



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

MGM SCHOOL OF PHYSIOTHERAPY

Sector-1, Kamothe, Navi Mumbai – 410209

APPLICATION FOR SEED MONEY/RESEARCH GRANT

Date: 16th December 2021

Name of Principal Investigator: Miss Bhumika Adsul

Name of co-investigator/s : Dr. Rajani Mullerpatan

Title of the project: Development of a Two-dimensional method for evaluating movements of temporomandibular joint (MGM/DCH/IEC/58/2021)

Name of Department: MGM Centre of Human Movement Science, MGM School of Physiotherapy

Name of the Institution: MGM Institute of Health Sciences, NM

Designation: Professor- Director

E-mail address: rajani.kanade@gmail.com

Mobile :9920048476

List of important publications of last 5 years of the all the investigators in the relevant fields

1. Bagwe H, Agarwal BM, **Mullerpatan R**. Evaluation and Physiotherapy Management of Diaphragm Dysfunction in Patients Admitted to the Medical Critical Care Unit: A Review of the Literature. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2022;34(4). Pg.no: 39-62
2. **Mullerpatan R**, Waingankar P, Parab S, Agarwal B, Nagrale O, Dalvi S. Pilot implementation of rural rehabilitation services, India. *Bulletin of the World Health Organization*. 2022 Nov 1;100(11): pg.no:662-8.
3. Khan L, Shetty M, Kherada S, Kava R, Kazi M, Walankar P, **Mullerpatan R**. Dough kneading exposure at the kitchen workstation: Influence on handgrip strength and implications for therapy in hand rehabilitation. *Work*. (Preprint):1-6.
4. Bagwe H, Agarwal B, **Mullerpatan R**. Evaluation and physiotherapy management of diaphragm dysfunction in medical critical care unit. *Critical Reviews™ in Physical and Rehabilitation Medicine*.
5. Costanzo G, Misaggi B, Ricciardi L, AlEissa SI, Tamai K, Alhelal F, Alqahtani Y, Alsobayel HI, Arand M, Balsano M, Blattert TR. SPINE20 recommendations 2021: spine care for people's health and prosperity. *European Spine Journal*. 2022 Apr 7:1-0.
6. **Mullerpatan RP**, Bharnuke JK. Differences in Foot Characteristics Between Bharatanatyam Dancers and Age-Matched Non-Dancers. *Medical Problems of Performing Artists*. 2022 Mar 1;37(1):53-7.



