

SERUM MAGNESIUM AS A PROGNOSTIC INDICATOR IN ACUTE CORONARY SYNDROMES AND COMPARISON WITH CORONARY PROGNOSTIC INDEX

*¹DR ANNADATHA ACHYUTA AKHILESH,²DR ANUJ VARMA,³DR SUNIL KUMAR

ABSTRACT--Coronary heart disease is one of the leading causes of morbidity and mortality in the world. Various risk factors at different levels have been extensively studied in this disease and various relationships of factors with the disease have been already been established. It is not far ahead by the time we start correlating new factors with CHD. Electrolyte studies in Acute Coronary Syndromes have been studied but there has been no ground breaking research which would change the approach towards managing a case of ACS and CHD (1-4). Serum Magnesium is second most major cation in the body with variety of functions in the body. Majority of the Serum Magnesium in the body is through the dietary sources and majority of the adults do not consume the average daily requirement of the same. Magnesium has been reported to cause arrhythmias and has a role in cardiac metabolism (5-10).

Keywords--acute coronary syndromes, serum magnesium, coronary prognostic index, chest pain

I. INTRODUCTION

The pathway with which it functions and its role has been debatable and unclear. This study is an attempt to establish a connection between Serum Magnesium Levels in Acute Coronary Syndromes. Coronary Prognostic Index is a score which is based on bedside clinical and ECG findings and is used to assess the prognosis in a patient of Acute Myocardial Infarction. This study also attempts to establish a relationship between Serum Magnesium and Coronary Prognostic Index in Acute Coronary Syndromes

II. BACKGROUND/RATIONALE

Several studies have been done which showed variable results in establishing the relationship between Serum Magnesium levels and STEMI. If a clear relationship is established, the role of Intravenous Magnesium Sulphate will be a first line treatment approach in treating or stabilising patients of ACS. It also compares the levels of Serum Magnesium with Coronary Prognostic Index.

¹* POST GRADUATE RESIDENT, DEPARTMENT OF GENERAL MEDICINE, JAWAHARLAL NEHRU MEDICAL COLLEGE, DMIMSU, ROOM NO G-16, YASHODA PG BOYS HOSTEL, JNMC, SAWANGI (M), WARDHA – 442001, achyutakhilesh@gmail.com, 9000285756

² ASSOCIATE PROFESSOR, DEPARTMENT OF GENERAL MEDICINE, JAWAHARLAL NEHRU MEDICAL COLLEGE, DMIMSU

³ PROFESSOR AND HEAD, DEPARTMENT OF GENERAL MEDICINE, JAWAHARLAL NEHRU MEDICAL COLLEGE, DMIMSU

III. OBJECTIVES

To assess Serum Magnesium levels in ACS and correlate it with Coronary Prognostic Index.

To correlate Serum Magnesium with Arrhythmias

IV. METHODS

Study design: Cross sectional study

Setting: Study will be carried out in Acharya Vinobha Bhave Rural Hospital, Sawangi, Meghe, a tertiary care hospital situated in the rural area of Wardha district

The present study will be carried out on all patients of acute coronary syndromes, who will satisfy the selection criteria of the study, admitted in the M.I.C.U/ I.C.CU of Acharya Vinoba Bhave Rural Hospital of Jawaharlal Nehru Medical College, Sawangi, Wardha from August 2019 – 2021.

Participants:

INCLUSION CRITERIA

- Patients who has symptoms and are confirmed any of the acute coronary syndromes.
- Patients who satisfy the ECG criteria for diagnosis of acute STEMI.
- Patients who presented within twelve hours after the onset of symptoms.
- Patients who consented for being included in the study

EXCLUSION CRITERIA

- Patients with Hypokalemia, Hypercalcemia
- Patients with Fat Malabsorption (Celiac disease, Crohns disease)
- Patients with Chronic Alcoholism
- Patients with previous history of diuretic use (Loop,Thiazide), Long term PPI use

Variables: Patient at the end of study could either have Hypomagnesemia or Hypermagnesemia or Normal levels of Mg. Diagnosing STEMI : ST segment elevation acute coronary syndrome is defined by the presence of >1mm ST elevation in atleast two adjacent limb leads, >2mm ST elevation in atleast two contiguous precordial leads or new onset LBBB and with raised Cardiac Markers.

