

Vestibular Rehabilitation Therapy in Patients with Visual-Vestibular Mismatch Disorders

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلْ رَبِّ
أَدْخِلْنِي مُدْخَلَ صِدْقٍ
وَأَخْرِجْنِي مُخْرَجَ صِدْقٍ
وَأَجْعَلْ لِي مِنْ لَدُنْكَ سُلْطَانًا نَصِيرًا

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CONTENTS

<i>Content</i>	<i>Page</i>
Introduction and Rationale	1
Aim of the work	4
Review of literature.....	6

Chapter 1: Anatomy and Physiology of the Vestibular system:

Peripheral Vestibular system	7
Central Vestibular system	19
Vestibular reflexes	23

Chapter 2: Visual-Vestibular Mismatch:

Anatomy of VVI	28
Role of VVI	30
Mechanism of VVI	30
Theories of VVI	31
Clinical picture of VVM	33
Common causes of VVM	34
Relation between VVM and motion sickness	35
VVI and radiological imaging	35
Clinical testing for diagnosis of VVM	36

Chapter 3: Vestibular Rehabilitation and Balance Therapy (VRBT):

Introduction	42
Vestibular Compensation	42
Management of dizzy patient	49
Vestibular Rehabilitation	49
Management of VVM	58
Outcome assessment for VRBT	60
Materials and methods.....	62
Results	69
Discussion	86
Conclusion	98
Recommendations.....	99
Summary	100
References.....	104
Arabic Summary	

LIST OF TABLES

No	Title	Page
1	Gender distribution over age in years among the study group	71
2	Distribution of patients according to associated dizziness complaints	71
3	Distribution of other complaints in VVM patients	72
4	Pure tone audiogram results among study group	73
5	Analysis of the modified VVM questionnaire	74
6	Distribution of positive answers for each question in modified VVM questionnaire	74
7	Patients' performance on office tests	75
8	Patients performance in different conditions of MCTSIB test	75
9	Means and Standard deviation for MCTSIB test results in seconds	76
10	VNG test results in VVM group	76
11	cVEMP test results in VVM patients	77
12	Patient performance during optokinetic training program	77
13	Patient answers in modified VVM questionnaire before and after rehabilitation	78
14	Degree of recovery for VVM symptoms according to modified VVM questionnaire after rehabilitation	78
15	Correlations for pre and post answers in modified VVM questionnaire	79

16	Performance of VVM patients in DVA test before and after rehabilitation	79
17	Comparison between abnormal MCTSIB test results(in seconds) pre and post rehabilitation	80
18	Comparison between MCTSIB test results	80
19	Performance of VVM patients in Functional Reach test before and after rehabilitation	81
20	Effect of age on patients' results in questionnaire, office tests and Vestibular test battery	81
21	Effect of duration of complaint on patients' results in questionnaire, office tests and Vestibular test battery	82
22	Vestibular test profile of VVM patients	82

LIST OF FIGURES

No.	Title	Page
1.	Bony Labyrinth	6
2.	Spatial arrangement of semicircular canal	9
3.	Three-dimensional orientation of semicircular canal planes and Extraocular muscles pulling directions in humans	10
4.	Semicircular Duct	10
5.	Otoliths register linear acceleration and static tilt	12
6.	The Peripheral neural circuit of the otolith for enhancing sensitivity to linear acceleration and the related vestibulospinal neurons	13
7.	Macula	14
8.	Orientation of the Maculae of the utricle and saccule	14
9.	Otolith membrane	15
10.	Planar Polarity and the organization of vestibular hair cells in the utricle and saccule	17
11.	Cupula	17
12.	Labyrinthine hair cells	18
13.	Vestibular Nuclear complex	21
14.	Excitatory projections from individual semicircular canals on the right side to the extra ocular muscles	24
15.	Optokinetic Neural pathway	29
16.	Visuo-Vestibular interactions. A proposed schema	31
17.	Exercises for enhancing gaze stability	52
18.	Exercises for enhancing eye movements	53

19.	Swaying back and forth	55
20.	Exercises for improving Vertigo	57
21.	Still images from DVD stimuli	59
22.	Functional reach test	66
23.	Number of VVM patients according to modified VVM questionnaire and Mallinson VVM questionnaire	70
24.	Distribution of patients` current illness among the study group	72

