

Development of Spanish Version of Home-Based Video Module of Balance Exercises for Peripheral Vestibular Disordered Patients

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Abstract

Any disturbances affecting one or more of the balance organs lead to imbalance difficulties and as a consequence, the quality of life of the affected individuals can be seriously affected, especially if the episodes end with injuries or even fatal accidents. Bal Ex is the first home-based video guided workout that was created by Zainun and her colleagues in 2009. Ten languages are currently supported by Bal Ex, including Cantonese, Malay, English, Mandarin, Hokkien, Tamil, Persian, Arabic, Nigerian, and Spanish. With permission, several changes were made to this module from its original version, CCCE. Bal Ex has twenty exercises that are broken down into three levels: postural movement, placement, and head and neck movement. This module offers a lot of advantages and is simple to use because it provides step-by-step instructions along with audio and visual hints. Second, because it is provided at home, patients can receive therapy without regularly visiting the hospital. In addition to being more flexible, this is also useful for patients with disabilities. Long-term cost effectiveness is also achieved indirectly. Above all, Bal Ex can enhance a patient's quality of life and balance symptoms in less than three months. According to our experiences, the majority of chronic peripheral cases had a positive outcome, feeling an improvement two to three months after starting an activity program. Here, we offer an illustration of a case that was handled well: Due to the complexity of vestibular illnesses, vestibular rehabilitation is one option for treating individuals with vestibular disorders and assisting in their recovery. These physical therapy have been shown to be quite effective. Indeed, patients and physicians gain from having a home-based therapy that works. Targeting various components of the balancing system, the video-guided instructions are provided in an easy-to-follow and methodical manner. Subsequent research ought to compare this video module's efficacy in situations of central vestibular problem and Parkinson's disease. It will be interesting to observe if this physical activity helps with other disease causes like stroke.

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INTRODUCTION

Balance is the capacity to maintain one's center of gravity over their base of support with minimal movement [1, 2]. An effective balance system necessitates a complex and integrated network involving a properly functioning brain, proprioception, visual system, and vestibular system [3]. Any disturbances affecting one or more of the balance organs lead to imbalance difficulties (e.g. dizziness, vertigo etc.) [4–6]. As a result, the

quality of life for those affected can significantly deteriorate, particularly if the incidents lead to injuries [7] or even fatal accidents [8].

Any disturbance or malfunction of the vestibular system leads to vestibular disorders. Vestibular disorders are classified into three types based on the location of the lesion: peripheral, central, and mixed vestibular disorders. Vestibular problems have been linked to a number of variables, including aging, genetic predisposition, head trauma, and hormone fluctuations. (i.e. premenstrual or oral contraceptive users) [9, 10]. Besides these factors, many vestibular disorders still have unknown causes [11].

It is well established that patients with vestibular disorders struggle to maintain balance during rotary and/or linear movements [6]. Any disruption to the vestibular system can result in symptoms such as unsteadiness, vertigo, oscillopsia, nausea, vomiting, and other self-limiting issues. For example, individuals with saccular dysfunction may have trouble with linear movements and orienting to gravity [12]. In other words, patients with vertigo often experience sweating, nausea, and vomiting more frequently than those with other types of dizziness [13], making vertigo a more common diagnosis than other dizziness subtypes. In fact, balance disorder cases are common and the number of sufferers increases over time. However, clinically, the management of balance disorder is challenging and controversial. In this situation, the use of effective treatment methods is undoubtedly important in order to improve patients' symptoms, as well as their quality of life. Usually, the patients receive treatment with prescription drugs, surgery, physical therapy, and/or exercise. This paper gives an overview regarding a home-based video guide of balance exercises and the development of the Spanish version of this module.