NSTEMI is diagnosed with raised cardiac enzymes without the above mentioned ST elevation criteria.

Bias: None Study size: 100 patients sample size was arrived with a confidence level of 95% with confidence interval of 10 in a population size of 5000 Quantitative variables: Serum Magnesium levels are estimated within the 72 hrs of episode of Acute Coronary Syndromes

V. DISCUSSION

Key results: Serum Magnesium is an important prognostic indicator in Acute Coronary syndromed. Relevant related studies in this region were explored for additional information related to geographic context (11-35). Few studies related to other related non-communicable entities(36-58) and sociocultural aspects (59-84) were reviewed.

Limitations: Patients having Acute STEMI can undergo thrombolysis which would lead to reperfusion and give false values of serum magnesium if measured. The duration after the episode of ACS after which the sample was taken could also make a difference in the values of Acute Coronary Syndromes.

REFERENCES

1. Chandak, Lina Govind, Vidya Krushnarao Lohe, Rahul R. Bhowate, Krushna P. Gandhi, and Neha V. Vyas. "Correlation of Mandibular Radiomorphometric Indices with Serum Calcium and Serum Estradiol in Pre- and Post-Menopausal Women." *CONTEMPORARY CLINICAL DENTISTRY* 8, no. 1 (March 2017): 53–58. <https://doi.org/10.4103/0976-237X.205044>.
2. Mishra, Kshirod K. "Neuroinflammation in Depression - Serum Cytokines as an Indicator." *INDIAN JOURNAL OF PSYCHIATRY* 59, no. 6, 2 (January 2017): S146.
3. Taksande, A. "A New Scoring System for the Diagnosis of Pulmonary Arterial Hypertension." *EUROPEAN HEART JOURNAL* 38, no. 1 (August 2017): 158–59.
4. Choudhari, Mangesh Sudhakar, Manish I. Sonkusale, and Rashmi A. Deshpande. "Sudden Cardiac Arrest on 5th Day after Coronary Artery Bypass Graft Surgery: Diagnostic Dilemma." *ANNALS OF CARDIAC ANAESTHESIA* 21, no. 3 (September 2018): 341–42. https://doi.org/10.4103/aca.ACA_214_17.
5. Schwartz, G. G., P. G. Steg, M. Szarek, D. L. Bhatt, V. A. Bittner, R. Diaz, J. M. Edelberg, et al. "Alirocumab and Cardiovascular Outcomes after Acute Coronary Syndrome." *NEW ENGLAND JOURNAL OF MEDICINE* 379, no. 22 (November 29, 2018): 2097–2107. <https://doi.org/10.1056/NEJMoa1801174>.
6. Jain, Jyoti, Shashank Banait, Iadarilang Tiewsoh, and Madhura Choudhari. "Kikuchi's Disease (Histiocytic Necrotizing Lymphadenitis): A Rare Presentation with Acute Kidney Injury, Peripheral Neuropathy, and Aseptic Meningitis with Cutaneous Involvement." *INDIAN JOURNAL OF PATHOLOGY AND MICROBIOLOGY* 61, no. 1 (March 2018): 113–15. https://doi.org/10.4103/IJPM.IJPM_256_17.
7. Jukema, J. Wouter, Michael Szarek, Laurien E. Zijlstra, H. Asita de Silva, Deepak L. Bhatt, Vera A. Bittner, Rafael Diaz, et al. "Alirocumab in Patients With Polyvascular Disease and Recent Acute Coronary Syndrome ODYSSEY OUTCOMES Trial." *JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY* 74, no. 9 (September 3, 2019): 1167–76. <https://doi.org/10.1016/j.jacc.2019.03.013>.
8. Ray, Kausik K., Helen M. Colhoun, Michael Szarek, Marie Baccara-Dinet, Deepak L. Bhatt, Vera A. Bittner, Andrzej J. Budaj, et al. "Effects of Alirocumab on Cardiovascular and Metabolic Outcomes after Acute Coronary Syndrome in Patients with or without Diabetes: A Prespecified Analysis of the ODYSSEY OUTCOMES Randomised Controlled Trial." *LANCET DIABETES & ENDOCRINOLOGY* 7, no. 8 (August 2019): 618–28. [https://doi.org/10.1016/S2213-8587\(19\)30158-5](https://doi.org/10.1016/S2213-8587(19)30158-5).

