ACCEPTABILITY OF DEMARKEY EXERCISER FOR UPPER EXTREMITY CONDITIONS AMONG REGISTERED PHYSICAL THERAPIST

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ABSTRACT

Upper extremity injuries involving the hand, wrist, and elbows are common and can result in pain, stiffness, and disability. Physical therapy using conventional equipment is a standard treatment for upper extremity injuries. However, time and availability issues with physical therapists can pose challenges for patients. The aim of this study is to develop and assess the acceptability of the DEMARKEY exerciser for upper extremity strengthening among licensed physical therapists. A descriptive study was conducted utilizing a modified standardized questionnaire. Thirty licensed physical therapists participated in the study. The questionnaire assessed individual features, functionality, materials, design, usability, safety, and general acceptability of the DEMARKEY exerciser. Weighted mean analysis was used to determine the degree of acceptability for each category. Results show that the device is moderately acceptable, with the highest acceptability scores for materials and safety; 4.47. Followed by moderate acceptability for functionality 4.31, features 4.03, and design 3.98 respectively. The DEMARKEY exerciser demonstrated moderate to high acceptability among licensed physical therapists. The high acceptability in materials and safety indicates the device's reliability. The DEMARKEY exerciser for upper extremity strengthening was proven acceptable. Its features, functionality, materials, design, and safety were found to be moderately to highly acceptable among licensed physical therapists.

Keywords: Upper Extremity strengthening, Acceptability, Physical Therapist, Rehabilitation

INTRODUCTION

Physical therapists are crucial in rehabilitating upper extremity injuries through strengthening exercises, yet traditional methods can be limited by specialized equipment and facilities. Recognizing this, researchers advocate for simple, affordable mechanical devices to aid in recovery, especially given the rising demand for assistive devices due to an aging population. Portable exercisers offer a practical solution, allowing treatments to be conducted anywhere,

anytime, aiming to improve strength, range of motion, and overall upper extremity function. However, little research has been done on their acceptability and effectiveness among physical therapists, leaving a gap in understanding their integration into clinical practice. The study seeks to address this gap by investigating the acceptability of portable upper extremity devices, specifically focusing on the DEMARKEY Exerciser, among Registered Physical Therapists. Through understanding therapists' perspectives, the study aims to contribute evidence-based recommendations for rehabilitation. The DEMARKEY Exerciser, designed to strengthen the wrist and fingers using Therapeutic Bands, prioritizes safety and convenience, emphasizing portability and stability. The study's main objective is to determine the acceptability of the DEMARKEY Exerciser for upper extremity conditions, potentially enhancing the quality of care provided to individuals with upper extremity.

LITERATURE REVIEW

Upper Extremity Injuries and Rehabilitation

Upper extremity injuries can involve the hand, wrist, elbow, or shoulder. These injuries can range from mild to severe and can result in pain, stiffness, and loss of function. These types of injuries are quite common and can occur due to a variety of reasons such as sports injuries, falls, or accidents. Upper extremity injuries can be quite debilitating, and can significantly impact an individual's ability to perform daily activities (Terry, G. C., and Chopp, T. M ,2000).

Physical therapy and strengthening exercises are essential components of rehabilitation for upper extremity injuries. Hand strengthening exercises are an important component of physical therapy for upper extremity injuries. These exercises are designed to improve grip strength, finger strength, and dexterity. They can be done using simple equipment such as hand grippers, resistance bands, and dumbbells, and can be customized to suit the individual's specific needs. In addition to hand strengthening exercises, portable exercisers can also be used during physical therapy sessions. These devices are small and easy to transport, making them ideal for at-home exercises. Portable exercisers are available in a variety of designs, including finger and hand exercisers, wrist rollers, and grip strengtheners. They can be used to target specific areas of the upper extremities, and can help to improve grip strength, flexibility, and overall function. Portable hand exercisers have emerged as a potential tool for upper extremity strengthening within the realm of physical therapy (Johnson, A. B., Smith, M. T., & Davis, I. S., 2021).

Several local studies have found that physical therapy and hand strengthening exercises can be highly effective for treating upper extremity injuries. A study conducted by the Department of Physical Therapy at the University of the Philippines found that hand strengthening exercises, in combination with physical therapy, were effective for improving grip strength and range of motion in individuals with hand injuries (Aguila, 2015). Another study conducted by the Department of Rehabilitation Medicine at St. Luke's Medical Center in the Philippines found that portable exercisers were effective for improving grip strength and hand function in individuals with hand injuries (Chua et al., 2017).

