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The Impact of Physiotherapy Interventions on the Elderly Population with Mental Health Conditions at Chainama Hills College Hospital in Zambia. A Pre-Post Single Sample Study Design

Bibi Mwanatambwe Phiri[1,2*], Martha Banda Chalwe[2], Margaret Mweshi[2], Loveness Anila Nkhata[2]

[1]Department of Physiotherapy, Chainama Hills Hospital, Lusaka Zambia,
[2]School of Health Sciences, Department of Physiotherapy, University of Zambia, Lusaka, Zambia
Email: *bibianphiri89@gmail.com

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Abstract

Background: Physical functional decline is common among elderly individuals with mental disorders, worsening their symptoms. Physiotherapy interventions have shown some evidence in improving physical function and mental health outcomes in this population. This study aimed to assess the impact of physiotherapy interventions on the elderly with mental health conditions at Chainama Hills College Hospital in Zambia. **Methods:** A pre-post single sample design was used to track patient progress over six weeks, with 10 physiotherapy sessions. The study population (N = 30) comprised of all elderly individuals with mental health conditions, encompassing both men and women, who were hospitalized during the research period. The Katz Index of Activities of Daily Living and the six-minute walk test were evaluated before and after the intervention. The IBM SPSS version 26 was used to analyze data and results were presented as mean ± SD with a 95% confidence interval. The variables were described in terms of their mean, SD, and range. A significance level of 0.05 was used for a paired T-test to detect changes and multiple logistic regression was used to identify factors associated with mental health. **Results:** Following the intervention, the percentage of participants achieving full function and independence increased significantly to 96.7% from the initial 73.3%, supported by a 95% CI = [0.82 - 0.99]. There was also a notable decrease in the proportion of individuals experiencing moderate impairment, dropping from 26.7% to just 3.3%, with a corresponding 95% CI = [0.00 - 0.17]. **Conclusion:** The findings derived from this study illustrate an

enhancement in the aspects of participants' overall health and functional condition, including blood pressure, heart rate, and respiratory rate. Consequently, physiotherapy exercises can be employed as a tactic to ameliorate the functional status and physical well-being of older individuals afflicted with mental disorders in Zambia.

Keywords

Elderly, Mental Health, Conditions, Physiotherapy, Exercise

1. Background

The process of aging is a multifaceted phenomenon that commences at birth and culminates in death, typically manifesting in the fifth decade of life with variations among individuals [1] [2]. Genetic predisposition, dietary patterns, environmental factors, and personal lifestyle choices collectively play a role in the progressive decline of organ systems. In older adults with mental health conditions, there is often a deterioration in physical capabilities, exacerbating their mental health symptoms and overall quality of life [3]. Disorders such as dementia, depression, and anxiety can significantly impact this decline. According to the World Health Organization, mental illness is characterized by an inability to perform daily tasks, manage stress, maintain employment, or contribute to society [4]. The preservation of mental well-being is essential for overall health, and global recognition of the significance of addressing mental health issues is widespread.

The research conducted in Sub-Saharan Africa, specifically in South Africa and Zambia, brought attention to the increasing occurrence (14.3%) of mental health disorders, particularly in severe instances associated with the region's limited socio-economic conditions [3]. Mental health disorders are believed to contribute to 21% of the global disease burden in developing and newly industrialized countries, a figure that escalated to around 40% in 2020 [5]. Another research in New Delhi, India [6], found that depression alone affects 400 million people worldwide, while a study in Mexico in 2014 indicated a 21% prevalence of mental illness among individuals aged 60 - 69 years for both genders. In Zambia, the proportion of elderly individuals in the overall population currently stands at 4.7%. However, future projections suggest a significant rise in the elderly population, with estimates indicating that it will reach 1,452,706 by the year 2050. This represents a substantial increase from the 292,178 elderly individuals recorded in 2004 [7]. Additionally, research suggests that around 30% of this aging demographic in Zambia may face mental health challenges such as depression, bipolar mood disorder, schizophrenia, dementia, and other conditions [8].