9. Steg, Philippe Gabriel, Michael Szarek, Deepak L. Bhatt, Vera A. Bittner, Marie-France Bregeault, Anthony J. Dalby, Rafael Diaz, et al. "Effect of Alirocumab on Mortality After Acute Coronary Syndromes An Analysis of the ODYSSEY OUTCOMES Randomized Clinical Trial." *CIRCULATION* 140, no. 2 (July 9, 2019): 103–12. <https://doi.org/10.1161/CIRCULATIONAHA.118.038840>.
10. White, Harvey D., Ph. Gabriel Steg, Michael Szarek, Deepak L. Bhatt, Vera A. Bittner, Rafael Diaz, Jay M. Edelberg, et al. "Effects of Alirocumab on Types of Myocardial Infarction: Insights from the ODYSSEY OUTCOMES Trial." *EUROPEAN HEART JOURNAL* 40, no. 33 (September 1, 2019): 2801–9. <https://doi.org/10.1093/eurheartj/ehz299>.
11. Agarwal, A., N. Bhola, R. Kambala, and R.M. Borle. "Touch Imprint Cytology: Can It Serve as an Alternative to Frozen Section in Intraoperative Assessment of Cervical Metastasis in Oral Squamous Cell Carcinoma?" *Journal of Oral and Maxillofacial Surgery* 77, no. 5 (2019): 994–99. <https://doi.org/10.1016/j.joms.2019.01.011>.
12. Aglawe, P.B., R.K. Jha, V. Mishra, K.M. Sakore, A. Chetan, and D.S. Shrivastava. "Appraisal of Core Therapy, Supportive Therapy, and Alternative Therapy in a Tertiary Care Rural Hospital of Vidarbha Region in Correlation to Plethora of Menopausal Problems." *Journal of Mid-Life Health* 10, no. 1 (2019): 14–21. <https://doi.org/10.4103/jmh.JMH-131-18>.
13. Agrawal, D., A.S. Bhake, N. Rastogi, S. Laishram, A. Wankhade, and A. Agarwal. "Role of Bethesda System for Reporting Thyroid Lesion and Its Correlation with Histopathological Diagnosis." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 74–81. https://doi.org/10.4103/jdmimsu.jdmimsu_76_18.
14. Agrawal, M., N. Acharya, K. Joshi, and D. Shrivastava. "Effectiveness of Isosorbide Mononitrate in Cervical Ripening before Induction of Labor in Full-Term Antenatal Patients." *Journal of SAFOG* 11, no. 2 (2019): 96–99. <https://doi.org/10.5005/jp-journals-10006-1668>.
15. Aryal, N., P.R. Regmi, E. van Teijlingen, P. Simkhada, and P. Mahat. "Adolescents Left behind by Migrant Workers: A Call for Community-Based Mental Health Interventions in Nepal." *WHO South-East Asia Journal of Public Health* 8, no. 1 (2019): 38–41. <https://doi.org/10.4103/2224-3151.255348>.
16. Bajaj, A., S. Kumar, A.H. Inamdar, and L. Agrawal. "Noninvasive Ventilation in Acute Hypoxic Respiratory Failure in Medical Intensive Care Unit: A Study in Rural Medical College." *International Journal of Critical Illness and Injury Science* 9, no. 1 (2019): 36–42. https://doi.org/10.4103/IJCIIS.IJCIIS_40_18.
17. Baliga, M. "Artificial Intelligence-The next Frontier in Pediatric Dentistry." *Journal of Indian Society of Pedodontics and Preventive Dentistry* 37, no. 4 (2019): 315. https://doi.org/10.4103/JISPPD.JISPPD_319_19.
18. Baliga, S. "It's Time for Creative Solutions: Collaborations." *Journal of Indian Society of Pedodontics and Preventive Dentistry* 37, no. 3 (2019): 223. https://doi.org/10.4103/JISPPD.JISPPD_284_19.
19. Baliga, S.M. "Child Oral Health-Care Literacy in India: Can Access to Services Be Improved?" *Journal of the Indian Society of Pedodontics and Preventive Dentistry* 37, no. 1 (2019): 1–2. https://doi.org/10.4103/JISPPD.JISPPD_18_19.
20. Balwani, M.R., C.P. Bawankule, P. Khetan, and A. Pasari. "Awareness about Kidney and Its Related Function/Dysfunction in School Going Children: A Survey from the Central India." *Saudi Journal of*

- Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia 30, no. 1 (2019): 202–7.
21. Balwani, M.R., C.P. Bawankule, A. Pasari, P. Tolani, S. Vakil, and R. Yadav. “Minimal Change Disease and Kimura’s Disease Responding to Tacrolimus Therapy.” *Saudi Journal of Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia* 30, no. 1 (2019): 254–57.
 22. Balwani, M.R., A. Pasari, and P. Tolani. “Widening Spectrum of Renal Involvement in Psoriasis: First Reported Case of C3 Glomerulonephritis in a Psoriatic Patient.” *Saudi Journal of Kidney Diseases and Transplantation : An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia* 30, no. 1 (2019): 258–60.
 23. Bhat, N., S. Mentri, G. Iliev, F. Qahtani, S. Godbole, S. Mantri, and A. Bal. “First Impression of Teeth Design on Others: A Facial and Personality Analysis in the Central Indian Population.” *Nigerian Journal of Clinical Practice* 22, no. 11 (2019): 1503–8. https://doi.org/10.4103/njcp.njcp_135_19.
 24. Bhayani, P., R. Rawekar, S. Bawankule, S. Kumar, S. Acharya, A. Gaidhane, and M. Khatib. “Profile of Urinary Tract Infection in a Rural Tertiary Care Hospital: Two-Year Cross-Sectional Study.” *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 1 (2019): 22–26. https://doi.org/10.4103/jdmimsu.jdmimsu_87_18.
 25. Borle, R.M., A. Jadhav, N. Bhola, P. Hingnikar, and P. Gaikwad. “Borle’s Triangle: A Reliable Anatomical Landmark for Ease of Identification of Facial Nerve Trunk during Parotidectomy.” *Journal of Oral Biology and Craniofacial Research* 9, no. 1 (2019): 33–36. <https://doi.org/10.1016/j.jobcr.2018.08.004>.
 26. Chaudhary, K.S., and S.V. Phatak. “Choroidal Melanoma in a Young Patient Ultrasonography and Magnetic Resonance Imaging.” *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 106–8. https://doi.org/10.4103/jdmimsu.jdmimsu_48_18.
 27. Chintalwar, R.S., S. Patond, and S. Ninave. “Estimation of Time since Death from Postmortem Lividity.” *Indian Journal of Forensic Medicine and Toxicology* 13, no. 4 (2019): 164–66. <https://doi.org/10.5958/0973-9130.2019.00281.0>.
 28. Dambhare, A., M.L. Bhongade, P.V. Dhadse, B. Sehdev, K.K. Ganji, K. Thakare, H. Murakami, Y. Sugita, H. Maeda, and M.K. Alam. “A Randomized Controlled Clinical Study of Autologous Platelet Rich Fibrin (PRF) in Combination with HA and Beta-TCP or HA and Beta-TCP Alone for Treatment of Furcation Defects.” *Journal of Hard Tissue Biology* 28, no. 2 (2019): 185–90. <https://doi.org/10.2485/jhtb.28.185>.
 29. Dangore Khasbage, S., and A.S. Bhake. “Cervical Lymphadenopathy in a Dental Patient: An Eye Opener Case Report.” *Special Care in Dentistry* 39, no. 1 (2019): 59–64. <https://doi.org/10.1111/scd.12336>.
 30. Deolia, S., J. Johny, M.S. Patil, N.R. Lanje, and A.V. Patil. “Effectiveness of ‘Audio-Tactile Performance Technique’ to Improve the Oral Hygiene Status of Visually Impaired Schoolchildren.” *Journal of Indian Society of Pedodontics and Preventive Dentistry* 37, no. 2 (2019): 172–76. <https://doi.org/10.4103/1319-2442.261344>.
 31. Deopujari, S., A. Shrivastava, A.G. Joshi, A. Meshram, and S. Chaudhary. “Algoman: Gearing up for the ‘Net Generation’ and Era of Artificial Intelligence, One Step at a Time.” *Indian Journal of Pediatrics* 86, no. 12 (2019): 1079–80. <https://doi.org/10.1007/s12098-019-03073-5>.