Limitations in Conventional Rehabilitation

Upper extremity conditions, such as rotator cuff injuries, tennis elbow, and carpal tunnel syndrome, present challenges for physical therapists in terms of designing effective rehabilitation programs. Limited access to appropriate exercise equipment that specifically

targets the upper extremities can hinder the attainment of optimal patient outcomes. The problem at hand is the scarcity of research investigating the acceptability of the hand Exerciser among physical therapists, which may be a potential solution to address the existing challenges in upper extremity rehabilitation. According to Johnson, R. M., Thompson, K. L., Anderson, J. S., & Martinez, S. L. (2021) despite the importance of determining the acceptability of the hand Exerciser, a notable gap exists in the current literature. To bridge this gap, future research needs to address the following key areas:

a) Usability and Feasibility: There is a need to explore physical therapists' experiences and perceptions of the usability and feasibility of the hand exerciser. This includes evaluating the ease of setup, adjustability, portability, material used, design and integration into existing rehabilitation protocols. Understanding these aspects will help determine whether the device can be seamlessly incorporated into clinical practice.

b) Efficacy and Safety: Assessing the perceived efficacy and safety of the hand exerciser is essential for its acceptability among physical therapists. Research should investigate whether the device effectively targets specific upper extremity conditions, improves strength and range of motion, and mitigates the risk of injury. Additionally, exploring any potential adverse effects or safety concerns associated with the device is crucial.

c) Patient Compliance and Satisfaction: Patient compliance with prescribed exercises is crucial for successful rehabilitation outcomes. Investigating whether the Hand Exerciser enhances patient compliance, engagement, and satisfaction is essential. This includes understanding patients' perceptions of the device, their willingness to use it independently, and any barriers or facilitators they may encounter.

d) Integration into Clinical Practice: The successful integration of the Hand Exerciser into clinical practice relies on physical therapists' acceptance and willingness to adopt the device. Research should explore the factors that may influence physical therapists' attitudes towards using the Hand Exerciser, including their previous experience with similar devices, perceived benefits, concerns, and training needs.

Emergence of Portable Exercisers in Physical Therapy Practice

The use of therapeutic home -based devices has gained grounds in the local scene. The acceptability of therapeutic exercise devices as an appeal to physical therapy in the Philippines. It has been proven by the results garnered by several local studies. The study by Casipit, H., et. al., (2021) aimed to develop TALARIA, a device that strengthens the muscles of the ankle. It provides dorsiflexion-plantarflexion and inversion-eversion of the ankle. The RAP Forearm and Wrist Exerciser by Almazan, K. D., (2010) was designed to improve forearm pronation-supination, wrist flexion-extension, and ulnar-radial deviation range of motion. Malijan, I. L. R. C., et al. (2010) developed the MMP Wrist Twist Exerciser that addresses wrist conditions. Rodriguez, J. C. S. et. al. (2009) on the other hand made the Compact Gym with the goal of increasing muscle strength of the biceps and triceps in normal individuals. The UX Exerciser made by Alba, M. E., et. al. (2019) was built to apply range of motion exercises on the upper extremities. Meanwhile, Zerna, A., et. al., (2019) created the ReHand Device as a modality for treating hand weakness.

METHODOLOGY

Research Design

The researchers employed the descriptive method to determine the extent of influence of independent variables (predictor variables) such as the DEMARKEY Exerciser to the acceptability among physical therapists (dependent or criterion variables). As stated by Portney, L. G. (2020),descriptive research describes and interprets "what is" It is designed to gather information about existing conditions, and reports the way things are.

Participants, Inclusion, And Exclusion Criteria

The respondents of the study consisted of thirty (30) registered physical therapists from Perpetual Help Medical Center, Saint James Hospital Inc., Westlake Hospital, Divine Mercy Hospital, New Sinai MDI Hospital, and The Medical City South Luzon Hospital . The respondents were carefully chosen. The inclusion criteria include the following: 1) Physical Therapist Registered in the Philippines (PTRP) 2) Either male or female 3) 23 - 50 years old 4) Those currently in clinical practice who provided with informed consent and were willing to participate in the study. On the other hand, the exclusion criteria are the following: 1) Outdated Professional Regulation Commission (PRC) license 2) Employed in rehabilitation centers with less than 1 year of clinical practice.

