OUTCOMES AFTER TAI CHI TRAINING FOR PATIENTS WITH VESTIBULOPATHY

Thesis submitted for partial fulfillment Of MD Degree in Audiology

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ABSTRACT

Vestibular rehabilitation (VR) has become a mainstay in the management of patients with vestibulopathy (VSP). Tai Chi (TC) have recently gained popularity as a treatment paradigm for a variety of human ailments, including balance impairment. The aim of this study was to investigate the effects of Tai Chi practice on balance control when adults with VSP join the TC practitioners. Fifty patients with VSP who were referred for vestibular and balance rehabilitation – participated in our study. Thirty patients received TC training (TC group) and twenty patients received systematic preset exercises program (VR group). All patients were evaluated before and after therapy by the sensory organization test (SOT), the Dizziness Handicap Inventory (DHI), and the Vestibular Disorders Activities of the Daily Living scale (VADLs). Patients with unilateral vestibular hypo-function (UVH) in both the TC and VR groups had highly significant improvement after therapy as regards the SOT, DHI, and VADLs. However, the TC group had significantly better SOT improvement than the VR group as regards the equilibrium score of conditions 5 and the vestibular ratio. No statistically significant difference was obtained post therapy between the two groups as regards the DHI and the VADLs. The post therapy results of the SOT, DHI, and VADLs were also better in the TC cases with BVH than the VR case with BVH. Outcome measures of the TC and VR programs highlights the value of TC as an alternative therapy for patients with VSP.

Key Words: Vestibulopathy - Vestibular Rehabilitation - Tai Chi Posturography - DHI - VADLs.

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ABR	:	Auditory brainstem response.
ADL	:	Activities of daily living.
AP sway	:	Anterior-posterior sway.
BPPV	:	Benign paroxysmal positional vertigo.
BVH	:	Bilateral vestibular hypo-function.
CDP	:	Computerized dynamic posturography.
COG	:	Center of gravity.
CNS	:	Central nervous system.
CT	:	Computerized Tomography.
CVI	:	Chronic vestibular insufficiency.
ECoG	:	Electro-cochleography.
EGb	:	Ginko biloba extract.
ENG	:	Electronystagmography.
ES	:	Equilibrium score.
DHI	:	Dizziness handicap inventory.
DP	:	Directional preponderance.
FTA-abs	:	Free treponemal antigen absorption.
Hz	:	Hertz
IEPT	:	Inner ear barotraumas.
IEDS	:	Inner ear decompression sickness.
IGCS	:	Isobaric gas counter diffusion sickness.
LOS	:	Limits of stability.
MCT	:	Motor control test.
MHTAP	:	Microhaemagglutination treponema pallidum.
MRI	:	Magnetic resonance imaging
ROM	:	Range of movement.
SNHL	:	Sensory neural hearing loss
SP/AP	:	Summating potential/action potential.
SSC	:	Semi circular canal.
SS	:	Strategy score.
SVH	:	Subjective visual horizontal.
TC	:	Tai Chi.
TCC	:	Tai Chi Chuan.
VBRT	:	Vestibular and balance rehabilitation therapy.
VHT	:	Vestibular habituation training.
VOR	:	Vestibulo-ocular reflex.
VR	:	Vestibular Rehabilitation.
VSP	:	Vestibulo-spinal reflex.

Introudction

Introduction

Peripheral vestibular deficit is defined as any disease process that results in damage, either partial or complete, to one or both sides of the peripheral vestibular system involving the vestibular end organs and/or the vestibular nerve ***(Gianoli, 2001).*** Vestibulopathy (VSP) is caused by damage to the peripheral vestibular system ***(Brandt, 1996).***

Inability to maintain visual stability is one effect of VSP, from diminished or absent function of the vestibulo – ocular reflex (VOR). Decreased whole body dynamic postural control contributes to functional limitation in people with VSP ***(Ishikawa et al., 1995)*** and is thought to be a direct consequence of reduced VOR and vestibule- spinal reflex (VSR) function ***(Grossman and Leigh, 1990).***