32. Deshpande, S.S., and S.V. Phatak. "A Rare Case of Bilateral Multiple Ovarian Dermoids with Uterine Fibroid and Ectopic Kidney." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 1 (2019): 39–41. https://doi.org/10.4103/jdmimsu.jdmimsu_79_18.
33. Dhar, R., S. Singh, D. Talwar, M. Mohan, S.K. Tripathi, R. Swarnakar, S. Trivedi, et al. "Bronchiectasis in India: Results from the European Multicentre Bronchiectasis Audit and Research Collaboration (EMBARC) and Respiratory Research Network of India Registry." *The Lancet Global Health* 7, no. 9 (2019): e1269–79. [https://doi.org/10.1016/S2214-109X\(19\)30327-4](https://doi.org/10.1016/S2214-109X(19)30327-4).
34. Dhattrak, A.A., K. Chaudhary, B.R. Singh, and U. Gajbe. "Evaluation of Intensive Pulse Polio Immunization in Solapur District." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 82–85. https://doi.org/10.4103/jdmimsu.jdmimsu_56_19.
35. Dubey, Y.K., and S. Damke. "Baby Monitoring System Using Image Processing and IoT." *International Journal of Engineering and Advanced Technology* 8, no. 6 (2019): 4961–64. <https://doi.org/10.35940/ijeat.F9254.088619>.
36. Gadgail, A.R., M.S. Chaudhary, S.C. Sarode, S.M. Gondivkar, L. Belekhar, M.P. Mankar-Gadgail, R. Dande, S.A. Tekade, M.B. Yuwanati, and S. Patil. "Ki67, CD105 and α -Smooth Muscle Actin Expression in Disease Progression Model of Oral Submucous Fibrosis." *Journal of Investigative and Clinical Dentistry* 10, no. 4 (2019): e12443. <https://doi.org/10.1111/jicd.12443>.
37. Gondivkar, S.M., R.R. Bhowate, A.R. Gadgail, R.S. Gondivkar, and S.C. Sarode. "Impact of Socioeconomic Inequalities on Quality of Life in Oral Submucous Fibrosis Patients." *Future Oncology* 15, no. 8 (2019): 875–83. <https://doi.org/10.2217/fon-2018-0645>.
38. Gondivkar, S.M., R.R. Bhowate, A.R. Gadgail, R.S. Gondivkar, S.C. Sarode, and G.S. Saode. "Comparison of Generic and Condition-Specific Oral Health-Related Quality of Life Instruments in Patients with Oral Submucous Fibrosis." *Quality of Life Research* 28, no. 8 (2019): 2281–88. <https://doi.org/10.1007/s11136-019-02176-y>.
39. Gondivkar, S.M., R.R. Bhowate, A.R. Gadgail, S.C. Sarode, and R.S. Gondivkar. "Assessment of Oral Health-Related Quality of Life Instruments for Oral Submucous Fibrosis: A Systematic Review Using the COnsensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN) Checklist." *Oral Oncology* 93 (2019): 39–45. <https://doi.org/10.1016/j.oraloncology.2019.04.009>.
40. Gulve, S.S., and S.V. Phatak. "Parathyroid Adenoma: Ultrasonography, Doppler, and Elastography Imaging." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 1 (2019): 47–49. https://doi.org/10.4103/jdmimsu.jdmimsu_91_18.
41. Gupta, B., S. Gupta, M. Chaudhary, A.T. Raj, K.H. Awan, and S. Patil. "Hematological Alterations in Lepromatous Leprosy: A Cross-Sectional Observational Study." *Disease-a-Month*, 2019. <https://doi.org/10.1016/j.disamonth.2019.100919>.
42. ———. "Oral Candida Prevalence and Species Specificity in Leprosy." *Disease-a-Month*, 2019. <https://doi.org/10.1016/j.disamonth.2019.100920>.
43. Gupta, B., S. Gupta, M. Chaudhary, A.T. Raj, and S. Patil. "Oro-Facial Manifestations in Lepromatous Leprosy Patients in Central India: Clinical Findings from a Cross-Sectional Study." *Clinical Oral Investigations*, 2019. <https://doi.org/10.1007/s00784-019-03061-1>.

