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Physiotherapy Exercise Program for the Upper and Lower Body in Older Adults to Manage the Risk of Falls in A Gerontological Center

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Abstract

Introduction: Falls in the Elderly (A.M), comprise one of the public health problems and the deterioration of balance corresponds to one of the most important causes of the risk of falls and exercise is one of the most common intervention systems for the reduction of falls, taking into account that therapeutic balance exercise is one of the preventive efforts for balance and posture, focused on reducing the risk of falls in this age group. Objective: is to implement a physical therapy exercise program for the upper and lower body in Older Adults to improve the risk of falls; Background: Falls in the Elderly (AM) create a health problem, and it is estimated that around 70% of falls in AM have clinical consequences and 50% suffer from functional deterioration, with loss of autonomy and level of dependency. functional; Methods: The study had a non-experimental descriptive methodology, a quantitative cross-sectional approach. For the investigation, the Tinetti Test was applied, which measures the level of falls in the Elderly. It was tabulated in Excel, for data processing and statistical analysis, the SPSS2 2020 computer system for Windows in Spanish was used; Results: the risk of falls in AM improved after the application of physiotherapeutic exercises, from a 70% high risk of falls in the initial assessment, it decreased to 15% in the final assessment; Conclusions: The low-intensity Vivifrail upper and lower body exercise program has a positive impact on balance and gait in AM, improving quality of life and reducing the risk of falls.

Keywords: *Exercise Therapy, Accidental Falls, Aged; Physical Therapy Specialty, Upper Extremity, Lower Extremity.*

Introduction

According to the World Health Organization (WHO), falls in older adults are the second leading cause of death worldwide due to direct injuries, becoming a problem of great importance in the field of health that complicates lifestyle and quality of life. It is the consequence of any situation where the elderly person falls to the ground against their will, its cause being multifactorial and its risk factors both intrinsic and intrinsic ("Physical exercise programs for the prevention of falls in older people: a systematic review", 2019). Among the risk factors, previous falls, strength, balance and gait impairment, as well as the use of certain medications, have been identified. Intrinsic factors such as physical and pathological characteristics of AM as well as age and extrinsic factors such as architectural barriers, slippery floors, inadequate furniture, inadequate lighting, uneven surfaces, small spaces and real estate in poor condition that do not provide the

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necessary guarantees, can also favor the risk of falls (Palma Hernández et al., 2018).

Worldwide, according to the WHO, it is estimated that some 684,000 people die annually as a result of falls and more than 80% is recorded in low- and middle-income countries, taking into account that the people who suffer fatal falls are the elderly population. It is reflected that every year there are 37.3 million falls that require medical attention and of serious intensity (WHO, 2021).

Therapeutic exercise in AM is one of the methods for reducing falls, showing positive results at the level of postural balance and mobility, improving their gait dynamics (Kiik et al., 2020). Physical exercise and the different activities carried out throughout life will help this population to improve their functional capacities and have an active and healthy ageing, reducing the risk of falls that may occur in the course of life, exercise being one of the most frequent methods for this problem (Atención et al., 2019).

The objective of this research is to implement a program of therapeutic exercises of the upper and lower body to manage the risk of falls, focused on the residents of the Gerontological Residential Center of Good Living for Older Adults Amawta Wasi Samay, through the low-intensity Vivifrail program, with a combination of strength, endurance, balance and gait. Improving their functional capacity and independence in activities of daily living (ADLs) and a decrease in the risk of falls in this population (Izquierdo, 2017).

Methods

This development project is focused on the prevention of the risk of falls in older adults, through a multicomponent exercise program of Vivifrail used as a strategy to promote health and quality of life, where balance, strength and gait are combined, thus improving functional capacity and activities of daily living (ADL). The study has a non-experimental descriptive methodology, a quantitative cross-sectional approach. During the research, a program of upper and lower body physiotherapeutic exercises was developed for 20 older adults, of which 6 are women and 14 men, aged 65 to 95 years, who belong to the Amawta Wasi Samay Residential Gerontological Center in the city of Guaranda – Province of Bolívar, taking into account the inclusion criteria in which users ≥ to 65 years of age and who are at risk were included of falls.

Through a file for the collection of information from the participants, the inclusive and exclusive data of the residents was determined, as well as the respective informed consent where it was established that participation will be voluntary and will be subjected to an investigation, the tests have no risk or side effects, understanding that no type of monetary contribution will be requested or delivered to carry out the activities and consents that the results are of usefulness for study.

At the beginning of the research, the Tinetti Test was applied, since it is the tool used to assess the balance and gait of the elderly, which measures the level of risk of falls. The time determined for the stopover is 8-10 minutes. The evaluator must walk behind the Older Adult, where he or she will be asked to answer the questions of the gait and balance subscale. To answer the subscale, the evaluator must stand next to the Older Adult (in front and to the right).

The maximum score of the balance subscale is 16 and for walking 12, the sum of the two scores will determine the risk of falls, the higher the score the lower the risk of falls. Reflected that at < 19 High risk of falls and 19-24 Risk of falls. The total results of the subscale will be reflected when the Older Adult is seated, taking into account that the higher the score, the better the

functioning.

For the statistical analysis, the SPSS version 29.0 program was used, expressing the results in tables, Wilcoxon's test was also applied to compare the results of the mean between the pre and post test, resulting in a level of significance less than $p<0.005$, accepting the alternative hypothesis and rejecting the null hypothesis.

This project has the approval of the Bioethics Committee for Research in Human Beings of the Faculty of Health Sciences of the Technical University of Ambato, with the code UTA-UTP-FCS-2022-0329, the respective methodology and informed consent were carried out.

Results

Sociodemographic Information.

