

How to Cite:

Khurana, B., Kaur, S., Kour, M. P., & Sharma, B. (2022). Physiotherapy in leukoaraiosis: A case study. *International Journal of Health Sciences*, 6(S1), 9178–9182.
<https://doi.org/10.53730/ijhs.v6nS1.7071>

Physiotherapy in leukoaraiosis: A case study

Dr. Barkha Khurana

Associate Professor, Chandigarh University, Mohali, Punjab

Email: barkhaakhurana@gmail.com

Ms. Swarnjeet Kaur

Assistant Professor, Chandigarh University, Mohali, Punjab

Email: swarnkhangura@gmail.com

Dr. Monica Preet Kour

Assistant Professor, Chandigarh University, Mohali, Punjab

Email: swarnkhangura@gmail.com

Dr. Bhavna Sharma

Assistant Professor, Chandigarh University, Mohali, Punjab

Email: bhavnasharma0289@yahoo.co.in

Abstract---The human brain is a complex structure having a plethora of functions. The human beings utilize their brain according to their need and requirement. Any injury or disease, whether caused due to degeneration or the mishap (Road traffic accident, fall from height) may lead to ischemia or necrosis of the neurons. The death of the neurons, may affect the productivity of the specific functions of the brain and likewise the overall performance of the person. The white and gray matter are present in the brain. The gray matter forms the outline of the brain, whereas the white matter forms the inner part. The white matter consists of axons of the nerves. The white matter got the name as the nerves are covered by myelin sheath. Leukoaraiosis is the condition where there are abnormal changes in the white matter of the brain. This condition is generally seen in aged people. On CT scans, leukoaraiosis appears as hypodense periventricular lesions of white matter. Leukoaraiosis is a feature of the arterioles cerebrovascular pathologies that lead to stroke, including hypertensive arteriopathy, cerebral amyloid angiopathy, and CADASIL. There are gait disturbances as well as dementia in patients of LA. Physiotherapy is the mainstay of the disorder. Gait re-education and balance exercises play an essential role in cases of LA.

Keywords---Leukoaraiosis, Physiotherapy, gray matter, myelin sheath.

Introduction

The human beings have the most developed brain among all the species. The brain controls all the emotions, thoughts, touch, motor skills, hunger, temperature and all other activities that are required by the humans to carry on with their living.

White and gray matter of brain

In the brain, the gray matter refers to the outer portion of the brain, whereas the white matter is present in the inner portion. Although, it is just the opposite in case of spinal cord.

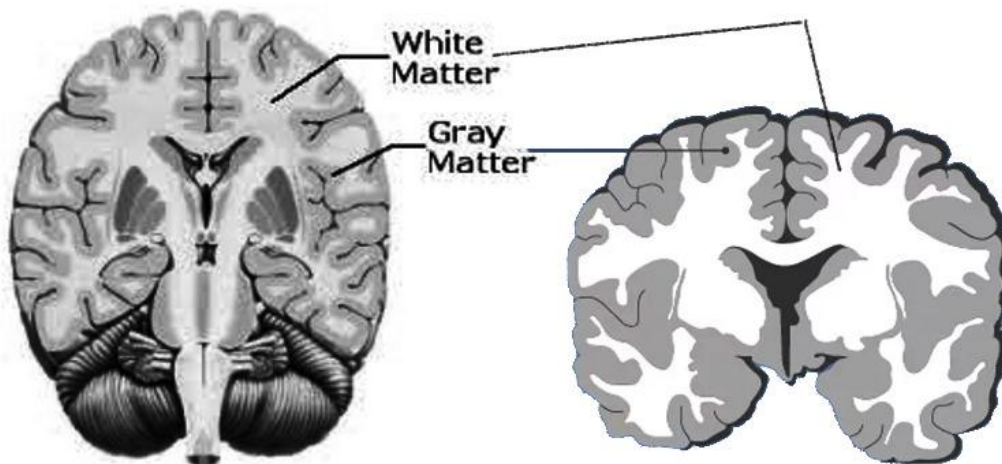


Fig- 1

The white matter in brain is formed of axons of the nerve cells. It is found in the subcortical area of brain. Yet white matter makes up half the human brain and has not been thought to play a vital role in cognition or learning outside the context of pathology. That view could change. Imaging and cellular and molecular studies reveal white matter plasticity with possible implications for normal cognitive function and also psychological disorders.

What is leukoaraiosis?

It is also known as small vessel ischemia. It is a pathological condition where the blood supply from the small vessels is compromised, ischemia, micro-hemorrhage or loss and deformation of myelin sheath. Leukoaraiosis (*leuko* – white, *araiosis* – rarefaction) was first described by Hachinski 30 years ago, and still has remained an important and widely studied research topic, especially regarding its aetiology and clinical correlates. It is caused by hypoxia/ischemia of

the small vessels, mainly the thalamostriate arteries and other perforating arteries. As the age advances, the arteries lose their elasticity, as a result of deposition of atherosclerotic plaques. Not only the aging process is the reason but any fall, injury on the head can also cause ischemia of the white matter.