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

MGM SCHOOL OF PHYSIOTHERAPY

Sector-1, Kamothe, Navi Mumbai – 410209

7. **Mullerpatan RP**. National Education Policy 2020: Call for reconfiguration of physiotherapy education and research in India. *Journal of Society of Indian Physiotherapists*. 2022 Jan 1;6(1):1.
8. Agarwal BM, Yadav RP, Tambe SD, Kulkarni CC, **Mullerpatan RP**. Evaluation of Early Knee Osteoarthritis Using Biomechanical and Biochemical Markers. *Critical Reviews™ in Biomedical Engineering*. 2021;49(6).
9. Desai P, **Mullerpatan R**. Functioning of Older adults in Low-Middle Income Countries: A Literature Review. *Critical Reviews™ in Physical and Rehabilitation Medicine*.
10. Patel G, **Mullerpatan R**, Agarwal B, Shetty T, Ojha R, Shaikh-Mohammed J, Sujatha S. Validation of wearable inertial sensor-based gait analysis system for measurement of spatiotemporal parameters and lower extremity joint kinematics in sagittal plane. *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine*. 2022 Jan 8:09544119211072971.
11. Vaidya SS, Agarwal B, Singh Y, **Mullerpatan R**. Effect of Yoga on Performance and Physical Fitness in Cricket Bowlers. *International Journal of Yoga Therapy*. 2021;31(1): Article-10.
12. **Mullerpatan R**, Shetty T, Singh Y, Agarwal B. Lower extremity joint loading during Bounce rope skip in comparison to run and walk. *Journal of Bodywork and Movement Therapies*. 2021 Apr 1;26:1-6.
13. Pahade AJ, Wani SK, **Mullerpatan RP**, Elizabeth Roach K. Indian (Marathi) version of the Shoulder Pain and Disability Index (SPADI): Translation and validation in patients with adhesive capsulitis. *Hong Kong Physiotherapy Journal*. 2021 Dec 19;41(02):139-46.
14. Agarwal BM, van Deursen R, **Mullerpatan RP**. Electromyographic evaluation of spine and lower extremity muscles during repeated and sustained bodyweight deep-squat. *Trends in Sport Sciences*, 2021, 28(1): 19-27.
15. Scott Haldeman, Margareta Nordin, Patricia Tavares, **Rajani Mullerpatan** et al. Distance Management of Spinal Disorders During the COVID-19 Pandemic and Beyond: Evidence-Based Patient and Clinician Guides from the Global Spine Care Initiative. *JMIR Public Health Surveill*. 2021 Feb 17;7(2): 25484. doi: 10.2196/25484.
16. Jinny P Kanjirathingal, **Rajani P Mullerpatan**, Girish Nehete, Nagarathna Raghuram. Effect of Yogasana intervention on standing balance performance among people with diabetic peripheral neuropathy: A pilot study. 2021; 14 (1) 60-70.
17. **Rajani Mullerpatan**, Triveni Shetty, Yuvraj Singh, Bela Agarwal. Lower extremity joint loading during Bounce rope skip in comparison to run and walk. *Journal of Bodywork & Movement Therapies*. 26 (2021) 1-6.
18. Dharod R, Shetty T, Shete R, **Mullerpatan R**. Effect of Plyometric Training on Explosive Power, Agility, Balance, and Aerobic Performance of Young Adult Male Kabaddi Players. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2020;32(3).
19. **Rajani P Mullerpatan**, Bela M Agarwal, Triveni V Shetty. Exploration of muscle activity using surface electromyography while performing Suryanamaskar. *International Journal of Yoga*; 2020 13 (2): 137-143.
20. **Mullerpatan R**, Nahar S, Singh Y, Cote P, Nordin M. Burden of spine pain among rural and tribal populations in Raigad District of Maharashtra State of India. *European Spine Journal*. 2020 Sep 10:1-7.



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

MGM SCHOOL OF PHYSIOTHERAPY

Sector-1, Kamothe, Navi Mumbai – 410209

21. Mohanty T, Mehta D, **Mullerpatan R**, Agarwal B. Cardiorespiratory Endurance, Flexibility and Lower-Extremity Muscle Strength in Children and Adolescents with Cerebral Palsy. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2020;32(2)
22. Bharnuke JK, **Mullerpatan RP**, Hiller C. Evaluation of Standing Balance Performance in Indian Classical Dancers. *Journal of Dance Medicine & Science*. 2020 Mar 15;24(1):19-23.
23. Preface: Rehabilitation with a Focus on Pathologies that Significantly Impact the Quality of Life. Mullerpatan R, Kamath MV. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(4).
24. Shetty M, Balasundaran S, **Mullerpatan R**. Grip and pinch strength: Reference values for children and adolescents from India. *Journal of pediatric rehabilitation medicine*. 2019 Jan 1;12(3):255-62
25. **Mullerpatan R**, Shetty T, Ganesan S, Johari A. Review of lower extremity function following SEMLS in children with cerebral palsy. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(2)
26. **Mullerpatan R**, Girdhar P, Singh Y, Salgotra KR, Wilkey A, Nordin M. Evidence-Based Rehabilitation of Spine-Pain Disorders among Underserved Individuals in Navi Mumbai, India: A Two-Year— Observational Report. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(2).
27. **Mullerpatan R**, Sonkhia M, Thomas B, Mishra S, Gupta A, Agarwal B. Review of Contextual Factors Influencing Function Following Lower Extremity Amputation in Low to Middle Income Countries. *Crit Rev PhysRehabil Med*. 2019;31(2)
28. Shah T, Shetty M, Bose M, **Mullerpatan R**. A Study of Fine and Manual Hand Dexterity in People with Parkinson's disease. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
29. **Mullerpatan R**, Bharnuke J, Hiller C. Gait kinematics of Bharatanatyam dancers with and without low back pain. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
30. Agarwal B, Advani M, van Deursen R, **Mullerpatan R**. Influence of varying squat exposure on knee pain and function among people with knee osteoarthritis. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
31. Nair S, Agarwal B, Chatla J, **Mullerpatan R**. Health-related physical fitness of people with type 2 diabetes mellitus. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
32. Naryanan G, Bose M, Parab S, Agarwal B, **Mullerpatan R**. Energy expenditure using three different walking techniques in individuals with spinal cord Injury. *Crit Rev Phys Rehab Med*. 2019;31(1):35-41
33. Amberkar O, Agarwal B, Singh Y, Shete R, **Mullerpatan R**. Level of sports participation and performance among people with spinal cord injury. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
34. Shetty T, Johari A, Ganesan S, **Mullerpatan R**. Gait Deviation Index of Children with Cerebral Palsy with Severe Gait Impairment. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
35. **Mullerpatan R**, Thanawala M, Agarwal B, Ganesan S. Development of the Deep Squat Milestone in Typically Developing Children. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
36. Shetty T, Parab S, Ganesan S, Agarwal B, **Mullerpatan R**. Lower extremity muscle strength and endurance in ambulatory children with cerebral palsy. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