PERIPHERAL VESTIBULAR DISORDER AND ITS CONSEQUENCES

PVD is the most common of vestibular disorder cases [14–17]. Disturbances in the peripheral vestibular organs or nerve, which comprise the vestibular system, are the hallmark of peripheral vestibular dysfunction (PVD) [18]. This category includes conditions like acute vestibular neuritis, vestibular labyrinthitis, benign paroxysmal positional vertigo (BPPV), and Meniere's disease. Patients with PVD typically experience vertigo, hearing difficulties, tinnitus, abnormal eye movements (nystagmus), and unsteadiness [13].

Previous research [14–17] estimated that 17-30% of patients with vertigo who sought treatment at vestibular clinics were diagnosed with unclassified PVD. More recently, [19] found that among individuals diagnosed with PVD, 40% had an unknown cause, 21% had BPPV, and 13% were diagnosed with Meniere's disease. According to [20] among 2169 patients, 33.8% of them were diagnosed as peripheral vertigo, 17.2% central vertigo, 26.8% unclassified vertigo and 22.2% vertigo of unknown origin. It was also found that vertigo was more prevalent among older patients [20]. A retrospective study in Hospital Universiti Sains Malaysia (HUSM) by [21] found that 73.6% of vestibular disorders to be PVD, 17.6% were central vestibular disorder, 1.1% mixed vestibular disorders, and the remaining 7.7% were unknown.

People who experience vestibular problems may or may not recover over time. The estimated duration for central compensation in unilateral vestibular disorder cases is about 4-6 weeks. The person's quality of life may be significantly impacted by such challenges [8]. There is also a financial impact, with the cost of treating fall incidents among the elderly exceeding seven million US dollars each year [22]. Untreated cases of balance disorders may lead to the involvement of psychological symptoms [23]. Consequently, the cases may become more complicated and difficult to manage.

MODES OF TREATMENT FOR VESTIBULAR DISORDER

Selection of the appropriate treatment and management of PVD is really important to enable better improvements and good as outcomes for each patient. Whether the causes are central, peripheral, or

psychological determines the kind of treatment that should be administered). In acute attacks of PVD, the main aim of treatment is symptomatic relief and medications such as maxolon and stugeron are prescribed. Rapidly treating the symptoms of nausea, vertigo, and vomiting is the treatment. In severe cases, anti-vomiting tablets or injection are administered.

Further treatment is dependent on the diagnosis for each case. BPPV is normally treated with special manoeuvres such as Epley's manoeuvre [24], Brandt Daroff's exercise and Semont's exercise. Meniere's disease is usually treated with a diuretic agent and high doses of the tablet betahistine.

Vestibular rehabilitation has been found to be useful in overcoming peripheral vestibular difficulties [25, 26]. The Cawthorne–Cooksey exercise (CCE) has been shown to be beneficial in patients with chronic vestibular disorders. The newer version, Customized Cawthorne–Cooksey exercise (CCCE) has been found to be superior to the traditional version [26–28]. The CCCE is also effective in chronic unilateral or bilateral vestibular disorders.

More serious complications may arise in the majority of PVD cases that go untreated. At this level, patients typically experience psychological symptoms such as palpitation, shortness of breath, anxiety, phobia and others. Psychological treatment is also important in cases that usually involve psychological symptoms. The last option for vestibular treatment is surgery such as removal of the affected vestibular organs. This is normally performed in cases where medical and physical treatment has been evidenced to be unsuccessful.

HOME-BASED VIDEO MODULE OF BALANCE EXERCISES

Since Zainun and her colleagues (2009) [29] created the initial video-guided home exercise program known as Bal Ex, it has been made available in ten languages: English, Mandarin, Hokkien, Tamil, Persian, Arabic, Nigerian, Cantonese, and Spanish. With permission, several modifications were made to this module from its original version, CCCE [30]. Bal Ex includes twenty movements organized into three levels (Table 1). While retaining the existing movements as in the original CCCE, Bal Ex has included two additional movements. The first added movement is bending down of the body at 90° position with hand touching knee and the second movement is while sitting, bending down the body with palm, forehead and knee touching the floor. These movements were included because they reflect the routine activities performed by Malaysians.

