CEREBRAL SMALL VESSEL DISEASE – A LONGITUDINAL 10 YEARS EVIDENCED STUDY

ABSTRACT

A cluster of geriatric health issues can lead to many neurodegenerative disorders including Parkinson's disease, Alzheimer's, and dementia. All these carry along with it a potential decline in quality of life, health care expenses; a larger amount of disability. An early identification of risk factors, along with treatment using due medication coupled with non – pharmacological treatment using physiotherapy were analyzed with evidence in a ten-year follow-up of a subject with cerebral small vessel disease. The outcome of the research can be beneficial for geriatric subjects and to further the continuation of the findings of the research.

KEY WORDS:

CSVD – Cerebral small vessel disease

QOL – Quality of life

ADL – Activities of daily living

NPRS – Numerical pain rating scale

INTRODUCTION

There is an increasing longevity found to be associated with various health ailments, especially geriatric subjects vulnerable to psychosocial, physical, financial issues leading to a diminished dignity, larger dependence and different degrees of disabilities. Systemic illnesses like hypertension, diabetes, atherosclerosis, can along with genetic factors play a vital role in global geriatric subjects developing neurodegenerative disorders like stroke, Parkinson's disease, cognitive decline, psychiatric disorders, Alzheimer's. These neuro ailments are found to be linked with long-term health care affecting subjects, families, and society. Early identification of risk factors and treatment of that were to be more focused medically. Another key factor from literature recorded was an early onset of these said risk factors can more be critical on living days of affected subject.

One among the pathological manifestations of neurodegenerative disorders was vertigo, cerebral small vessel disease especially among subjects above 60 years. This research where

non – pharmacological ways with specific physiotherapy were discussed using evidence on geriatric females on a longitudinal analysis from 2011 – 2021.

AIMS AND OBJECTIVES:

1. To understand the pathogenesis of vertigo
2. To find the role of physiotherapy as a prophylactic therapeutics.

MATERIALS AND METHODOLOGY:

Mrs. XXXX aged 68 years known hypertensive, Mesomorph Complaint of chronic neck pain with Vertigo was treated with Tablet Vertin and NSAID since 2010; subsequently NMRI taken in 2011 has shown small vessel disease.

The Author was treating her since 2011 with cervical spine strengthening, shoulder bracing along with core strengthening exercises, and Inversion therapy weekly twice of 20 to 30 minutes duration from May 2011 to December 2021.

Meanwhile, her HbA1C has gone from 6 in 2011 to 7.5 in 2013 and 7 in 2021.

She was tested positive for Covid 2019 in July 2020, recovered with rest and medical care. In December 2021 on evaluation she had an increased tone of both extremities, upon reference to the physician, she was treated with Tablet Pregabantin.

CLINICAL PROGNOSIS AND RESULTS:

Major functional problems faced by this research subject were neck pain, dizziness who has retired from Government service, being the mother of two adult girls, and becoming a widow at the age of 76 years.

She was treated for hypertension and diabetes, but mesomorph. She was infected with SARS Covid 19, developed cerebral hypoxia, and was medically treated.

Along with medication for Hypertension and Diabetes Mellitus, she was regularly treated twice a week with physiotherapy and her functional prognosis was analyzed along with from 2011 till December 2021.

She is functionally independent for ADL, daily care, and financial needs.

Pain, stiffness of shoulders, knee pain (Right) with occasional dizziness recorded.

Cognitively doing good as she was found to live independently with a good lifestyle.

TABLE 1. RESULTS ON NPRS, HBA1C, KATZ, FAZEKELS SCALE

YEARS	SCALES ON NPRS	HbA1c	KATZ INDEX ON ADL	FAZEKELS SCALE ON CSVD
2011	8	6		
2021	2	7		
PROGNOSIS	Has not taken MRI			

DISCUSSION

Critical Research Questions arising:

I. Does Vertigo give a clue for SVD

Vertigo was thought to be related to cardiovascular predictor; Few researchers have related dizziness among elders with CSVD leading to neurodegenerative disorders.

Toker et al 2008 in a systematic review from 1,506 citations and 5 studies vertigo could be a predictor for cardiovascular diagnosis. Whereas this research does not give any known history or complaints of cardiac ailment, but a hypertensive and on medication. Further *Fatahzadehet al 2006* in clinical classification of including stroke and transient ischemic attack to be cardiovascular diseases, which supports this subject having had the single-vessel disease as shown in her NMRI with vertigo for which she was treated but SVD was not treated with medication.