Vestibular rehabilitation (VR) has become a mainstay in the management of patients with balance disorders manifesting as dizziness and disequilibrium ***(Furman and Whitney, 2000).*** VR is designed to adapt the CNS to diminished vestibular input and to compensate for VOR and VSR loss, via gaze and balance retraining, which in turn should improve whole body dynamic stability ***(Krebs et al., 2003).***

Findings from VR research provide an understanding of the benefits and limits of VR for this patient population. Tai Chi, which purports to improve overall body control, mind-body focus, and psychological well-being, may offer an alternative or complementary approach to treating vestibulopathy – induced balance dysfunction ***(Wayne et al., 2005)***. Tai Chi (TC) is an ancient Chinese martial art consisting of a series of slow but continuous movements of every body part ***(Wu, 2002).***

In the current health care environments, VR typically ends because patients either show a plateau in improvement or health insurance coverage limits the number of VR visits provided ***(Wayne et la., 2004).***

Although there is strong evidence that VR ***(Krebs et al., 20003 and Herdman 1998)*** and more recently TC ***(Wu 2002 and Mc Gibbon et al.,2005)*** can benefit people with VSP, to date, little such evidence exist to support TC as an effective intervention for this population ***(Wayne et al., 2005).***

However, there are compelling reasons to further investigate TC for VSP, in part because TC appears useful for a non vestibulopathy etiologic balance disorders, and is safe ***(Wayne et al., 2004).***

Rationale of The Work

Although there is strong evidence that Tai Chi is useful for a variety of non vestibulopathy etiologic balance disorders, to date, little evidence exist to support Tai Chi as an effective treatment for vestibulopathy patients and little work has been done to compare between Tai Chi training and vestibular rehabilitation therapy in treating patients with vestibulopathy.

Aim of the Work

The aim of this study is to find out objective and subjective outcomes after Tai Chi training for patients with vestibulopathy and to compare these outcomes with that obtained after vestibular rehabilitation training for age – matched vestibulopathy group.

VESTIBULOPATHY

Vestibulopathy (VSP) is caused by damage to the peripheral vestibular system, often resulting in profound balance impairment (Brandt, 1996).

Vertigo is an illusory sense of motion. The patient can feel as if the motion is internal or that objects in the surroundings are moving or tilting. The sense of motion can be rotatory, linear, or a change in orientation relative to the vertical. Vertigo indicates a problem within the vestibular system (Cummings et al., 2005).

Schessel et al. (2005) viewed that one of the most important features of the pattern of presentation of peripheral vestibular disorders is the duration of vertigo. Based on this parameter, the following classification of VSP is put forward:

1. Vertigo lasting seconds (benign paroxysmal positional vertigo)
2. Vertigo lasting days (vestibular neuronitis)
3. Vertigo lasting minutes to hours
   a. Idiopathic endolymphatic hydrops (Meniere's disease)
   b. Secondary endolymphatic hydrops
   (1) Otic syphilis
   (2) Delayed endolymphatic hydrops
   (3) Cogan's disease
   (4) Recurrent vestibulopathy
4. Vertigo of variable duration
   a. Inner ear fistula

b. Inner ear trauma

(1) Non penetrating trauma

(2) Penetrating trauma

(3) Barotrauma

c. Familial vestibulopathy

d. Superior semicircular canal dehiscence syndrome

5. Bilateral vestibular deficit

1) VERTIGO LASTING SECONDS:

Benign Paroxysmal Positional Vertigo (BPPV)

BPPV is the single most common cause of vertigo seen in our neurotology clinic. BPPV is a fascinating syndrome, the hallmark of which is the onset of brief (seconds) spells of often severe vertigo that are experienced only with specific movement of the head (Cummings et al., 2005).

Two theories exist regarding the cause of BPPV. The first, known as “cupulolithiasis", proposes that debris or fragments of degenerating otoconia from the utricle become adherent to the cupula of the posterior SCC. When the canal is in the plane parallel to the force of gravity, the cupula is inappropriately deflected producing a sense of rotation, i.e. paroxysmal positioning vertigo, and the paroxysmal positioning nystagmus. The nystagmus will be in the plane of the stimulated SCC (Fetter and Sievering, 1995).

The second theory is known as "canalolithiasis". This hypothesis purports that the debris is free floating in the posterior SCC. When the head is moved into the provoking position, the debris moves to the most dependent position of the canal, which causes the endolymph to move