Table 1. Bal Ex: Home-based video module of balance exercises.

Level 1 (All movements are performed with eyes open and closed)	
1	a) Move your head backward and forward without visual fixation on a stationary or moving object
	b) Move your head side to side without visual fixation on a stationary or moving object
	c) Move your head backward and forward with visual fixation on a stationary or moving object
	d) Move your head side to side with visual fixation on a stationary or moving object
Level 2 (All movements are performed with eyes open and closed)	
1	a) Bend down your body with your hand touching the floor from sitting position
	b) Bend down your body with you hand touching the floor from standing position
2	Bend down your body at 90° position with your hand touching your knee
3	Bend down your body and rotate your head to left and or right
4	Look over your shoulder left and right
5	Lie down and roll from one side to the other
6	Move from lying position to sitting position
7	While sitting, bend down your body with your palm, forehead and knee touching the floor
Level 3 (All movements are performed with eyes open and closed)	
1	Stand with your feet close together without support

2	a) While standing, lift your right foot and left foot alternately
	b) While standing, raise your heels and then your toes.
3	a) Put an object on the floor and try to touch the object in standing position with feet wide apart
	b) Put an object on the floor and try to touch the object in standing position with feet close together
4	Stand on one leg only
5	a) Stand on a soft pillow or cushion, altered surface condition, and march by lift your knee to your hip level
	b) Move your head and body simultaneously to left and right while on a soft pillow or cushion (altered surface condition)
6	Walk forward in a straight line with one foot behind the other
7	Walk sideways (left and right)
8	Walk on an uneven surface.
9	a) Walk while performing figure eights
	b) Walk while performing circles
	c) Walk while performing pivot turns
10	Step onto and off a step (different heights)
11	a) Perform head movements backward and forward without visual fixation in sitting, standing and walking position
	b) Perform head movements side to side without visual fixation in sitting, standing and walking position
12	Walk and look over your left and right shoulder alternately

This physical exercise module has many advantages. First of all, it's simple to execute because there are clear directions accompanied by visual and auditory signals. Patients no longer need to visit the hospital for therapy, which is the second advantage. Additionally, there is more flexibility offered, which is quite helpful for people who have limited mobility. It is, in turn, long-term and economically advantageous. The fact that Bal Ex can enhance a patient's quality of life and balance symptoms in less than three months is its most significant benefit. In most chronic peripheral instances, our experience has shown a positive outcome; after two to three months of exercise, the patients may feel an improvement. Here we present an example of case that has been treated successfully:

Case 1

A 44 years old, female school teacher presented with chronic vestibular symptom for 4 years duration. In this 4 years duration, she was on a few medications that were prescribed by a few clinicians but it did not work. The main complaints were vertigo, unsteadiness, floating sensation, nausea and vomiting. During the attacks, she experiences all the symptoms and felt imbalance for one day up to a few days. There is no history of tinnitus, fullness of ear, double vision, weakness or numbness of the limb. The symptoms became more severe where they had impaired her quality of life such as phobia on height and crowded place, was unable to drive a car even in short distances and was unable to stand for the longer duration during teaching.

Every clinical balance exam was normal, with the exception of the straight-line, Romberg, and Fukuda tests. Tests for vestibular evoked myogenic potential (VEMP) and videonystagmography (VNG) were also normal. The patient then underwent Bal Ex home based video module of balance exercises without taking any medication. She was also required to report her progress on provided sheet.

After two months, the patient could feel the significant improvements. Now she is able to stand while teaching for a longer duration as compared to before, can to drive a car in a short distance and feels less phobic on height and crowded places. All these improvements indirectly have significantly improved her quality of life. This case study demonstrates the effectiveness of Bal Ex in treating a chronic patient in a short duration.

