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Research Paper

Tele-rehabilitation As an Adjunct Service for Geri Care: Reaching the Unreached

Medical Science

KEYWORDS : Elderly, Occupational Therapy, Tele-rehabilitation, Telemedicine, Balance, fall, Home care

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ABSTRACT

Objective: Tele-rehabilitation has been rapidly developing from single-case to controlled trials with larger samples in different Populations. Still reports on using this potentially promising cost effective technology with Geriatrics fall Care are limited. Hence, this study assessed feasibility and clients' acceptance of Tele-rehabilitation as a Home Based Geri Care Service and also to estimate the magnitude of its clinical impact.

Methodology: 22 clients were recruited from the four Community Centers (Delhi/NCR), age range 65-90 years. Modified conventional balance protocol with individualized preventive education on falls was given through Skype, 45 minutes, thrice a week for six weeks.

Result: Improvement was shown in Berg Balance Score (Mean from 38.3 +/–1.21to 42.95 +/– 2.18). 14 Clients reported 70%, 5 clients' reported 50% improvement on BPPM Scale. 100% clients completely agreed on TSS that tele-rehabilitation can be used to continue follow up rehabilitation and for saving expenses.

Conclusion: Home-based tele-rehabilitation can improve outcomes in elderly and could be used as an adjunct approach to continue the follow up care for elderly.

Introduction

India has around 100 million elderly at present and the number is expected to increase to 323 million, constituting 20 per cent of the total population, by 2050.[1] It has been estimated that among community dwelling residents, one-third of persons over the age of 65 years, and one-half of persons over the age of 80 will experience a fall each year.[2,3]After a fall, a person may become more sedentary, which can decrease an individual's independence and affect his/her ability to complete valued occupations.[4] Falls are often begin a downward spiral of fear that leads to inactivity in normal activities of self-care.[5-7] Regular exercises can improve physical functioning, reduce mortality, decrease the risk of falls by improving balance and strength.[8] Nowadays, technologies provides a wide range of possibilities in perception, communication, information processing, mobility and in maintaining health.[9] Tele-rehabilitation is one such technological approach which have being used as a means to enhance physical exercises and social interaction while the patient is at home and the health personnel is at the office.[10] A subfield of telemedicine, it is quite a new scientific area. In recent years the number of tele-rehabilitation programme has been rapidly increasing mainly because of the growing attention upon its potentialities and as a result of proper technological developments which have allowed the establishment of reliable rehabilitation services. Such services include, monitoring of the rehabilitation status, education and training of families and professionals. The pressure to provide quality services for an increasing population are felt in the elderly care sector.[11] Tele-rehabilitation facilitates access to rehabilitation services anywhere, anytime, for clients who are unable to access healthcare facility due to long distance, mobility impairments [12] or lack of trained clinicians in their geographical area. The scientific literature from single case studies to controlled samples attributed tele-rehabilitation the capability to cure and rehabilitate for different populations.[13, 14]

Therefore, to address the balance and mobility needs of elderly population, tele-rehabilitation program was conducted for balance rehabilitation in order to prevent falls and to improve better mobility. The questions formulated in order to reach the aims are as follows:

What is the importance of tele-rehabilitation for elderly people living at homes?

What are the challenges of using tele-rehabilitation?

Methodology

Sample 22 Elderly participants from four Community Centres (Delhi/NCR) were selected conveniently. For sample selection, advertisements through brochure and personal communications were done in the community. 2 participants however discontinued due to personal reasons. 20 participants completed the entire study (Male14 & Female 6). Informed consent was taken from all participants at the start of study.