The population subject to study is made up of 20 older adults, of which 6 were women corresponding to 75% and 14 men corresponding to 25%.

Board 1. Older Adult Sex.

Sex	Frequency	Percentage (%)
Women	6	30
Men	14	70
Total	20	100

The age of the participants is distributed in age ranges, which vary from 65 to 94 years of age, from 65-74 years of age there are 5 A.M., which represent 25%, from 75-84 years of age, 11 A.M., which represent 55%, and from 85-94 years of age, 4 A.M., which represent 20%.

Board 2. Age of older adults.

Age	Frequency	Percentage (%)
65-74	5	25.0
75-84	11	55.0
85-94	4	20.0
Total	20	100.0

Fall Risk Assessment

To assess the risk of falls, an initial evaluation was carried out with the Tinetti Test, with the result that <19 points present a high risk of falls, 19 – 24 points present a risk of falls and >24 have a low risk of falls. At the initial assessment: 70% had a high risk of falls corresponding to 14 A.M and 30% presented a risk of falls corresponding to 6 A.M. In the final assessment: 15% presented a high risk of falls corresponding to 3 A.M., 50% presented a risk of falls corresponding to 10 A.M and 35% presented a low risk of falls corresponding to 7 A.M.

Board 3. Assessment of the risk of falls.

Risk of falls	Initial assessment	Percentage (%)	Final Assessment	Percentage (%)
High risk of	14	70	3	15

falls				
Risk of falls	6	30	10	50
Low risk of falls	0	0	7	35
Total	20	100	20	100

Wilcoxon Sign Range Test

Ranges				
		N	Average Range	Sum of ranks
FINAL FALL RISK - INITIAL FALL RISK	Negative Ranges	0a	.00	.00
	Positive Ranges	11b	6.00	66.00
	Draws	9c		
	Total	20		
a. FINAL FALL RISK < INITIAL FALL RISK				
b. FINAL FALL RISK > INITIAL FALL RISK				
c. FINAL FALL RISK = INITIAL FALL RISK				

Test statisticians	
	FINAL FALL RISK - INITIAL FALL RISK
Z	-3.035b
Asymptotic sig. (bilateral)	.002
to. Wilcoxon Sign Range Test	
b. It is based on negative ranges.	

Wilcoxon Test for Related Samples		
P-value= 0.002	<	Confidence level α =0.05(95%)

Null hypothesis(H0):
Does the Vivifrail upper and lower body physiotherapy exercise program not decrease the risk of falls in older adults?

Investigator's hypothesis (H1):
Does the Vivifrail upper and lower body physiotherapy program decrease the risk of falls in older adults?

Conclusion:
Since p-value 0.002, which is less than 0.05 (95%) confidence level, the null hypothesis is rejected and the researcher's hypothesis is accepted, so it can be inferred that the Vivifrail upper and lower body physiotherapy exercise program decreases the risk of falls in older adults

Discussion

The present research was carried out in older adults of the Amawta Wasi Samay Residential Gerontological Center located in the city of Guaranda, a program of upper body physiotherapeutic exercises was carried out in Vivifrail lower body to improve the risk of falls to 20 older adults of which 14 were men and 6 women with an age range of 65 to 94 years. The Vivifrail exercise program consists of low-intensity exercises, with a combination of strength, resistance, balance and gait exercises, it was performed for 12 weeks with a frequency of 2 times a week and a duration of 45 minutes per older adult (Casas-Herrero et al., 2019).

The fall risk index in this population was obtained through an initial and final assessment at 20 A.M with the Tinetti Test, with the initial result that 70% (14 A.M) presented a high risk of falls and 30% (6 A.M) presented a risk of falls. After the final assessment, an improvement in the risk of falls was obtained, where 15% (3 A.M.) presented a high risk of falls, 50% (10 A.M) presented a risk of falls and 35% (7 A.M) presented a low risk of falls, where it was established that the Vivifrail program improves the risk of falls in older adults.

Recent studies have shown that by applying Vivifrail physiotherapeutic exercises in older adults they improve the risk of falls, as mentioned in a study carried out at the Hospital of Querétano a population of 26 people, of which 9 were men represented by 34.1% and 17 women corresponding to 65.3%, with an age range of 65-83 years old. where the Vivifrail multicomponent training program for balance and gait was applied, carried out for 12 weeks, with a frequency of 2 days per week, after a pre- and post-test evaluation, complying with the inclusion and exclusion criteria, with a predominance of an improvement in balance and gait, greatly improving the prevalence of the risk of falls (Rico Gallego et al., 2020).

Conclusions

The Vivifrail upper and lower body physiotherapeutic exercise program applied at the Amaw Wasi Samay residential gerontological center in the city of Guaranda, province of Bolívar, Ecuador, had a great impact on the applied population, in which 16 men and 4 women participated, with an initial evaluation of the Tinetii Test for balance and gait. The risk of falls in this age group was assessed.

At the beginning of the balance and gait assessment, it was evident that 70% of older adults had a high risk of falls and after the application of the multicomponent strength and balance program Vivifrail during the 12 weeks, an improvement in the risk of falls could be observed, with a predominance of 15% of high risk of falls in this population.

Contribution of Each Author in the Manuscript:

	% contribution from each author.			
Task	**A1**	**A2**	**A3**	**A4**
A. Theoretical, conceptual foundations and problematization:	35%	20%	25%	20
B. Data research and statistical analysis:	35%	25%	20%	20%
C. Preparation of figures and tables:	35%	20%	25%	20%
D. Writing and proofreading:	35%	25%	20%	20%
E. Selection of bibliographic references:	35%	20%	25%	20
F. Other (please indicate)	-	-	-	-

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