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Effects of exercises on calf muscles in patients with diabetis mellitus as validated by magnetic resonance imaging

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Purpose: Diabetes Mellitus (DM) is a multi-systemic disease associated with significant complications affecting multiple organs. Purpose of this work is to evaluate the changes in calf muscles for patients with Diabetic Mellitus (DM) using Magnetic Resonance Imaging (MRI) techniques.

Methods: Time of Flight (TOF) Maximum Intensity Projection (MIP), T1 maps with variable flip angles, T2 weighted spin echo imaging were performed on 4 volunteers (aged 30±5) and DM patients (aged 32, 68) pre-exercise, on a 1.5 T Siemens scanner. Total acquisition time was 6 minutes 20 seconds. Each volunteer & DM patient were then requested to perform yoga postures Supta Padangusthasana, Utkatasana and Calf raises for 6 minutes 30 seconds at maximum effort, outside the scanner and subsequently rescanned. To calculate significant signal increase, region of interest were drawn on TOF MIP coronal images in arteries of calf muscles. Student t-tests were performed to determine statistical significance.

Results: Amongst volunteers, significant signal increase in arteries of calf muscles can be noticed, signal intensity graphs are illustrated. In DM patients, signal increase in TOF MIP, T_2 weighted images can be seen in specific arteries (posterior, anterior tibial, posterior tibial) of calf muscles post-exercise. T_1 map depicts fat distribution in calf muscles for DM patients compared to volunteers.

Discussion: The study indicates that yoga has a positive short term effect on multiple DM related foot complications. This study depicts that MRI provides a potential insight into the benefits of yoga for DM patients through deriving biomarkers for preventive medicine relevant to yoga interception.

Biography

Arush Honnedevasthana Arun has completed Master's in Bio-medical Signal Processing and Instrumentation in Dayananda Sagar College of Engineering and his research interest is in the development of novel techniques in the domain of medical imaging, such as image processing techniques applied to medical imaging modalities to enable robust imaging and applications in MR reconstruction. He has 7 conference proceedings and 1 provisional patent filed.

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