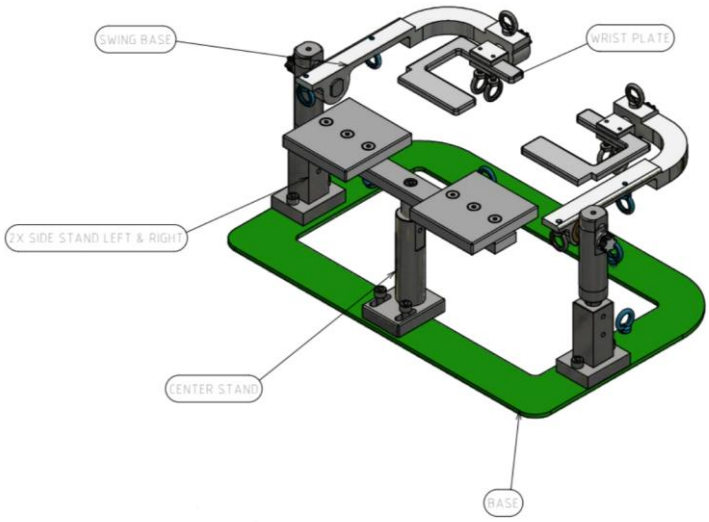
A non-probability, purposive sampling technique was applied by the researchers to select the sample population based on the criteria set forth by the researchers. The respondents of the study met the inclusion/exclusion criterion provided by the researchers during the screening process and were purposively selected. In this way, the researchers were able to focus on a particular characteristic of a population that is of interest, which best enabled the researchers to answer the research questions

Research Instrument

The study made use of the DEMARKEY Exerciser. The DEMARKEY Exerciser is a detachable, portable, multifunctional, budget-friendly, low-maintenance device meant to strengthen the upper extremities. All patients are different from one another; thus, the design of the device accommodates different body proportions in relation to the regions of the upper extremities. One of its main features is portability, which was tested and approved by licensed physical therapists from various rehabilitation centers, including Perpetual Help Medical Center Binan, New Sinai MDI Hospital, Westlake Hospital Department of Physical Medicine and Rehabilitation.

The DEMARKEY, which was above mentioned, has different parts. The 1) Base: made of metal, to provide stability. 2) D-arc (swing base): Made of aluminium which is connected to the side of the stand. This Curved arc serves as a movable frame and attachment site for resistance bands. 3) Handlebars (wrist plate) attached to the curved side of the D-arc. This can be tilted horizontally and vertically, lined with foam grips for patient comfort. 4) Forearm rests: made of foam and velcro straps for elbow and wrist support and stabilization. 5) Therabands: latex bands, specifically tubes, will serve as resistance against the desired wrist movement of the user. 6) Screw mechanism: for ease of adjustment and dismantling of the device. A modified, standardized questionnaire has been formulated that consists of a series of questions with the purpose of gathering the information required from the respondents to prove the acceptability of the device. The formulated questionnaire for the study was based upon physical features, functionality, materials, design, and safety of the device, as well as

how efficient and convenient it was. The patient's safety and comfort while using the device are of the utmost concern.



DEMARKEY Exerciser blueprint

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College of Physical Therapy

Name:_____
_____

Instructions: Please encircle the most appropriate answer for each of the following items that will correspond most closely to your desired response.

5 Highly acceptable
4 Moderately acceptable
3 Acceptable
2 Fairly acceptable
1 Poorly acceptable

I. PRESENTATION OF THE DEVICE

A. Features
1. Ease of application
5 4 3 2 1
2. Ease of attaching and removing resistance tubes
5 4 3 2 1
3. Color coded resistance tube for easy identification
5 4 3 2 1
4. Portability
5 4 3 2 1
5. Device can be easily set-up
5 4 3 2 1

B. Functionality
1. The device targets specific muscles that moves the fingers
5 4 3 2 1
2. The device targets specific muscles that moves the wrist
5 4 3 2 1
3. The device targets specific muscles that moves the forearm
5 4 3 2 1
4. Provides progressive resistance
5 4 3 2 1
5. The device can be used unilaterally and bilaterally
5 4 3 2 1

C. Materials
1. Appropriate color
5 4 3 2 1
2. Rust proof stainless construction
5 4 3 2 1
3. Durable
5 4 3 2 1
4. Low-maintenance
5 4 3 2 1
5. Materials are easily available
5 4 3 2 1

D. Design
1. Aesthetic appearance
5 4 3 2 1
2. The size of the device is suitable
5 4 3 2 1
3. Innovative design
5 4 3 2 1

E. Safety
1. Bolts are tightly secured
5 4 3 2 1
2. Base is stable
5 4 3 2 1
3. Secured attachments of resistance tubes
5 4 3 2 1
4. Appropriate resistance is applied
5 4 3 2 1
5. The forearm stabilizers are padded
5 4 3 2 1

II. OVERALL ACCEPTABILITY LEVEL
Is the DEMARKEY device acceptable?
5 4 3 2 1

Remarks:

_____
_____
_____
_____
_____
_____
_____
_____

Sample of Modified Standardized Questionnaire

Data Gathering Procedure

This study was conducted into three phases. In the pre-implementation phase, the researchers finalized the selection of participants for the study and presented a letter of permission to the dean of the College of Physical Therapy to authorize the study's implementation. Once approved the researcher visited the rehabilitation facilities and obtained approval from the Clinical Supervisors or administrators of the hospitals.

