CENTRE FOR BRAIN RESEARCH
CBR

TATA
LONGITUDINAL
STUDY OF
AGING

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ಬೆಂಗಳೂರು
BRAIN WAVES

MONTHLY NEWSLETTER FEB - 2024

Letter From Principal Investigator's Desk

Dear participants,

I am excited to share our newest newsletter, spotlighting the transformative role of gait assessment in detecting early signs of dementia. Our research underscores how changes in gait, and how we walk, are closely linked to brain health and can indicate cognitive decline even before other symptoms emerge.

In this issue, we explore the intricate connection between mobility and cognitive function. Gait assessment is not just about movement; it's a window into brain health, offering a non-invasive yet powerful means for early detection and intervention in cognitive impairment.

Your involvement in our gait studies is crucial. Each step you take in our research helps us advance our understanding of dementia, paving the way for innovative care and prevention strategies. We encourage your continued participation and welcome others who wish to join this vital research journey.

Thank you for being an integral part of our community, committed to improving cognitive health. Together, we are opening doors to a future of better understanding and management of dementia.

Warm regards,

Dr. Thomas Gregor Issac
PI, CBR-TLSA
Associate Professor
CBR, IISc, Bengaluru-12, India

ಫೆಬ್ರವರಿ 2024 ರ ನಮ್ಮ ಸುದ್ದಿ ಪತ್ರವನ್ನು ಹಂಚಿಕೊಳ್ಳಲು ನಾನು ಉತ್ಸುಕನಾಗಿದ್ದೇನೆ. ಈ ಸುದ್ದಿಪತ್ರವು ಬುದ್ಧಿಮಾಂದ್ಯತೆಯ ಆರಂಭಿಕ ಚಿಹ್ನೆಗಳನ್ನು ಪತ್ತೆ ಹಚ್ಚುವಲ್ಲಿ ನಡಿಗೆ ಮೌಲ್ಯ ಮಾಪನದ ಪರಿವರ್ತಕ ಪಾತ್ರವನ್ನು ಒತ್ತಿಹೇಳುತ್ತದೆ. ನಮ್ಮ ಸಂಶೋಧನೆಯು ನಡಿಗೆಯಲ್ಲಿನ ಬದಲಾವಣೆಗಳು ಮತ್ತು ನಾವು ಹೇಗೆ ನಡೆಯುತ್ತೇವೆ ಎಂಬುದು ಮೆದುಳಿನ ಆರೋಗ್ಯಕ್ಕೆ ನಿಕಟವಾಗಿ ಸಂಬಂಧ ಹೊಂದಿದೆ ಎಂಬುದನ್ನು ಒತ್ತಿಹೇಳುತ್ತದೆ ಮತ್ತು ಇತರ ರೋಗಲಕ್ಷಣಗಳು ಹೊರಹೊಮ್ಮುವ ಮೊದಲೇ ಅರಿವಿನ ಅವನತಿಯನ್ನು ಸೂಚಿಸಬಹುದು.

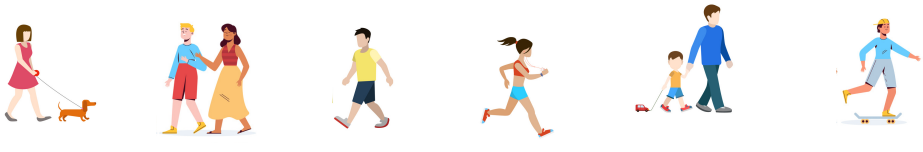
ಈ ಸಂಚಿಕೆಯಲ್ಲಿ, ಚಲನಶೀಲತೆ ಮತ್ತು ಅರಿವಿನ ಕ್ರಿಯೆಯ ನಡುವಿನ ಸಂಕೀರ್ಣ ಸಂಪರ್ಕವನ್ನು ನಾವು ಅನ್ವೇಷಿಸುತ್ತಿದ್ದೇವೆ. ನಡಿಗೆ ಮೌಲ್ಯಮಾಪನವು ಕೇವಲ ಚಲನೆಯ ಬಗ್ಗೆ ಅಲ್ಲ; ಇದು ಮೆದುಳಿನ ಆರೋಗ್ಯಕ್ಕೆ ಒಂದು ಕಿಟಕಿಯಾಗಿದ್ದು, ಅರಿವಿನ ದುರ್ಬಲತೆಯ ಆರಂಭಿಕ ಪತ್ತೆ ಮತ್ತು ಮಧ್ಯಸ್ಥಿಕೆಗೆ ಆಕ್ರಮಣಶೀಲವಲ್ಲದ ಆದರೆ ಶಕ್ತಿಯುತವಾದ ವಿಧಾನವಾಗಿದೆ.