LIST OF ABBREVIATIONS

VVM	Visual –Vestibular Mismatch
VOR	Vestibulo-Ocular reflex
PB	Phonetically Balanced
VVI	Visual-Vestibular Interaction
VRBT	Vestibular Rehabilitation and Balance Therapy
SRT	Speech Reception Threshold
SD	Speech Discrimination
DVA	Dynamic Visual Acuity
MCTSIB	Modified Clinical Test for Sensory Interaction of Balance
FR	Functional Reach
VNG	Videonystagmography
c-VEMP	Cervical Vestibular Evoked Myogenic Potentials
SCM	Sternocleidomastoid Muscle
SCC	Semicircular Canal
SCD	Semicircular Duct
HC	Hair Cell
PCP	Planar Cell Polarity
LPR	Line of Polarity Reversal
K⁺	Potassium ion
Ca⁺⁺	Calcium ion
SO	Superior Oblique
IO	Inferior Oblique

<i>IR</i>	Inferior Rectus
<i>LR</i>	Lateral Rectus
<i>SR</i>	Superior Rectus
<i>MR</i>	Middle Rectus
<i>AC</i>	Anterior Canal
<i>PC</i>	Posterior Canal
<i>LC</i>	Lateral Canal
<i>MLF</i>	Medial Longitudinal Fasciculus
<i>ATD</i>	Ascending Tract of Dieter's
<i>BC</i>	Brachium Conjunctivum
<i>VN</i>	Vestibular Nuclei
<i>tVOR</i>	Translational Vestibulo-Ocular Reflex
<i>VSR</i>	Vestibulo-Spinal Reflex
<i>VCR</i>	Vestibulo-Collic Reflex
<i>OPK</i>	Optokinetic
<i>CNS</i>	Central Nervous System
<i>SP</i>	Smooth Pursuit
<i>AOT</i>	Accessory Optic Tract
<i>NAOT</i>	Nuclei of Accessory Optic Tract
<i>MS</i>	Multiple Sclerosis
<i>PET</i>	Positron Emission Tomography
<i>fMRI</i>	Functional Magnetic Resonance Imaging
<i>PIVC</i>	Parieto-Insular Vestibular Cortex
<i>SOT</i>	Sensory Organization Test
<i>CDP</i>	Computerized Dynamic Posturography

<i>HSN</i>	Head Shake Nystagmus
<i>CDVAT</i>	Computerized Dynamic Visual Acuity Test
<i>COR</i>	Cervico-Ocular Reflex
<i>PKC</i>	Protein Kinase C
<i>VRT</i>	Vestibular Rehabilitation Therapy
<i>DHI</i>	Dizziness Handicapped Inventory
<i>ABC</i>	Activity Specific Confidence scale
<i>DGI</i>	Dynamic Gait Index
<i>BBS</i>	Berg Balance Scale
<i>BPPV</i>	Benign Paroxysmal Positional Vertigo

Introduction and Rationale





Introduction and Rationale

The term “visual vestibular mismatch” (VVM) was first used by Benson and King in 1979, the term was used to describe a “motion cue mismatch”.

Present studies stated that VVM is a symptom set that arises as a result of pathology in the balance system, to the point where it can no longer act as the “template” against which other sensory information is compared, this results in an inappropriate reliance on environmental visual cues, even under circumstances in which they are orientationally inaccurate (**Mallinson, 2011**).

The complaints of VVM include both autonomic and vestibulospinal symptoms that can generate distress which could result in avoidance behavior for some things as shopping malls, 3D movies, passing traffic, trains, flowing water, windshield wipers, striped shirts because they give an illusion of instability or movement .Elucidation of these symptoms from a patient requires a comprehensive history to be taken in a non-leading manner (**Mallinson, 2011**).

Examination of dizzy patients include: office vestibular test battery and specific vestibular laboratory tests which are an important part of the clinical assessment and management of patients with dizziness and other balance disorders (**Katz and Barin, 2009**).

Stabilization of the retinal image during movement is necessary for optimal visual performance for an ambulatory human. Visual tracking (pursuit), proprioception, motor preprogramming ,prediction, and mental set (non -visual parametric adjustment) interact synergistically to optimize the gain of the vestibulo-ocular reflex (VOR) to stabilize the retina during head movements and are collectively termed visual vestibular interaction (VVI). Patients with a deficient vestibular system often compensate with other VVI mechanisms. These mechanisms are insufficient for optimal vision at higher rotational frequencies and velocities, and often give rise to symptoms of oscillopsia (**Clark, 2001**).



Visual vestibular mismatch is difficult to diagnose because of a severe lack of adequate investigation tools, a limited ability to measure degree of injury in these patients, and because there is a wide inter-individual variability between degree of injury and intensity of symptoms (**Mallinson , 2011**).

For intervention, exercises may be required that optimize the use of the visual system inputs for maintaining equilibrium and gaze stability. These may be incorporated with hand-eye coordination exercises when needed (**Shepard and Telian, 1996a**).

There are few researches conducted on visual-vestibular interaction disorder and the efficacy of vestibular rehabilitation therapy in these patients. This study will be conducted to evaluate the benefit Of VRBT in patients with VVM of peripheral vestibular lesion in origin.