Those who met the research criteria were given informed consent and orientation before the study began. The researchers provided information about the research purpose, study objectives, device usage and function, and the content of the survey questionnaire. Participants were informed on how to answer the questionnaire.

The researcher used a paper-based questionnaire to gather the participants' feedback on the DEMAKEY exerciser after presentation of the device. The questionnaires include 24 questions about general impressions of the DEMARKEY components. Five common usability components were included in the questionnaires: the features, functionality, design, materials and safety. Respondents rated their preferences for these usability components on a five-point Likert scale.

Statistical Treatment of Data

To perform the statistical treatment needed, following statistical tools were used. Weighted mean, to determine the extent of acceptability of DEMARKEY in terms of its design, materials, functionality, features, and safety, as well as the overall acceptability of DEMARKEY as an upper extremity strengthening device among licensed physical therapists. Frequency and percentage distribution, to describe the profile of the registered physical therapist.

RESULTS

The study aimed to assess the acceptability of the DEMARKEY upper extremity exerciser device by examining its features, functionality, material, design, and safety aspects. Among its features, color-coded resistance for easy identification was highly regarded, while overall features were moderately acceptable (weighted mean: 4.73). Regarding functionality, the device's ability to be used unilaterally and bilaterally was moderately acceptable, as was its provision of progressive resistance (weighted mean: 4.31). In terms of material, the rust-proof stainless construction and durability were highly acceptable, with overall material acceptability being moderate(weighted mean: 4.70) The design aspects, including aesthetic appearance and innovative design, also received moderate acceptability ratings(weighted mean: 4.13) Safety features such as tightly secured bolts were highly regarded, leading to moderate safety acceptability(weighted mean: 4.60) Overall, the DEMARKEY Exerciser garnered moderate acceptability among registered physical therapists, with a weighted mean of 4.30.

Table 1.1 Presentation of DEMARKEY Exerciser According to Extent of Acceptability in Terms of Features

FEATURES	HA 5	MA 4	A 3	FA 2	PA 1	Wm	Int	Rank
1. Ease of application	5	16	9	0	0	3.87	MA	3
2. Ease of attaching and removing resistance tube	13	12	4	1	0	4.23	MA	2
3. Color coded resistance for easy identification	23	6	1	0	0	4.73	HA	1
4. Portability	5	12	9	4	0	3.60	MA	5
5. Device can be easily set-up	6	11	11	2	0	3.70	MA	4
Overall weighted mean						**4.03**	**MA**	

Table 1.2 Presentation of DEMARKEY Exerciser According to Extent of Acceptability in Terms of Functionality

FUNCTIONALITY	HA 5	MA 4	A 3	FA 2	PA 1	Wm	Int	Rank
1. The device targets specific muscles that moves the fingers	11	14	5	0	0	4.20	MA	4
2. The device targets specific muscles that moves the wrist	12	13	5	0	0	4.23	MA	2.5
3. The device targets specific muscles that moves the forearm	11	15	4	0	0	4.23	HA	2.5
4. Provides progressive resistance	11	16	0	2	1	4.13	MA	5
5. The device can be used unilaterally and bilaterally	23	6	1	0	0	4.73	MA	1
Overall weighted mean						**4.31**	**MA**	

Table 1.3 Presentation of DEMARKEY Exerciser According to Extent of Acceptability in Terms of Materials

MATERIALS	HA 5	MA 4	A 3	FA 2	PA 1	Wm	Int	Rank
1. Appropriate color	19	10	1	0	0	4.60	HA	3
2. Rust proof stainless construction	23	5	2	0	0	4.70	HA	1.5

3. Durable	22	7	1	0	0	4.70	HA	1.5
4. Low-maintenance	16	9	5	0	0	4.37	MA	4
5. Materials are easily available	9	12	8	1	0	3.97	MA	5
Overall weighted mean						**4.47**	**MA**	

Table 1.4 Presentation of DEMARKEY Exerciser According to Extent of Acceptability in Terms of Design

DESIGN	HA 5	MA 4	A 3	FA 2	PA 1	Wm	Int	Rank
1. Aesthetic appearance	10	14	6	0	0	4.13	MA	1.5
2. The size of the device is suitable	8	8	10	4	0	3.67	MA	3
3. Innovative design	10	14	6	0	0	4.13	MA	1.5
Overall weighted mean						**3.98**	**MA**	