Unfortunately, mental health issues in the elderly can lead to a decline in physical abilities, exacerbating their mental health symptoms [9]. Cognitive im-

pairments such as dementia can hinder cognitive function, making it challenging for elderly individuals to follow instructions or remember exercise routines [10]. Moreover, physical limitations resulting from other health conditions like arthritis, heart disease, or mobility issues can restrict their ability to participate in physical activities [11]. Side effects of medications, such as fatigue or weight gain, may also discourage physical activity [12]. Lack of motivation due to conditions like depression and anxiety can further impede their willingness to engage in physical exercise. Safety concerns arise as impulsive behaviour or impaired judgment may put them at risk of injury during physical activities [13]. Additionally, societal stigma, limited transportation options, lack of safe outdoor spaces, and inadequate fitness facilities can all contribute to the difficulty older adults with mental illnesses face in participating in physical activities [14]. Engaging elderly individuals with mental illness in regular physical activity can significantly impact their mental health and overall well-being [15].

Physiotherapy plays a crucial role in improving physical function, mobility, and overall well-being, which in turn benefits mental health [16]. Studies have shown that physiotherapy is effective for older adults with mental disorders, with interventions having the potential to enhance both physical and mental health outcomes in this demographic [15] [16]. This is due to the ability of physiotherapists to develop personalized exercise programs, provide education on proper body mechanics, and offer support to elderly patients with mental disorders during the rehabilitation process [17]. Physiotherapy, is a healthcare profession dedicated to the prevention and treatment of conditions that might restrict an individual's movement capabilities [18]. It emphasizes the various body systems involved in the movement, such as muscles, joints, the nervous system, the circulatory system, and the respiratory system. Our study aimed to assess the effect of physiotherapy interventions on elderly individuals with mental health disorders at Chainama Hills College Hospital in Lusaka, Zambia. This research was conducted with the goal of enhancing the knowledge regarding the effects of physiotherapy interventions on physical function and quality of life health outcomes in elderly patients with mental disorders in Zambia. The findings were also anticipated to influence the design of physiotherapy programs and services tailored to this specific population in the country. Furthermore, the results were expected to offer evidence supporting more of the incorporation of physiotherapy services into mental health care for elderly patients in Zambia, thereby helping to address obstacles and encouraging physical activity to enhance their overall well-being.

2. Materials and Methods

***Study Design*:** Our research utilized a pre-post-test single-sample design, which was chosen based on the methodologies employed in similar research studies [19]. This design proved to be beneficial in recognizing overall trends and simplifying the testing process by minimizing the necessary time and resources. Ad-

ditionally, it facilitated a thorough evaluation of the impacts and benefits of the intervention on the study participants through pre- and post-intervention assessments. Over a span of 6 weeks, participants were enlisted and closely supervised, participating in 10 physiotherapy sessions from the commencement to the conclusion of the study. The subsequent results of the program were then recorded. Each exercise session lasted 40 - 45 minutes at around 50% - 55% of the maximal warm-up and cool-down component [20], with a 2-week follow-up post-treatment to determine the sustained effects of the physiotherapy care program.

Study Setting: The research was carried out in the Department of Physiotherapy at Chainama Hills College Hospital (CHCH) in Zambia. This hospital plays a crucial role as the primary national referral centre for psychiatric care in Zambia, offering a wide range of treatment options for individuals with psychiatric disorders. In terms of size, CHCH is the third largest hospital and medical training facility in Lusaka, following the University Teaching Hospital (UTH) and Levy Mwanawasa University Teaching Hospital (LMUTH), and it has a total of approximately 210 beds available for patients. Being the only specialized psychiatry referral hospital in the country, CHCH also provides training programs for general clinical officers, psychiatrists, and psychiatric registered nurses. The selection of this study site was based on its unique position as the national referral centre for psychiatry in Zambia, as well as its diverse treatment modalities for effectively managing psychiatric conditions.

