical activity and exercise have shown

to be an effective therapy of chronic diseases with direct results on chronic diseases and mental and physical health⁶.

The other reasons for exercising given by both groups were: staying younger and socializing as both AEG and LEG were convinced that they were younger than people of the same age and they were socialized with others during their exercise particularly the AEG. This was compatible with Huertas²¹ indicated positive results of exercise on his research; Stay Fit, Stay Young: Mitochondria in Movement. Moreover, some of the participants believed that the exercise helped them relieve from their sickness particularly allergy, diabetes, and bone & muscle pain. From the individual interviews, those who had received medical treatment and kept exercising did so to prevent the return of the disease. Giallonardo et. Al.,⁴ suggested exercise and physical activity as a therapy to fight against the mental and physical consequences of COVID-19 quarantine with older people. Abdelbasset²⁸ recommended physical exercise training in elderly individuals' ability to face the COVID-19 Infection. In Thailand, there were some researches on physical activity, sedentary behavior, and the effect of physical activity promotion on improvement of health and physical fitness in office workers^{29,30}.

CONCLUSION AND RECOMMENDATIONS

In conclusion, AEG was also more active with the top three activities are walking, running, and dancing compared with LEG's walking, cycling, and housework respectively. Both groups also had a high level of usage and skills in IT and social networks with the top score indicated were the future use of telehealth. The health record results of both groups

demonstrated that chronic non-communicable diseases were still the highest rate of diseases among the seniors. Besides, it showed that other sicknesses, particularly allergy, bone & muscle, and respiratory symptoms were also at a high rate of sickness. The AEG had an overall better health record with fewer chronic diseases on average than LEG. It was found that AEG was also more active in performing regular exercise even during the lockdown. As a result of exercise, AEG had better physical health (stronger than before), better mental health (stress relief), and prevention of diseases whereas LEG showed a lower rate in almost all areas. Other reasons for exercise in both groups were staying younger, socializing, and relief from sickness. Moreover, it was found that some of the participants believed that the exercise helped them relief from their sickness particularly allergy, diabetes, hypertension, and bone & muscle symptoms. From the individual interviews, those who had received medical treatment on chronic diseases and cancer kept exercising regularly to prevent the return of the disease.

The research results conformed to several researches that regular exercise and physical activity helped people particularly the seniors maintain their physical and mental health and prevent them from chronic non-communicable diseases, cancer, and also bone, muscle, respiratory systems. As a result of this research, it is recommended that regular exercise will help people, especially the seniors to maintain good health physically and mentally and prevent them from chronic and other diseases during the COVID-19 Pandemic. A variety of exercises can be conducted without the need for specific equipment for training such as walking, running, bicycling, swimming, dancing, or

housework. These can be done at home during quarantine or at the public parks or fitness gyms in normal conditions.

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