44. Gupta, R., M. Chaudhary, S. Patil, C. Fating, A. Hande, and H. Suryawanshi. "Expression of P63 in Tooth Germ, Dentigerous Cyst and Ameloblastoma." *Journal of Oral and Maxillofacial Pathology* 23, no. 1 (2019): 43–48. https://doi.org/10.4103/jomfp.JOMFP_125_18.
45. Hande, A., M. Chaudhary, M. Gawande, A. Gadail, P. Zade, S. Bajaj, S. Patil, and S. Tekade. "Oral Submucous Fibrosis: An Enigmatic Morpho-Insight." *Journal of Cancer Research and Therapeutics* 15, no. 3 (2019): 463–69. https://doi.org/10.4103/jcrt.JCRT_522_17.
46. Jagati, A., R. Chaudhary, S. Rathod, B. Madke, K. Baxi, and D. Kasundra. "Preparation of Platelet-Rich Fibrin Membrane over Scaffold of Collagen Sheet, Its Advantages over Compression Method: A Novel and Simple Technique." *Journal of Cutaneous and Aesthetic Surgery* 12, no. 3 (2019): 174–78. <https://doi.org/10.4103/2543-1854.267617>.
47. Jain, S., P.T. Deshmukh, P. Lakhotia, S. Kalambe, D. Chandravanshi, and M. Khatri. "Anatomical Study of the Facial Recess with Implications in Round Window Visibility for Cochlear Implantation: Personal Observations and Review of the Literature." *International Archives of Otorhinolaryngology* 23, no. 3 (2019): E281–91. <https://doi.org/10.1055/s-0038-1676100>.
48. Jain, S., S. Gaurkar, P.T. Deshmukh, M. Khatri, S. Kalambe, P. Lakhotia, D. Chandravanshi, and A. Disawal. "Applied Anatomy of Round Window and Adjacent Structures of Tympanum Related to Cochlear Implantation." *Brazilian Journal of Otorhinolaryngology* 85, no. 4 (2019): 435–46. <https://doi.org/10.1016/j.bjorl.2018.03.009>.
49. Jain, S., P. Singh, D. Methwani, and S. Kalambe. "Role of Eustachian Dysfunction and Primary Sclerotic Mastoid Pneumatisation Pattern in Aetiology of Squamous Chronic Otitis Media: A Correlative Study." *Indian Journal of Otolaryngology and Head and Neck Surgery* 71 (2019): 1190–96. <https://doi.org/10.1007/s12070-018-1259-x>.
50. Khanam, N., V. Wagh, A.M. Gaidhane, and S.Z. Quazi. "Assessment of Work-Related Musculoskeletal Morbidity, Perceived Causes and Preventive Activities Practiced to Reduce Morbidity among Brick Field Workers." *Indian Journal of Community Health* 31, no. 2 (2019): 213–19.
51. "Knowledge, Attitude and Practice on Uses of Plastic Products, Their Disposal and Environmental Pollution: A Study among School-Going Adolescents." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 57–60. https://doi.org/10.4103/jdmimsu.jdmimsu_27_19.
52. Kumar, S., S. Jain, A. Wanjari, and S. Mandal. "Development and Validation of a Modified Frailty Risk Index as a Predictor of Mortality in Rural Elderly People." *Asian Journal of Gerontology and Geriatrics* 14, no. 1 (2019): 15–22. <https://doi.org/10.12809/ajgg-2018-315-oa>.
53. Laishram, S., V. Gupta, A. Bhake, A. Wankhede, and D. Agrawal. "To Assess the Utility of Proliferative Marker Ki-67 in Surface Epithelial Ovarian Tumor." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 1 (2019): 6–10. https://doi.org/10.4103/jdmimsu.jdmimsu_71_18.
54. Madurwar, K.A., and S.V. Phatak. "Benign Fibrous Histiocytoma of Male Breast: Ultrasonography, Doppler, and Elastography Imaging with Pathological Correlation." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 103–5. https://doi.org/10.4103/jdmimsu.jdmimsu_44_18.
55. Mahalle, S. "Osteoma of External Auditory Canal Associated with External Auditory Canal Cholesteatoma and Exuberant Granulation Tissue in Mastoid Air Cell System: A Rare Association." *Indian Journal of Otolaryngology and Head and Neck Surgery* 71 (2019): 1505–7. <https://doi.org/10.1007/s12070-019-01643-9>.