Participants, Sample Size and Sampling Methods: The research sample consisted of elderly patients diagnosed with mental health disorders, encompassing both male and female individuals, who were undergoing treatment at CHCH during the entire duration of the study. Data obtained from CHCH in 2021 indicated that an average of 20 to 40 elderly individuals were admitted to the institution annually. Due to the relatively small number of patients in the wards, which was below 100, a census sampling method was deemed appropriate for the investigation. Consequently, a total of 30 eligible elderly individuals with mental health conditions were chosen to participate in the study. During the selection process, we specifically included older individuals with mild symptoms of anxiety and depression, who were capable of communicating and engaging in the prescribed exercise routine. Moreover, older individuals with mental health disorders were included if their guardian provided proxy informed consent on their behalf. Conversely, individuals with severe cardiovascular, respiratory, or endocrine disorders, significant medical or psychological conditions, recent surgical procedures, or chronic or acute pain were excluded from the study.

Intervention Description: The exercise plan adhered to the guidelines established by the American College of Sport Medicine [21]. These guidelines stipulate that maintaining fitness requires three weekly exercise sessions on alternate days. Each session lasted 40 to 45 minutes, with the intensity set at around 50% - 55% of the maximum warm-up and cool-down component [20]. The physiotherapy regimen included a warm-up phase lasting 5 to 10 minutes, involving activities like walking or jogging in place; a 25-minute session of physiotherapy activ-

ities, incorporating art therapy (such as games, coloring, singing, dancing, and conversations) and exercise routines like stationary cycling, mat exercises, sit-ups, and bench exercises that included standing up and sitting down while holding a ball; and a 5-minute cooling down phase with stretching exercises and breathing techniques to induce relaxation in patients (Table 1).

Data Collection and Outcome Measurements: The participants' preliminary information, encompassing demographic characteristics, clinical profile, and initial functional status, was collected using a data capture form. This baseline information was obtained through assessment and review of medical records as needed. Subsequently, participant variables and baseline parameters such as Blood Pressure (BP), Pulse Rate (PR), Respiratory Rate (RR), weight (Kgs), muscle power, balance and coordination, as well as quality of life (QoL) and functional status, were documented at the beginning of the program. The same measurements were repeated after six weeks at the conclusion of the program using appropriate measuring tools. The assessments and measurements were conducted by authors (BMP) and (LAN). The Katz Index of Activities of Daily Living (ADL) was utilized as the most suitable instrument for evaluating functional status, assessing the individual's ability to independently perform daily activities. It assists in identifying challenges in activities of daily living and planning appropriate care [22]. The Index evaluates the adequacy of performance in six functions: Bathing, dressing, toileting, transferring, continence, and feeding. Participants scored yes/no for independence in each function. A score of 6 indicates full function, 4 indicates moderate impairment, and 2 or less indicates severe functional impairment. Additionally, the six-minute walk test (6MWT) was conducted following the guidelines of the American College of Sports Medicine [21]. The test took place in a quiet environment with designated turning points. Participants were instructed to walk briskly for 6 minutes without running. Standardized verbal cues and encouragement were provided during the test. Blood pressure (BP), heart rate (HR), and respiratory rate (RR) were measured before and after the test.

Table 1. Physiotherapy intervention activities.

Program	Duration	Type of activity
Warm up	5 - 10 min	• Performing 2 meters walking and jogging • Stationary walking or jogging.
Physiotherapy activities	30 min	• Recreational activities like games, colouring, singing, and dancing. • Physical exercises like stationary cycling, mat exercises, bench exercises, and ball games such as sitting on a bench and holding the ball. • Functional activities like dressing, combing hair, conversation games
Cool down	5 min	• Stretching exercises • Deep breathing techniques

Data Analysis: The data analysis involved considering the following variables. The primary outcomes focused on physical well-being and functional status, while the secondary outcomes included participants' weight (in kilograms), muscle power, balance and coordination, as well as quality of life (QoL). The IBM SPSS version 26 software was utilized to perform the statistical analysis, and the obtained statistical results were presented through descriptive statistics, including percentages and 95% confidence intervals. To assess whether there was a notable disparity in activities of daily living (ADL) before and after the 6-week physiotherapy program, the paired t-test was employed, with a significance level of 5%. Furthermore, multiple logistic regressions were conducted to account for confounding variables and identify the factors linked to elderly individuals with mental illness.