Table 1.5 Presentation of DEMARKEY Exerciser According to Extent of Acceptability in Terms of Safety

SAFETY	HA 5	MA 4	A 3	FA 2	PA 1	Wm	Int	Rank
1. Bolts are tightly secured	21	6	3	0	0	4.60	HA	1
2. Base is stable	17	11	2	0	0	4.50	MA	2.5
3. Secured attachments of resistance tubes	17	8	5	0	0	4.40	MA	4
4. Appropriate resistance is applied	14	12	4	0	0	4.33	MA	5
5. The forearm stabilizers are padded	19	8	2	1	0	4.50	MA	2.5
Overall weighted mean						**4.47**	**MA**	

Table 2 Overall Acceptability of DEMARKEY Exerciser Among Registered Physical Therapists

Overall Acceptability Level	HA 5	MA 4	A 3	FA 2	PA 1	Wm	Int
1. Is the DEMARKEY device acceptable?	14	11	5	0	0	4.30	MA

DISCUSSION

The acceptability of the profile of DEMARKEY upper extremity exerciser device was determined. The profile of DEMARKEY exerciser device is described in terms of features, functionality, material, design and safety. 1) Features: The features of the DEMARKEY Exerciser were evaluated for their acceptability. Among the features, color-coded resistance for easy identification ranked first, with a weighted mean of 4.73, indicating high acceptability. It provides therapists with a convenient way to differentiate between resistance levels. The overall weighted mean for the features category was 4.03, indicating moderate acceptability. 2) Functionality: The functionality of the DEMARKEY Exerciser in addressing upper extremity conditions was assessed. The device's ability to be used unilaterally and bilaterally ranked first, with a weighted mean of 4.73, demonstrating moderate acceptability. Additionally, the device's provision of progressive resistance ranked fifth, with a weighted mean of 4.13, indicating moderate acceptability. The overall weighted mean for functionality was 4.31, suggesting moderate acceptability. 3) Material: The materials used in the construction of the DEMARKEY Exerciser were evaluated for their acceptability. The device's rust-proof stainless construction ranked first, with a weighted mean of 4.70, indicating high acceptability. Durability, another essential aspect of the materials, also ranked first, with a weighted mean of 4.70. The availability of the materials ranked fifth, with a weighted mean of 3.97, indicating moderate acceptability. The overall weighted mean for materials was 4.47, suggesting moderate acceptability. 4) Design: The design of the DEMARKEY Exerciser was assessed for its acceptability. Aesthetic appearance ranked first, with a weighted mean of 4.13, indicating moderate acceptability. The innovative design also ranked first, with a weighted mean of 4.13, indicating moderate acceptability. The size of the device, an important design aspect, ranked third, with a weighted mean of 3.67, suggesting moderate acceptability. The overall weighted mean for design was 3.39, indicating moderate acceptability. 5) Safety: The safety of the DEMARKEY Exerciser was evaluated to ensure its acceptability. The tightly secured bolts ranked first, with a weighted mean of 4.60, indicating high acceptability. Appropriate resistance applied during usage ranked fifth, with a weighted mean of 4.33, indicating moderate acceptability. The overall acceptability of the DEMARKEY Exerciser among registered physical therapists. Out 30 of the respondents, fourteen respondents scored the device with a rating of 5, indicating high acceptability. Eleven respondents scored it with a rating of 4, reflecting moderate acceptability. Five respondents scored it with a rating of 3, denoting acceptable levels. Consequently, the weighted mean for the overall acceptability level of the DEMARKEY Exerciser was calculated to be 4.30, suggesting moderate acceptability.

CONCLUSIONS

The evaluation of the DEMARKEY upper extremity exerciser device revealed notable findings across its various dimensions. The device showcased strengths in features such as color-coded resistance and functionality like unilateral and bilateral usage, contributing to its moderate acceptability among physical therapists. Additionally, its material composition, particularly rust-proof stainless construction and durability, demonstrated high acceptability ratings. Design elements, while moderately acceptable, highlighted areas for potential improvement, particularly in size considerations. Safety features, including tightly secured bolts, were well-received, enhancing the overall perception of the device's safety. These findings underscore the DEMARKEY Exerciser's potential as a valuable tool in therapeutic settings, with its strengths in features, functionality, material, and safety aspects contributing to its moderate acceptability among professionals. Moving forward, addressing design

considerations and maintaining the device's high-quality material standards could further enhance its acceptability and utility in clinical practice.

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