MGM SCHOOL OF PHYSIOTHERAPY

Sector-1, Kamothe, Navi Mumbai – 410209

37. Iyer P, Shetty T, Ganesan S, Nair S, Rao N, **Mullerpatan R**. Exploration of sports participation in children with mild intellectual disability. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
38. Agarwal B, Advani M, van Deursen R, **Mullerpatan R**. Influence of varying squat exposure on knee pain and function among people with knee osteoarthritis. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2019;31(1)
39. Pisal A, Agarwal B, **Mullerpatan R**. Evaluation of Daily Walking Activity in Patients with Parkinson Disease. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2018;30(3)
40. Johnson CD, Haldeman S, Nordin M, Chou R, Côté P, Hurwitz EL, Green BN, Kopansky-Giles D, Randhawa K, Cedraschi C, Ameis A, **Mullerpatan R**. The Global Spine Care Initiative: methodology, contributors, and disclosures. *European Spine Journal*. 2018 Sep 1;27(6):786-95
41. Nordin M, Randhawa K, Torres P, Yu H, Haldeman S, Côté P, Torres C, Modic M, **Mullerpatan R**, Cedraschi C, Chou R. The Global Spine Care Initiative: a systematic review for the assessment of spine-related complaints in populations with limited resources and in low-and middle-income communities. *European Spine Journal*. 2018 Sep 1;27(6):816-27
42. Haldeman S, Johnson CD, Chou R, Nordin M, Côté P, Hurwitz EL, Green BN, Kopansky-Giles D, Cedraschi C, Aartun E, **Mullerpatan R**, Acaroğlu E. The Global Spine Care Initiative: classification system for spine-related concerns. *European Spine Journal*. 2018 Sep 1;27(6):889-900
43. Haldeman S, Johnson CD, Chou R, Nordin M, Côté P, Hurwitz EL, Green BN, Cedraschi C, Acaroğlu E, **Mullerpatan R**, Kopansky-Giles D, Ameis A. The Global Spine Care Initiative: care pathway for people with spine-related concerns. *European Spine Journal*. 2018 Sep 1;27(6):901-14
44. Kopansky-Giles D, Johnson CD, Haldeman S, Chou R, Côté P, Green BN, Nordin M, Acaroğlu E, Ameis A, Cedraschi C, **Mullerpatan R**, Hurwitz EL. The Global Spine Care Initiative: resources to implement a spine care program. *European Spine Journal*. 2018 Sep 1;27(6):915-24
45. Johnson CD, Haldeman S, Chou R, Nordin M, Green BN, Côté P, Hurwitz EL, Kopansky-Giles D, Acaroğlu E, Cedraschi C, **Mullerpatan R**, Ameis A. The Global Spine Care Initiative: model of care and implementation. *European Spine Journal*. 2018 Sep 1;27(6):925-45
46. Wani SK, **Mullerpatan R**. Prevalence of shoulder dysfunction among Indian people with type II diabetes. *International Journal of Diabetes in Developing Countries*. 2015 Sep 1;35(3):386
47. Nair SP, Kotian S, Hiller C, **Mullerpatan R**. Survey of musculoskeletal disorders among Indian dancers in Mumbai and Mangalore. *Journal of Dance Medicine & Science*. 2018 Jun 15;22(2):67-74.
48. Fernandes N, Gaikwad S, Hemmerich A, **Mullerpatan R**, Agarwal B. Birthing experience of women who have undergone normal delivery in selected community of India. *International Journal of Innovative, Knowledge Concepts*. 2018
49. Gupte S, **Mullerpatan R**, Ganesan S. Influence of Focus of Attention During Acquisition of Motor Skills in Children of 3–9 Years. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2018;30(1)
50. Agarwal BM, Deursen RV, **Mullerpatan RP**. Influence of habitual deep squatting on kinematics of lower extremity, pelvis and trunk. *Int J Health Rehabil Sci*. 2018;7(1):1-9
51. Agarwal B, Mukri A, Shah M, Ganesan SL, **Mullerpatan R**. Effect of Inspiratory Muscle Training in Individuals with Parkinson's Disorder. *Int J Health Sci Res*. 2017;7(6):178-85