56. Marfani, G., S.V. Phatak, K.A. Madurwar, and S. Samad. "Role of Sonoelastography in Diagnosing Endometrial Lesions: Our Initial Experience." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 1 (2019): 31–35. https://doi.org/10.4103/jdmimsu.jdmimsu_89_18.
57. Nikahde, P.P., A.N. Kibe, A.P. Thote, R.S. Gawarle, and A.T.T. Ali. "Assessment of Penetration of Low Surface Tension Vehicles in Dentinal Tubules Using Stereomicroscopy." *World Journal of Dentistry* 10, no. 2 (2019): 135–39. <https://doi.org/10.5005/jp-journals-10015-1619>.
58. Nimonkar, S., V.M. Belkhode, S. Sathe, and A. Borle. "Prosthetic Rehabilitation for Hemimaxillectomy." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 99–102. https://doi.org/10.4103/jdmimsu.jdmimsu_40_19.
59. Nimonkar, S.V., V.M. Belkhode, S.R. Godbole, P.V. Nimonkar, T. Dahane, and S. Sathe. "Comparative Evaluation of the Effect of Chemical Disinfectants and Ultraviolet Disinfection on Dimensional Stability of the Polyvinyl Siloxane Impressions." *Journal of International Society of Preventive and Community Dentistry* 9, no. 2 (2019): 152–58. https://doi.org/10.4103/jispcd.JISPCD_406_18.
60. Panchbhai, A. "Effect of Oral Submucous Fibrosis on Jaw Dimensions." *Turkish Journal of Orthodontics* 32, no. 2 (2019): 105–9. <https://doi.org/10.5152/TurkJOrthod.2019.18061>.
61. Patil, C., A. Jadhav, R. K. N. Bhola, R.M. Borle, and A. Mishra. "Piezosurgery vs Bur in Impacted Mandibular Third Molar Surgery: Evaluation of Postoperative Sequelae." *Journal of Oral Biology and Craniofacial Research* 9, no. 3 (2019): 259–62. <https://doi.org/10.1016/j.jobcr.2019.06.007>.
62. Patond, S., P. Mohite, S. Ninave, P. Wankhade, and V. Pande. "Age Related Changes in Accidental Contusion at Tertiary Care Centre." *Indian Journal of Forensic Medicine and Toxicology* 13, no. 4 (2019): 33–36. <https://doi.org/10.5958/0973-9130.2019.00257.3>.
63. Phatak, S., D. Shrivastav, G. Marfani, S. Daga, K. Madurwar, and S. Samad. "Transvaginal Sonography and Elastography Evaluation of Ectopic Pregnancy." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 2 (2019): 86–89. https://doi.org/10.4103/jdmimsu.jdmimsu_13_19.
64. Pisulkar, S.K., R. Agrawal, V. Belkhode, S. Nimonkar, A. Borle, and S.R. Godbole. "Perception of Buccal Corridor Space on Smile Aesthetics among Specialty Dentist and Layperson." *Journal of International Society of Preventive and Community Dentistry* 9, no. 5 (2019): 499–504. https://doi.org/10.4103/jispcd.JISPCD_2_19.
65. Rathi, K., N. Rathi, N. Thosar, and S. Baliga. "Modified Cantilever Bridge; A Novel Approach towards the Replacement of Missing Primary Anterior Teeth." *Indian Journal of Public Health Research and Development* 10, no. 6 (2019): 176–78. <https://doi.org/10.5958/0976-5506.2019.01261.0>.
66. Rathi, N., B. Taksande, and S. Kumar. "Nerve Conduction Studies of Peripheral Motor and Sensory Nerves in the Subjects with Prediabetes." *Journal of Endocrinology and Metabolism* 9, no. 5 (2019): 147–50. <https://doi.org/10.14740/jem602>.
67. Rathi, N.V., A.A. Khatri, A.G. Agrawal, M. Sudhindra Baliga, N.R. Thosar, and S.G. Deolia. "Anesthetic Efficacy of Buccal Infiltration Articaine versus Lidocaine for Extraction of Primary Molar Teeth." *Anesthesia Progress* 66, no. 1 (2019): 3–7. <https://doi.org/10.2344/anpr-65-04-02>.
68. Reddy, K.V., A. Jadhav, N. Bhola, A. Mishra, and P. Dakshinkar. "Is 0.75% Ropivacaine More Efficacious than 2% Lignocaine with 1:80,000 Epinephrine for IANB in Surgical Extraction of Impacted Lower Third Molar?" *Oral and Maxillofacial Surgery* 23, no. 2 (2019): 225–31. <https://doi.org/10.1007/s10006-019-00779-w>.