INDICATION AND TECHNIQUE FOR BAL EX HOME BASED VIDEO MODULE FOR BALANCE EXERCISES

At this stage, patients who will obtain benefits with Bal Ex are those with dizziness, balance disorders and vestibular disorders. In addition, Bal Ex can also be used by physiotherapists and rehabilitation staff during the therapy session. Bal Ex is also useful for teaching and research purposes.

The optimum time to start this exercise is after the acute episode of the diseases. The proper techniques to use this module as stated below:

- Please make sure you do this exercise under family supervision
- Start the therapy step by step which indicated or follow the doctor's instruction
- Repeat the movement 20 times for each movement and repeat this exercise 3-4 per day
- Start this Bal Ex's exercise by orderly and systematic according to your capability.
- Please do these movements step by step start from movement 1a (in level 1). At first, you might be feel symptoms of dizziness, nausea and vomiting but you should be continuing the same movement until that symptom becomes lesser and resolved.
- After you successfully doing that movement (such as less dizziness, no vomiting or nausea), you may proceed to next movement such as 1b and further follow sequence given.
- Avoid doing all movements (1-20) simultaneously at first stage. This will cause problem on you and delay your recovery process.
- After you successfully doing all 20 movements without problem, you can do all the movement in a session or simultaneously. And also you can increase the speed of movement in every movement.
- It depends on your stage of disease, someone may be able to finish all movements in 2 weeks and others may take 5 months.

This exercise is recommended in certain cases such as BPPV, severe neck or back injury and patients with heart problem.

SUGGESTED PRE- AND POST-THERAPY ASSESSMENTS

Different centers may use different methods in evaluating the effectiveness of therapy in pre- and post-sessions. In vertigo clinic, Otorhinolaryngology department, Universiti Sains Malaysia, we have a certain protocol for every patient who enrolls in this balance exercise mode. First, they are required to fill in the vertigo symptom scale questionnaire (consists of 22 questions that covers somatic anxiety, vertigo and autonomic symptoms), undergo basic clinical evaluations such as Romberg's test, Fukuda test, straight line test and Dix Hallpike test (to rule out any BPPV cases) and diagnostic vestibular assessments (video head impulse test, videonystagmography, posturography and vestibular evoked potential). They are also given a checklist for them to indicate their progress in doing the exercise at home (Appendix 2a & 2b). Post-therapy evaluations are similar to the pre-therapy assessments.

CONCLUSION

Vestibular rehabilitation is one of the therapeutic options available to individuals with vestibular diseases to aid with their recovery, as vestibular disorders are complex conditions. The benefits of these physical therapy have been amply proven. In actuality, patients and doctors alike can gain a great deal by having an efficient home-based therapy. Targeting various components of the balancing system, the video-guided instructions are provided in an easy-to-understand and methodical manner. Future research should compare the effectiveness of this video module in patients with central vestibular problem and Parkinson's disease. It would be interesting to observe whether other diseased populations, like stroke victims, can benefit from this physical activity as well.

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Appendix 2 (a)

Checklist Form for Patient (I)

(Thing, Surrounding of self spinning, Nausea, Vomiting and Imbalance)

	1	2	3
No	Mild	Moderate	Severe

Level 1				
Exercise	Date start	Current symptom (0-3) Please specify the symptom i.e nause, vomiting and others	Date End	Current symptom (0-3)
1(a)				
1(b)				
1(c)				
1(d)				
Level 2				
Exercise	Date start	Current symptom (0-3) Please specify the symptom i.e nause, vomiting and others	Date End	Current symptom (0-3)
1				
2				
3				
4				
5				
6				
7				
Level 3				

Exercise	Date start	Current symptom (0-3) Please specify the symptom i.e nausea, vomiting and others	Date End	Current symptom (0-3)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Appendix 2 (b)

Checklist Form for Balance Exercises Activities (11)

Name	RN	Age	Gender
Diagnosis/disease:	Date Start:	Date End:	

[illegible]

[illegible]

**This note must be filling for 3 months duration or more*