Cerchiai et al 2017 with ENT and Neurological experts from Italy have shown a link between cerebral small vessel white matter disease with dizziness among geriatric subjects. SVD further can give rise to cognitive decline *(De Groot 2002)* dementia *(Tavera 2016)* and Falls *(Sibolt 2014).*

II. Role of physiotherapy here?

Karlberg et al 2004 theorized that parts of the vestibular system are differentially susceptible to global drops in pressure leading to ischemia (Billet et al 1989). Further, *Newman et al 2008* have added strength (this research subject having vertigo and cerebral ischemic changes) that a global reduction in blood pressure leads to local asymmetries in the vestibular system causing vertigo via a Transient ischemic attack type mechanism.

Tan et al 2017, recorded hypertension, diabetes mellitus and genetics to be associated with Arteriosclerosis, aging hence called hypertensive SVD *(TerTelgte 2018).*

Impaired autoregulation of involved small vessels results in reduced cerebral blood flow and chronic cerebral hypoperfusion.

Rigsby et al 2007 have noted in male hypertension rats spironolactone to improve the tone of the cerebral vasculature.

Rensma et al 2018 in a systematic review risk factors such as hypertension, diabetes mellitus, smoking, dyslipidemia, infection, heredity diseases, obesity, homocysteine concentration for CSVD.

Pantoni 2010 with neuroimaging of CSVD involving lacunar infarcts, subcortical infarct with microbleeds, brain atrophy, and enlarged perivascular spaces.

While research studies have identified hypertension and diabetes to be associated with CSVD, this research subject was hypertensive and a diabetic along with vertigo, and more vulnerable to developing ischemic changes of neurological higher centers.

Her NMRI revealed at her age of 60 years with vertigo has shown CSVD with cortical atrophy.

III. Is there a link with hypertension age?

Li et al 2018 have stated main clinical manifestations of CSVD include stroke, cognitive decline, dementia, psychiatric disorders, an abnormal gait, and urinary incontinence.

According to *Petty et al 2000*, 25% of all ischemic strokes from SVD put patients at twice the risk for SVD *(Warldlow et al, 2013).*

The leading cause of functional loss, cognitive decline, and disability in elders.

Subtle gait and postural abnormalities were recorded among SVD subjects *(Ahmad et al, 2016).*

BPPV *(Bhatacharya et al 2017)* to be prevalent among 9 % of elders can reduce ADL and depression.

Vestibular rehabilitation programs were shown to be effective *(Herdman 2013).*

Gait and posture can get altered in CVSD which are physical components involved.

Pinkhardt et al 2014 recorded oculomotor and cognitive functioning probably depend more on which fibers are hit by SVD than the amount of fibers affected.

White matter lesions burden positively correlates with age *(Okroglic et al 2013)* as SVD is linked with the development of geriatric syndrome *(Kuo et al 2004).*

Dizziness Handicap Inventory Questionnaire *(Jacobson et al 1990).*

SVD burden based on Fazekas scale *(Fazekas et al 1999).*

White matter hyperintensities on T2 weighted on MRI are the radiological expression of SVD and known marker of a higher risk cerebral, cerebellar, and brainstem stroke *(Fazekas et al, 1993).*

Una et al 2021 on a holistic approach in the clinical management of CSVD.

This research subject was found to have in the last ten years independent for ADL, reasonable cognitive abilities going for regular walking for 30 minutes weekly five times.

Having been infected with SARS Covid -19, she has recovered with bilateral hypertonicity (could be cerebral hypoxia) but with good functional recovery. She was complaining of a stiff neck, shoulders which were treated with physiotherapy.

Regular adherence to specific physiotherapy findings of this longitudinal research can be vital for larger RCTs as prophylactic therapy for CSVD.

With infrequent complaints of knee pain, LBA was treated with specific physiotherapy and VD3 supplements.

As shown in the table of results, NPRS reduced but glycemic control varied but remained functionally independent for all his daily activities, which were worth noting.

CONCLUSION

Less focused was geriatric research, but as it necessitates their right to lead their life well, prophylactic means where especially with physiotherapy, a non – pharmacological means can, along with due treatment with medication can be a boon in elderly care with increasing elders worldwide, this unfocused area of preventing neurodegenerative disorders gets more highlighted in this ten years of longitudinal follow up and analysis with due evidence from 2011 – 2021.

Further studies on other measurable variables such as NMRI, specific parameters like gait, including other disciplines in the research are highly recommended.

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