Ethical Considerations: The research was approved by the UNZA School of Health Science Research Ethic Committee (Protocol ID: 202112030002), The National Health Research Authority (NHRA: NHRAR-R-1034/10/2023), and Chainama Hills College Hospital Management. Participants and their guardians were briefed on the study's purpose and benefits and consent was either obtained directly from the participants or through informed proxy consent from their guardians.

3. Results

3.1. Participant's Demographic Descriptions

The study involved 30 participants. Table 2 shows that the most common age group was 50 - 55 years (43.3%), followed by 56 - 60 years (36.7%). Most participants were female (53.3%) and unemployed. The majority were single (76.7%) and reported anxiety disorders as the most prevalent mental illness.

3.2. Impact of Physiotherapy Intervention on Participant's Physical Well-Being

Before the intervention was implemented, 70% of the participants were observed to have a high prevalence of hypertension. However, after the study, this percentage decreased to 43.3%, indicating an improvement in cardiovascular health. Following the intervention, 66.7% of the subjects showed enhanced respiratory rates, compared to 33.3% before the study. Additionally, there was a significant increase in the number of participants with a normal respiratory rate, reaching 66.7%. The data in Table 3 also showed improvements in balance, gait, and standing. These results demonstrate the effectiveness of the intervention in not only improving hypertension and respiratory rates but also in enhancing other important health indicators such as musculoskeletal health and overall physical well-being. The decrease in hypertension prevalence and the increase in participants with improved respiratory rates highlight the positive impact of the intervention on cardiovascular health. Moreover, the significant improvements in balance, gait, and standing suggest that the intervention also positively affected musculoskeletal health and overall physical well-being.

Table 2. Participants' demographic descriptions (N = 30).

Participants' demographic descriptions		N	(%)
Age in years	50 - 55	13	43.3%
	56 - 60	11	36.7%
	61 and above	6	20%
Gender	Male	14	46.7%
	Female	16	53.3%
Occupational background	Unemployed	30	100%
	Employed		-
	Self-employed	-	-
Marital status	Married	3	10%
	Unmarried	23	76.7%
	Divorced	4	13.3%
	Widowed	-	-
Type of mental illness	Depression	8	26.7%
	Bipolar mania	8	26.7%
	Anxiety disorders	14	46.7%
	Others	-	-
Comorbidities	Hypertension	5	16.7%
	Diabetes	-	-
	Cancer	4	13.3%
	Others	21	70%

Table 3. Impact of physiotherapy on participant's physical well-being (N = 30).

Impact of Physiotherapy on participant's physical well-being		Before N (%)	After N (%)
Blood pressure	Normal 90/60 mm/Hg - 120/80 mm/Hg	9 (30)	17 (56.7)
	High ≤ 140/90 mm/Hg	21 (70)	13 (43.3)
	Low ≥ 90/60 mm/Hg	1 (3.3)	-
Pulse rate	Normal 60 - 100 bpm	20 (66.7)	16 (53.3)
	High ≤ 120 bpm	10 (33.3)	13 (43.3)
	Low ≥ 90 bpm	-	1 (3.3)
Respiratory rate	Normal 12 - 18 bpm	16 (53.3)	20 (66.7)
	High ≤ 25 bpm	10 (33.3)	3 (30)
	Low ≥ 17 bpm	4 (13.3)	7 (23.3)
Balance/ coordination	Good	25 (83.3)	27 (90)
	Fair	4 (13.3)	3 (10)
	Poor	1 (3.3)	0
Gait	Good	25 (83.3)	27 (90)
	Fair	4 (13.3)	3 (10)
	Poor	1 (3.3)	0
Standing/sitting	Independent	24 (80)	27 (90)
	Assisted	6 (20)	3 (10)
	Unable	0	0