ನಮ್ಮ ನಡಿಗೆ ಅಧ್ಯಯನದಲ್ಲಿ ತಮ್ಮ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆ ಬಹು ಮುಕ್ಯವಾಗಿದೆ . ನಮ್ಮ ಸಂಶೋಧನೆಯಲ್ಲಿ ನೀವು ತೆಗೆದುಕೊಳ್ಳುವ ಪ್ರತಿಯೊಂದು ಹೆಜ್ಜೆಯು ಬುದ್ಧಿಮಾಂದ್ಯತೆಯ ಬಗ್ಗೆ ನಮ್ಮ ತಿಳುವಳಿಕೆಯನ್ನು ಹೆಚ್ಚಿಸಲು ಸಹಾಯ ಮಾಡುತ್ತದೆ, ನವೀನ ಆರೈಕೆ ಮತ್ತು ತಡೆಗಟ್ಟುವ ತಂತ್ರಗಳಿಗೆ ದಾರಿ ಮಾಡಿಕೊಡುತ್ತದೆ.

ನಿಮ್ಮ ನಿರಂತರ ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ನಾವು ಪ್ರೋತ್ಸಾಹಿಸುತ್ತೇವೆ ಮತ್ತು ಈ ಪ್ರಮುಖ ಸಂಶೋಧನಾ ಪ್ರಯಾಣಕ್ಕೆ ಸೇರಲು ಬಯಸುವ ಇತರರನ್ನು ಸ್ವಾಗತಿಸುತ್ತೇವೆ. ಅರಿವಿನ ಆರೋಗ್ಯವನ್ನು ಸುಧಾರಿಸಲು ಬದ್ಧವಾಗಿರುವ ನಮ್ಮ ಸಮುದಾಯದ ಅವಿಭಾಜ್ಯ ಅಂಗವಾಗಿರುವುದಕ್ಕಾಗಿ ಧನ್ಯವಾದಗಳು. ಒಟ್ಟಾಗಿ, ನಾವು ಬುದ್ಧಿಮಾಂದ್ಯತೆಯ ಉತ್ತಮ ತಿಳುವಳಿಕೆ ಮತ್ತು ನಿರ್ವಹಣೆಯ ಭವಿಷ್ಯಕ್ಕಾಗಿ ಬಾಗಿಲು ತೆರೆಯುತ್ತಿದ್ದೇವೆ.

ಶುಭಾಶಯಗಳೊಂದಿಗೆ,

ಡಾ. ಪ್ರತಿಮಾ ಅರವಿಂದ್, ಪಿಎಚ್. ಡಿ
ಸೈಂಟಿಫಿಕ್ ಆಫೀಸರ್,
ಸೆಂಟರ್ ಫಾರ್ ಬ್ರೈನ್ರಿಸರ್ಚ್



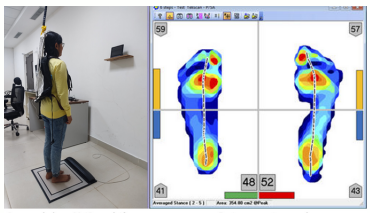
INTRICACIES OF GAIT AND POSTURAL STABILITY IN AGING AND NEURODEGENERATION

Gait and postural stability (balance) are two fundamental aspects of human movement. Gait refers to the manner or style of walking and postural stability refers to the maintenance of specific alignment of body parts relative to each other and to the surrounding environment. Maintenance of gait and postural stability involves a complex interplay of musculoskeletal and neurological systems.

(a) Gait and posture changes in aging and neurodegenerative disease

As people age, they undergo many physiological changes that can affect gait and postural stability. These changes stem from musculoskeletal, neurological, and sensory factors, as well as overall health status. Walking speed typically decreases with age due to reduced muscle strength and flexibility. Older adults also tend to adopt a cautious gait characterized by shorter steps to prevent falls.

Postural stability changes include stooped posture and increased sway due to muscle weakness and bone loss leading to instability and falls. Sensory impairments such as poor vision and proprioceptive deficits may affect spatial awareness and contribute to risk of falls and alteration in gait. Other chronic medical conditions such as arthritis and diabetes can further influence gait and posture by affecting joint mobility and overall fitness. Understanding these changes is vital for promoting healthy aging and preventing mobility issues in the elderly.



Sway analysis on MatScan platform Foot pressure topography

Neurodegenerative diseases may have debilitating effects on mobility, cognition, and overall quality of life. While the changes may be subtle in dementia, gait and posture abnormalities are prominent in Parkinson's disease. Hence, gait and posture changes hold significant clinical importance in neurodegenerative disorders, albeit manifesting differently in each condition due to distinct underlying brain changes.

(b) How to prevent gait and posture abnormalities and counter the risk of falls?

Preventing gait and posture abnormalities in aging involves a multifaceted approach that addresses various factors contributing to these changes. While some aspects may not be entirely preventable, adopting lifestyle modifications and engaging in specific exercises can help minimize their impact and promote healthy aging.