Study Design: Pre- Post Quasi Experimental Design

Setting: Main Operating Centre, Tele Health (E-SEVA Centre), Indian Spinal Injuries Centre, Vasant Kunj, Delhi. Two Community Centers from Vasant Kunj, Delhi and Two Community Centers from Ghaziabad

Inclusion Criteria: Medically stable participants, Age ranges 65- 90 years[15], 3MS score <77/100[16], Participants who don't have visual & auditory problems, Berg Balance Scale(BBS)scores between 36-40,Having Basic Literacy Skills (Alphabet and number recognition concept),No history of seizures

Exclusion Criteria: Any neurological disorder

Material Used: Laptop/computer, Skype version 7.0, Internet connectivity / net setter (band width; 128 kbps-300kbps), webcam, headphone & mike, speakers, telephone (as per necessity), projector (as per availability for easy communication) and equipments for balancing exercise (Table, chair, therapy ball, stool, blocks, walker for assistance)

Outcome Measures:

Berg Balance Scale (BBS) BBS has been used to identify and evaluate balance and have excellent intra rater reliability (ICC5.99).[17, 18]

Balance related Perceived Performance Measure (BPPM): BPPM is a self reported 20 items questionnaire for elderly. It assesses participant's feedback of their perceived performance related to balance, post intervention. BPPM mainly focuses on the following three themes- 'active participation', 'fear of falling' and 'confidence'. BPPM is a validated questionnaire to use in the

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elderly post intervention.[19] Participants have to rate their performance on 0 to 10, where 0 indicates very low and 10 indicates very high. Questions like: 1. Do you feel your number of falls (if any) has decreased, as compared to prior to the therapy/exercise?

Tele-rehabilitation Satisfaction Survey (TSS) [20] consisted of eight items rated on a 5-point scale (1= completely disagree, 5=completely agree). Questions on following themes like: Comfortable being evaluated & intervene, Video conference was as accurate as being face to face, Areas of Functional Independency considered, Technology interference with the protocol, Clarity of the video and audio, Continuing rehab through video conferencing help in preventing falls, 'e-rehab services' help you to save your monetary expenses, Would use televideo process again.

Procedure Prior to commencing data collection, study approval was obtained at each of the sites. At the start of the study all participants were assessed for BBS via videoconferencing. Education & Awareness on Tele-rehabilitation/e-rehab was prearranged at each of the respective community centers. Skype Handouts (Hindi & English) were given to all the participants. Tele training of half an hour in a group, orientation cum practice session on "e-rehab for Geri care i.e. How to avail and access e-rehab services," via projector screen was given at the start of the study for ease of understanding and use. Four common Skype IDs were created for four respective community centers. Each participant received a modified conventional balance protocol (Table1) that involves task- oriented exercises [21] with individualized preventive education on falls through videoconferencing (Skype) for 45 minutes, thrice a week for six weeks in a supervision of trained attendants.

All four attendants were trained enough for conducting videoconferencing, to deal with technical problems, for giving necessary assistance during the session. At the end of the study, all participants were scored again for BBS through videoconferencing only. Also, all participants rated their performance on BPPM and feedback on TSS post intervention of six weeks. All data was recorded and entered in to Microsoft Excel Sheet.All analysis was done using SPSS Software version 16.

Result Total 20 participants completed the study. Their Mean Age was 76.1. There was a significant improvement found in Mean ± SD scores of Pre test and Post test BBS scores, Table 2. All the participants showed remarkable changes in their post scores shown in Fig.1. The overall impressions of 20 participants were very much positive (Table 3, Table4)

Rising from a chair with and without the use of the arms

Table 1: Modified Conventional Balance Protocol based on these themes

Rising from a chair with and without the use of the arms

From a sitting position on a therapy ball (forward and backward rolling of the arm; bending the trunk forward and side to side)

Standing up from chair, walking four steps forward and walking backwards to the chair

Stepping forward, backward and sideways
Turning to the right, stepping over the exercise step, turning to the right again and walking forward to the chair and repeat it to the opposite side.

Stepping forward, backward and sideways on the exercise step, Sit to stand of various heights of stool, Stepping over blocks of various heights, Performing double legged stance for 10s, Performing tandem stance for 10s, Performing back on heels, Walking forward and backward with a tandem walking pattern

From a sitting position on a therapy ball (forward and backward rolling of the arm; bending the trunk forward and side to side)

Standing up from chair, walking four steps forward and walking backwards to the chair

Stepping forward, backward and sideways

Turning to the right, stepping over the exercise step, turning to the right again and walking forward to the chair and repeat it to the opposite side.