3.3. Impact of Physiotherapy Intervention on Participant's Functional Status (Katz ADL Tool)

The data presented in Table 4 clearly demonstrates a significant improvement in the self-sufficiency and capability of the participants after the intervention. The percentage of individuals who exhibited full functionality increased from 73.3% before the intervention to an impressive 96.7% after the intervention. This increase was found to be statistically significant with a 95% confidence interval ranging from 0.82 to 0.99. Additionally, the percentage of individuals with moderate impairment decreased substantially from 26.7% before the intervention to a mere 3.3% after the intervention. This decrease was also found to be statistically significant, with a 95% confidence interval ranging from 0.00 to 0.17. These findings were further supported by a two-tailed paired samples t-test, which revealed a p-value of less than 0.001. This indicates that the improvement in functional status following the intervention was highly significant. Overall, the results presented in Table 4 provide strong evidence of the effectiveness of the intervention in enhancing the participants' functional status. The substantial increase in the percentage of individuals with full functionality and the significant decrease in the percentage of individuals with moderate impairment highlight the positive impact of the intervention on the participants' self-sufficiency and capability.

4. Discussion

The positive effects of regular physical exercise on the well-being of older individuals have been well-documented. Different levels of physical activity have been shown to yield specific benefits for improving the symptoms of elderly individuals with mental health conditions [23]. Research suggests that even low-intensity and moderate to high-intensity physical activities can effectively alleviate symptoms in the elderly population and reduce the likelihood of depression among older adults [24]. In our study, we focused on the impact of physiotherapy interventions on elderly individuals with mental health conditions at Chainama Hills College Hospital (CHCH) in Lusaka, Zambia. Specifically, we examined how these interventions influenced the physical well-being, functional abilities, and overall quality of life of the elderly population.

The results of this study suggest that the intervention had a beneficial influence on the participants' well-being and functional status. The effectiveness of

Table 4. Katz ADL tool - impact of Physiotherapy on participant's functional status (N = 30).

Katz ADL Score	Before (%)	After (%)	95% CI	P-value
Full function (independent) = 5- 6 points	22 (73.3)	29 (96.7)	[0.82 - 0.99]	
Moderate impairment = 3 - 4 points	8 (26.7)	1 (3.3)	[0.00 - 0.17]	P < 0.001
Severe impairment = 1 - 2 points	-	-		
Dependent = 0	-	-		

the intervention is demonstrated not only by improvements in hypertension and respiratory rates but also by enhancements in other key health indicators such as musculoskeletal health and overall physical well-being. The reduction in hypertension prevalence and the rise in participants with better respiratory rates emphasize the positive impact of the intervention on cardiovascular health. Additionally, the notable enhancements in balance, gait, and standing imply that the intervention also had a positive effect on musculoskeletal health and overall physical well-being. In summation, the findings of the research reveal that the intervention had a holistic and positive impact on the health of the participants, as shown by the data presented in **Table 3**. These results highlight the effectiveness of the intervention in promoting overall well-being and quality of life.

The data presented in **Table 2** also provides support for the notable improvement observed in various areas during the pre and post-intervention periods. Specifically, the results demonstrate an increase in the proportion of participants who exhibited normal blood pressure, pulse, and respiratory rates after the intervention. This suggests that the intervention had a positive impact on these physiological parameters. These findings align with a study conducted in the United Kingdom [13], where different exercises were used as an intervention and improvements in blood pressure parameters among the elderly were observed. This indicates that exercise can play a beneficial role in regulating blood pressure [24] [25]. Additionally, Aslantekin-Özçoban and others [25] conducted a randomized controlled trial in Turkey, which further supports these findings. The primary objective of their study was to investigate the influence of exercises on the therapeutic response in individuals with depression. The results indicated that engaging in exercise led to a decrease in anxiety and depression levels for both the treatment and control groups. Furthermore, the group that was administered a combination of antidepressant medication and engaged in exercise demonstrated significant improvements in heart rate and respiratory rate in comparison to the control group. These results strongly indicate that exercise can have positive effects on both mental and physical well-being [26]. In general, the conclusions drawn from this study, combined with the corroborating evidence from previous research, suggest that exercise interventions can result in enhancements in well-being, functional status, and physiological parameters such as blood pressure, pulse, and respiratory rate [26] [27]. These findings emphasize the potential advantages of integrating exercise into healthcare interventions and endorse the promotion of exercise as a means of enhancing overall health and well-being.