Here are some strategies to consider:

1. **Regular Exercise:** Engage in approximately 30 minutes of regular physical activity, three to four times a week. Include a combination of light aerobic exercises such as brisk walking, strength training with resistance bands, and flexibility exercises.

2. **Balance and Posture Training:** Incorporate balance exercises into your routine to improve stability and reduce the risk of falls. Activities such as tai chi, yoga, and specific balance exercises can help strengthen the muscles involved in maintaining balance, posture, and coordination.

3. **Proper Footwear:** Wear supportive and well-fitted shoes that provide adequate arch support and cushioning. Proper footwear can improve balance and reduce the risk of foot-related problems that may affect gait. Use footwear with good traction to prevent slipping and falls.

4. **Routine Medical Checkup:** Schedule regular check-ups with your healthcare provider to monitor for any underlying medical conditions that may impact gait and posture. Early detection and management of these conditions can help prevent or minimize their effects on mobility and function.

5. **Environmental Modifications:** Make modifications to your home environment to reduce fall hazards by removing clutter, securing rugs, installing grab bars in bathrooms, and improving lighting.

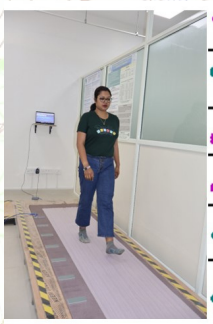
By incorporating these preventive measures into your lifestyle, you can help reduce the risk of gait and posture abnormalities and mitigate the risk of falls.

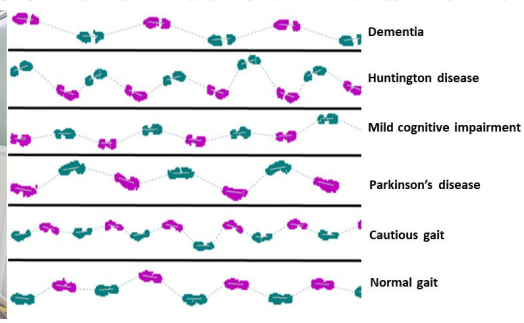
WHAT WE DO AT COGNITIVE AND MOTOR CONTROL LABORATORY AT THE CENTRE FOR BRAIN RESEARCH?

The Cognitive and Motor Control Laboratory uses state-of-the-art technology to study how cognition and motor control interact extensively to affect gait and posture in aging and neurodegenerative diseases.

By utilizing cutting-edge technology and innovative research methods, researchers in this laboratory aim to:

(1) **Identify early signs of neurodegeneration:** Changes in gait and posture can serve as early indicators of neurodegenerative disorders. By analysing subtle alterations in movement patterns, it is possible to potentially detect these conditions before other symptoms manifest, allowing for early intervention and treatment.


Gait analysis on GAITRite system



Patterns of gait in different disorders

(2) **Assess the risk of fall:** Falls are a significant concern and can lead to serious injuries and loss of independence. The laboratory seeks to understand the factors contributing to falls by examining gait, posture, and balance control. By identifying individuals at higher risk of falls, targeted interventions are instituted to prevent falls and improve overall safety.

(3) **Cognitive-motor integration:** Gait and postural stability adaptation paradigms are employed to examine the relationship between cognitive function and motor performance in aging individuals. By studying how cognitive tasks influence gait and posture, we hope to gain insights into cognitive-motor integration challenges and develop strategies to improve both physical and cognitive function.

In the future we hope to integrate virtual reality environments to create ecologically valid scenarios to study gait and posture in real-world situations. Predictive modelling using machine learning will be used to identify patterns associated with impending gait and posture changes.

Facilities available at Cognitive and Motor Control Laboratory

1. GAITRite Platinum Instrumented Walkway
2. MatScan Evolution
3. Movella DOT sensors

Dr Albert Stezin,
MBBS, DGM, PhD

FAQ

1. **Are falls a serious problem in elderly?**
   According to WHO, falls are the second leading cause of unintentional injury related deaths worldwide. One out of five falls causes a serious injury such as broken bones or a head injury.

2. **Is there a relationship between with dementia and gait/balance?**
   Gait and balance are closely related to dementia. Previous research suggests that changes in gait and balance can often precede the onset of cognitive decline and dementia symptoms. These changes are thought to be related to the underlying neurodegenerative processes affecting regions of the brain responsible for motor control and coordination.

3. **What can I do to decrease my risk of gait and balance impairment?**
   You should regularly follow a low-impact exercise program which include light aerobics, flexibility and stretching exercises, and muscle strengthening exercises. Use medicines carefully as per instructions provided and be mindful of the possibility of augmented side-effects when using multiple medicines together. Tackle nutritional deficiencies, especially Vitamin D deficiency.