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

MGM SCHOOL OF PHYSIOTHERAPY

Sector-1, Kamothe, Navi Mumbai – 410209

52. Sahasrabudhe SS, Agarwal BM, **Mullerpatan RP**. Comparison of muscle activity and energy cost between various bodyweight squat positions. Clinical Kinesiology: Journal of the American Kinesiotherapy Association. 2017 Jun 22;71(2):19-25
53. Rane SS, Paul A, **Mullerpatan RP**. Reference values of manual dexterity using Minnesota Rate of Manipulation Test for Indian adults. Hand Therapy. 2017 Jun;22(2):79-85

Duration of the project : 36 months

Approval from Scientific Advisory Committee Yes

Ethics committee Clearance Yes

Budget requirements (as per the format as **Annexure 1B**)

	Year I	Year II	Total (INR)
Recurring			
a. Consumables	1000	1000.00	2000.00
b. Travel	-	-	-
c. Contingency	-	-	-
Non-recurring (3D motion analysis)	4000.00*20	-	80000.00
	81000.00	1000.00	82000.00

Signature
Principal Investigator

Signature
Co-Investigator

Signature
Head of Department



CERTIFICATE

This is to certify that dissertation entitled "**Development of a two-dimensional method for evaluating movements of temporo-mandibular joint.**" is a bonafide work by Dr Bhumika Adsul (PT) under the guidance of Dr Rajani Mullerpatan as a partial fulfilment of the regulation for the award of the Degree of Masters of Physiotherapy in Musculoskeletal Physiotherapy.

We have a great pleasure in forwarding it to MGM Institute of Health Sciences, (Deemed to be University), Kamothe, Navi Mumbai.

Date: 1st Dec 2022

Place: Navi Mumbai



Dr Rajani Mullerpatan

Head of Department

Department of Musculoskeletal

Physiotherapy

Professor - Director
MGM School of Physiotherapy
MGMIHS, Navi Mumbai



Dr Rajani Mullerpatan

Professor-Director

MGM School of Physiotherapy,

Navi Mumbai

Professor - Director
MGM School of Physiotherapy
MGMIHS, Navi Mumbai



INSTITUTIONAL ETHICS COMMITTEE
MAHATMA GANDHI MISSION'S DENTAL COLLEGE & HOSPITAL

Junction of NH-4 and Sion Panvel Expressway,
Sector-01, Kamothe, Navi Mumbai- 410 209

Tel: 022- 27436604; Fax: 91-22-27433185; E-Mail:mgmdch@mgnmmumbai.ac.in

MGM/DCH/IEC/ 58 /2021

Date:- 12-17 /2021

To,
Miss Bhumika Prakash Adsul
PG Student, MGM School of Physiotherapy
Guide - *Dr. Rajani Sullerpatan*
Kamothe, Navi Mumbai- 410209

References:

1. Your submission of study protocol
2. Study Title: "Development of a Two-dimensional method for evaluating movements of temporomandibular joint"
3. IEC-MGMDCH referenceno *MGM/DCH/IEC/58/2021*