The enhancements in balance, gait, and standing observed in the participants following the intervention indicate that the exercise regimen had a beneficial effect on their physical capabilities. This is particularly significant for individuals with mental disorders, as physical well-being and functional capacity are closely associated with overall health and life quality [28]. The results of this research support the notion that integrating exercise into treatment strategies for mental disorders can result in substantial enhancements in both physical and mental

well-being [16]. The study conducted by Sayadi and others [29] further reinforces the advantages of exercise for mental health, demonstrating that walking exercise and progressive muscle relaxation can both effectively reduce mental stress. Although this study concentrated solely on exercise interventions, the outcomes are consistent with prior studies suggesting that physical activity can positively influence mental health outcomes [16] [29]. In general, the findings of this study underscore the importance of integrating exercise into treatment plans for individuals with mental disorders [16]. By enhancing physical capabilities and functional status, exercise can assist individuals in better managing their symptoms and improving their overall life quality [30] [31]. Generally, the findings of this study emphasize the importance of integrating exercise into treatment plans for individuals with mental disorders. By enhancing physical capabilities and functional status, exercise can help individuals better manage their symptoms and improve their overall quality of life. However, further research is needed to better understand the specific mechanisms by which exercise impacts mental health and to develop tailored exercise programs for individuals with different types of mental disorders.

5. Limitations

The present study faced constraints primarily due to the specific characteristics of the illness being investigated and the restricted pool of patients accessible within the hospital wards. These limitations hindered the generalizability of the findings, compromised the sample size, and potentially influenced the study's methodology and data collection. Future research should aim to overcome these constraints to obtain more robust and representative results. Additionally, it is crucial to highlight that the research was carried out solely at Chainama Hills Hospital, with data collected based entirely on participant observations. As a result, it is essential to proceed with caution when applying the findings of this study to other contexts. While comparable scenarios may occur in different environments, the unique conditions and attributes of each setting could lead to varying outcomes. Lastly, it is important to emphasize that the study was executed with limited financial resources, as no external funding was obtained. This financial restriction may have influenced the extent and resources accessible for the research.

6. Conclusion

The study findings indicate a positive change in the participants' overall well-being and ability to perform daily activities. The results of the six-minute walk test (6MWT) revealed a significant improvement in the participants' blood pressure (BP), heart rate (HR), and respiratory rate (RR). As a result, physiotherapy exercises can be considered an effective approach to enhance the quality of life. Therefore, it is recommended to incorporate these exercises to improve the functional status and physical well-being of elderly individuals with mental

health conditions. This current study builds upon previous research that has already confirmed the beneficial effects of physiotherapy interventions on physical function and mental health outcomes in elderly individuals with mental disorders. By conducting empirical research in Zambia, this study provides additional evidence to support the integration of physiotherapy services into mental health care for elderly patients in this specific context.

What Is Already Known on This Subject Matter

- ✓ Existing knowledge on this topic indicates that elderly individuals with mental disorders often experience a decline in physical function, which can exacerbate their mental health symptoms and diminish their overall quality of life.
- ✓ However, mental health care providers can effectively address the physical and mental health needs of these patients by incorporating physiotherapy interventions that aim to improve physical function and mobility.

What This Study Contributes on the Subject

- ✓ This study adds to the existing body of knowledge by providing empirical support for the effectiveness of physiotherapy interventions in improving outcomes for elderly individuals with mental disorders.
- ✓ By highlighting the positive effects of these interventions on physical function and mental health outcomes, the study emphasizes the importance of addressing both aspects of health in the care of elderly individuals with mental disorders.
- ✓ Furthermore, the study's research conducted in Zambia highlights the relevance and applicability of these interventions within a specific cultural and socio-economic context.

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Competing Interest

The authors assert that their financial and interpersonal relationships did not inadvertently impact their creation of this article.

Author's Contribution

All contributors made significant contributions to the completion of this project. The initial draft of the article was prepared by B.M.P and L.A.N. The conceptualization and planning of our study were undertaken by M.B.C and M.M.M. The final version of the text underwent a thorough review and received the approval

of all authors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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