(ಕನ್ನಡದಲ್ಲಿ)

1. **ವಯಸ್ಸಾದವರಲ್ಲಿ ಬೀಳುವಿಕೆಯು ಗಂಭೀರ ಸಮಸ್ಯೆಯಾಗಿದೆಯೇ?**
   WHO ಪ್ರಕಾರ, ಬೀಳುವಿಕೆಯು ಪ್ರಪಂಚದಾದ್ಯಂತ ಉದ್ದೇಶಪೂರ್ವಕವಲ್ಲದ ಗಾಯಗಳ ಸಾವುಗಳಿಗೆ ಎರಡನೇ ಪ್ರಮುಖ ಕಾರಣವಾಗಿದೆ. ಐದರಲ್ಲಿ ಒಂದು ಬೀಳುವಿಕೆಯು ಮುರಿದ ಮೂಳೆಗಳು ಅಥವಾ ತಲೆ ಗಾಯದಂತಹ ಗಂಭೀರವಾದ ಸ್ಥಿತಿಯನ್ನು ಉಂಟುಮಾಡುತ್ತದೆ.

2. **ಬುದ್ಧಿಮಾಂದ್ಯತೆ ಮತ್ತು ನಡಿಗೆ/ಸಮತೋಲನದ ನಡುವೆ ಸಂಬಂಧವಿದೆಯೇ?**
   ನಡಿಗೆ/ಸಮತೋಲನ ಮತ್ತು ಬುದ್ಧಿಮಾಂದ್ಯತೆಗೆ ನಿಕಟ ಸಂಭಂದವಿದೆ. ಹಿಂದಿನ ಸಂಶೋಧನೆಯ ಪ್ರಕಾರ ನಡಿಗೆ ಮತ್ತು ಸಮತೋಲನದಲ್ಲಿನ ಬದಲಾವಣೆಗಳು ಸಾಮಾನ್ಯವಾಗಿ ಅರಿವಿನ ಅವನತಿ ಮತ್ತು ಬುದ್ಧಿಮಾಂದ್ಯತೆಯ ರೋಗಲಕ್ಷಣಗಳ ಆಕ್ರಮಣಕ್ಕೆ ಮುಂಚಿತವಾಗಿರಬಹುದು ಎಂದು ಸೂಚಿಸುತ್ತದೆ. ಈ ಬದಲಾವಣೆಗಳು ಮೋಟಾರು ನಿಯಂತ್ರಣ ಮತ್ತು ಸಮನ್ವಯಕ್ಕೆ ಜವಾಬ್ದಾರರಾಗಿರುವ ಮೆದುಳಿನ ಪ್ರದೇಶಗಳ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವ ನ್ಯೂರೋ ಡಿಜೆನೆರೆಟಿವ್ ಪ್ರಕ್ರಿಯೆಗಳಿಗೆ ಸಂಬಂಧಿಸಿವೆ ಎಂದು ಭಾವಿಸಲಾಗಿದೆ.

3. **ನನ್ನ ನಡಿಗೆ ಮತ್ತು ಸಮತೋಲನದ ದುರ್ಬಲತೆಯ ಅಪಾಯವನ್ನು ಕಡಿಮೆ ಮಾಡಲು ನಾನು ಏನು ಮಾಡಬಹುದು?**
   ಲಘು ಏರೋಬಿಕ್ಸ್, ಸ್ಟ್ರೆಚಿಂಗ್ ವ್ಯಾಯಾಮಗಳು ಮತ್ತು ಸ್ನಾಯುಗಳನ್ನು ಬಲಪಡಿಸುವ ವ್ಯಾಯಾಮಗಳನ್ನು ಒಳಗೊಂಡಿರುವ ಕಡಿಮೆ-ಪ್ರಭಾವದ ವ್ಯಾಯಾಮ ಕಾರ್ಯಕ್ರಮವನ್ನು ನೀವು ನಿಯಮಿತವಾಗಿ ಅನುಸರಿಸಬೇಕು. ಒದಗಿಸಿದ ಸೂಚನೆಗಳ ಪ್ರಕಾರ ಔಷಧಿಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಬಳಸಿ ಮತ್ತು ಅನೇಕ ಔಷಧಿಗಳನ್ನು ಒಟ್ಟಿಗೆ ಬಳಸುವಾಗ ವರ್ಧಿತ ಅಡ್ಡಪರಿಣಾಮಗಳ ಸಾಧ್ಯತೆಯ ಬಗ್ಗೆ ಗಮನವಿರಲಿ. ಪೌಷ್ಟಿಕಾಂಶದ ಕೊರತೆಗಳನ್ನು, ವಿಶೇಷವಾಗಿ ವಿಟಮಿನ್ ಡಿ ಕೊರತೆಯನ್ನು ನಿಭಾಯಿಸಬೇಕು.

CENTRE FOR BRAIN RESEARCH CBR

Message from PI Desk
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