Dear Miss Bhumika Prakash Adsul

The IEC- MGMDCH has received and reviewed your submission

Following documents were reviewed in the meeting held on date 9/7/2021

1. Application to IERC MGMDCH dt. 25/5/21
2. Summary of research protocol
3. Research protocol (Version 5 dt 7/6 /2021)
4. Amendments to research protocol (Version - Dt - 1 - /2021)
5. Informed consent document (ICD) in English (Version...5...dt...7/6.../2021) -
6. ICD in Hindi language translated from English (Version ...5...dt...7/6.../2021) -
7. ICD in Marathi language translated from English (Version...5...dt...7/6.../2021) -
8. Back translations of ICD from Hindi to English (Version...5...dt...7/6.../2021) -
9. Back translations of ICD from Marathi to English (Version...5...dt...7/6.../2021) -
10. Amendments to the ICD (Versiondt...../2021) -
11. Case Record Form (CRF) / Study Questionnaire / Study Proforma ✓
12. Principal investigators Current Curriculum Vitae (signed and dated) ✓
13. Subject recruitment procedures: advertisement, letters to doctors, notices NA
14. Investigator Brochure (IB) – applicable for investigational new drugs (IND) NA
15. Ethics Committee clearance of other study centers (Total No.) NA
16. Insurance policy if any NA
17. Drugs Controller General (India) [DCG(I)] clearance if applicable NA
18. Investigator's undertaking to DCG(I) if applicable NA
19. Health Ministry Screening Committee (HMSC) approval if applicable NA
20. Bhabha Atomic Research Centre (BARC) approval if applicable NA
21. Genetic Engineering Advisory Committee (GEAC) approval if applicable NA
22. Director General of Foreign Trade (DGFT) approval if applicable NA
23. FDA marketing/manufacturing license for herbal drugs. if applicable NA
24. Other Documents (specify.....)

Page No.



INSTITUTIONAL ETHICAL COMMITTEE
MAHATMA GANDHI MISSION'S DENTAL COLLEGE & HOSPITAL
Junction of NH-4 and Sion Panvel Expressway,
Sector-01, Kamothe, Navi Mumbai- 410 209
Tel: 022- 27436604; Fax: 91-22-27433185; E-Mail:mgmdch@mgmmumbai.ac.in

MGM/DCH/IBC/ 58 /2021

Date:- 12/7/2021

The following members of the Ethics committee discussed the study documents and voted at the meeting:

Sn.	Name	Role and Responsibility
1.	Dr. Deepak Langade	Chairman, Scientific
2.	Dr. Srivalli Natarajan	Secretary, Scientific
4.	Adv. Dr. Karuna Malaviya	Scientific, Legal
5.	Dr. Shilpa Patel	Scientific, Woman
6.	Dr. Ravindranath VK	Scientific
7.	Dr. Ashvini Padhye	Scientific, Woman
8.	Dr. Jyoti Nadgers	Scientific, Woman
9.	Dr. Sumanthini MV	Scientific
10.	Ms. Nithya Eldho Varghese	Lay person
11.	Mrs. Rupali Gujar	Social worker

Approved
DECISION

PageNo.2



INSTITUTIONAL ETHICAL COMMITTEE
MAHATMA GANDHI MISSION'S DENTAL COLLEGE & HOSPITAL
Junction of NH-4 and Sion Panvel Expressway,
Sector-01, Kamothe, Navi Mumbai- 410 209
Tel: 022- 27436604; Fax: 91-22-27433185; E-Mail:mgmdch@mgmmumbai.ac.in

MGM/DCH/IEC/ 52 /2021

Date:- 12-17 /2021

Based on the discussion of the submitted documents for the scientific and ethical review, we approve the research protocol to be conducted and its presented form subject to the following conditions:

1. Applicable and mandatory regulatory permissions to be obtained prior to commencement of the study i.e. registration at clinical trial registry of India.(www.ctri.nic.in)
2. The investigators and other participants should be adequately trained on the protocol and its related procedures, the Good Clinical Practices (GCP) guidelines prior to commencing the study.
3. Participating subjects should be adequately enlightened about the protocol during informed consent process and under insurance coverage in an event of any trial related injury/accident.
4. Participating subjects should not be put to additional financial burden related to the study protocol.

The validity of this approval is for two years from date of approval. Within this period, the Institutional Ethics Committee expects to be periodically informed about the following:

- The progress of the study
- Any Serious Adverse Event (SAE) occurring in the course of the study
- Any significant changes in the protocol/patient information/ informed consent
- Update on safety of the investigating product or procedure

To provide an abridge copy of the final report after completion of the study.

Thanking You,

Yours Sincerely,

Misra Vally
Dr. Srivalli Natarajan
Member Secretary
Dr. Srivalli Natarajan
Member Secretary
IERC MGMDCH
Kamothe, Navi Mumbai-410 209.