Stepping forward, backward and sideways on the exercise step, Sit to stand of various heights of stool, Stepping over blocks of various heights, Performing double legged stance for 10s, Performing tandem stance for 10s, Performing back on heels, Walking forward and backward with a tandem walking pattern

Table 2 Paired t-test results for comparing the significance of change in BBS scores.

Participants	Mean±SD Pretest (BBS)	Mean±SD Post test (BBS)	t-test	P value
N=20	38.3+/−1.21	42.95 +/− 2.18	-13.28	.000

Participants

Fig.1 Change in BBS scores for all 20 participants

Table 3: Self rated % of improved performance on BPPM post intervention

Participants (N=20)	% on BPPM
N=14	< 70%
N=5	= 50%
N=1	59%

Participants Comments: One stated: 'It is really good because it saves you a trip to the hospital/clinic. Another couple, one participant and his spouse, commented that they would like to see 'e-rehab for Geri Care' to more people. Several Participants reported that it was an advantage as a preventive measure.

Table 4: Participants Feedback on TSS

Participants	TSS Items	Completely agree Participants %	Agree Participants %
N=20	Q1	70%	-
	Q2	-	72%
	Q3	75%	-
	Q4	-	64%
	Q5	80%	-
	Q6	100%	-
	Q7	100%	-
	Q8	100%	-

Discussion

The aim of this study was to assess the effects of six weeks 'e-rehab Geri care' focusing on balance training program while at home through videoconferencing in elderly. The Results showed that balance training given by Tele-rehabilitation means have a significant effect on balance and mobility function. This most likely suggests that supervised balance training for elderly by the use of concept tele-rehabilitation can lead to improvement in functional abilities in daily routine. It is also evident from the results that use of common software options like Skype or Videoconferencing can be a useful alternative for the patients who could not able to visit or fail to do follow ups at their respective clinics/hospitals.

As per our experiences, importance of tele-rehabilitation may explain by following challenges faced by elderly in their daily life.

Like, **Social interaction** is one of the problems faced by elderly people living at home who have disability and are unable to go out of the homes in the community. Taylor D et al, [22] also reported that there should be a good communication between the therapist and clients. Because this social interaction enabled the clients to willingly participate in the program. In the present study all participants completed the tele-rehabilitation program which shows that tele-rehabilitation also provided a good interaction between participants and the therapist.

Second was **Physical problems** that always interfere in their daily routine work habits and were not able to involve much in the functional activities. Tele-rehabilitation has the potential of providing functional intervention and the positive outcome in the improvement of physical function has been observed by Michel Tousignant et al [23] and Bernard et al [11] in their studies. Similar positive outcome has been notified in the present study result findings with the good change in participants BBS post scores.

Third, **Balance** is one of the factor that result from physical impairments which may result in to fall. Results on BPPM scale showed that participants were able to gain some balance and were more confident in using tele-rehabilitation protocol.

Fourth, **Technology wise**, materials and software utilized for conducting tele-rehabilitation session were user friendly and therefore it is expected that most of vulnerable group of people like elderly will be able to use it without help even if they do not have much experience with the computer.

Fifth, **Psychological problems** faced like depression, lack of confidence, loneliness by most of elderly people with disability. For them, Tele-rehabilitation was helping in overcoming their depression as reported by many participants because they were not alone, and were doing regular exercises and follow-ups with their concern therapist. most of the elderly participants who had fear of falls, had difficulties to move around like going to their weekly therapy or using public transports. For them, tele-rehabilitation acts as an alternative way of taking rehabilitation while at home. Now the participants would not think of planning about when to get out of the house and worry of being late for the rehabilitation which was reported by many participants in the study initially at the recruitment time.

This study highlights an important fact which is very important to visualize tele-rehabilitation as an adjunct service delivery model to traditional training that can be used to continue rehabilitation and follow ups at distance.

Limitation: TSS was not validated, as permission was taken from the author for the modification and addition of items to be used for this study.

Future Scope: Tele-rehabilitation could be compare with face to face services to find out its efficacy.

Conclusion: Tele-rehabilitation can therefore be called one of the health promotion strategies for elderly and found to be beneficial for those who live in their homes/community centers with physical limitations.

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