The main characteristics of patients with MCI (LACI) are the early and apparent clinical manifestations of delayed memory, attention, impaired executive function, and close association with dementia. This analysis of LACI may contribute to an early diagnosis of LACI and provide possible treatment for LACI. But a few cases have come with no loss of memory, attention deficit, except frequent falls.

The prevalence of leukoaraiosis increases with age, mainly over 60 years of age. The females are at more at risk than men. Heart diseases, hypertension, type 2 diabetes, abdominal obesity, occlusion of small vessels due to degenerative changes are the main risk factors. According to a study, age and hypertension were very strongly associated with LA.

The MRI studies reveal the form of low densities on CT and hyperintensities on T2-weighted MRI scans. The patient has mood swings, psychological disbalance and also gets irritated. The face of the patient is expressionless, as if stressed out with their disorder. The patient also has been witnessed with abnormal straight posture. The interaction with the patient is boring as he/she doesn't respond well to the queries. The voice of the patient is low, monotonous and stereotyped and no confidence while interacting. The patient often complains of frequent falls during walking. However, there is no effect on the sleep pattern of the patient as mostly has a sound sleep and awakens fresh. The interaction with the patient reveals a lot about the personality of the patient, as well. The communication is such that the patient does not find any interest in interrogation, simple talks and tries to ignore the examiner.

Pathology and Pathogenesis

The changes in the white matter are detectable through modern imaging techniques, nowadays. Despite many studies, the pathogenesis of this remains unclear. The vascular risk factor has a detrimental effect on their own endothelium. This endothelium dysfunction seems to cause severe ischemia of white matter and also the dysfunction of blood brain barrier.

How can physiotherapy help?

On examination, the balance is affected with frequent falls. There is problem in coordination. Taking these into consideration, the main aim of the Physiotherapist should be to improve the gait pattern, coordination and balance. The physical training helps to regain the lost confidence and also improve the balance. The Gait Re-education also plays a vital role in the cases of leukoaraiosis. It is the training given to regain the normal walking pattern in cases of neurological disorders. The Physiotherapist trains the patient to control his/her muscles of hip and legs. After the complete assessment, if strengthening is required, then exercises for the same are also given. Proper weight bearing is

the main concern for the Physiotherapist so as to avoid any compensatory or trick movements by the patient while walking.

Since physical activity decreases the vascular risk factors, physical activity may slow down the progression of leukoaraiosis in patients without advanced disease, thereby preventing neuropsychiatric disorders. In advanced disease, the interaction with the patient seems too unproductive as he/she is least interested to answer the queries put up by the Physiotherapist. The patient sounds low, lost in his/her own thoughts and unresponsive.

Conclusion

The cases of leukoaraiosis present with varying clinical features. The patient may be agitated sometimes whereas he/she may also be calm. The patient is occasionally talkative, smiles frequently and many a times he/she is with a blank/masked face. The cases represent a variety of features and none of them should be ignored. The patients may never complain about the problems being faced and therefore the problems get unnoticed. Frequent falls, can be fatal as that may increase the chances of associated injuries. Further studies in Physiotherapy, can help getting a solution and decide for a suitable treatment.

References

- 1) Neuroanatomy, Gray matter. Anthony A. Mercadante; Prasanna Tadi.
- 2) Leukoaraiosis and Stroke, Eric E. Smith, MD, MPH
- 3) <https://en.wikipedia.org/wiki/Leukoaraiosis>
- 4) Improving gait and balance in patients with leukoaraiosis using transcranial direct current stimulation and physical training: an exploratory study, Diego Kaski 1, Raul Omar Dominguez, John H Allum, Adolfo M Bronstein
- 5) Association between Leukoaraiosis Severity and Functional Outcomes in Patients with Subcortical Infarct, Go Eun Kim ,1 Min Ho Chun ,1Min Cheol Jang ,2 Kyung Hee Do ,3 Su Jin Choi
- 6) <https://medlineplus.gov/ency/article/002344>.
- 7) Change in the Brain's White Matter
- 8) The role of the brain's white matter in active learning and memory may be underestimated, R. Douglas Fields White Matter in the Brain
- 9) By Esther Heerema, MSW, October 06, 2020 Leukoaraiosis – new concepts and modern imaging, Marta Marek, Maciej Horynieccki, Michał Frączek, and Ewa Kluczevska
- 10) Diagnostic Imaging – Brain, Third edition, 2016
- 11) Physical activity and white matter hyperintensities: A systematic review of quantitative studies, Elisa R. Torres, Emily F. Strack, Claire E. Fernandez, Tyler A. Tumey, and Mary E. Hitchcock Elisa R. Torres, Emily F. Strack, Claire E. Fernandez, Tyler A. Tumey, and Mary E. Hitchcock
- 12) Leukoaraiosis with mild cognitive impairment, Mi Te, Ethan Zhao, Sun Qinjian
- 13) Pathogenesis of Leukoaraiosis, Matija Zupan

- 14) Pathological Correlates of White Matter Hyperintensities on Magnetic Resonance Imaging, Shim Y.S.^a · Yang D.-W.^a · Roe C.M.^b · Coats M.A.^b · Benzinger T.L.^b · Xiong C^b · Galvin J.E.^{c-e} · Cairns N.J.Morris J.C.