69. Regmi, P.R., E. van Teijlingen, P. Mahato, N. Aryal, N. Jadhav, P. Simkhada, Q.S. Zahiruddin, and A. Gaidhane. "The Health of Nepali Migrants in India: A Qualitative Study of Lifestyles and Risks." *International Journal of Environmental Research and Public Health* 16, no. 19 (2019). <https://doi.org/10.3390/ijerph16193655>.
70. Saoji, V., S. Kulkarni, and B. Madke. "Alopecia Areata Treated with Oral Azathioprine: A Case Series." *International Journal of Trichology* 11, no. 5 (2019): 219–22. https://doi.org/10.4103/ijt.ijt_57_19.
71. Sharma, S.K., and K. Dheda. "What Is New in the WHO Consolidated Guidelines on Drug-Resistant Tuberculosis Treatment?" *Indian Journal of Medical Research* 149, no. 3 (2019): 309–12. https://doi.org/10.4103/ijmr.IJMR_579_19.
72. Shrivastava, D., and A. Master. "Fetal Growth Restriction." *Journal of Obstetrics and Gynecology of India*, 2019. <https://doi.org/10.1007/s13224-019-01278-4>.
73. Singh, R., and A. Singam. "Comparative Evaluation of Dexmedetomidine versus Clonidine as an Adjuvant in Supraclavicular Brachial Plexus Block." *Journal of Krishna Institute of Medical Sciences University* 8, no. 3 (2019): 53–65.
74. Sudhindra Baliga, M. "Child's First Dental Visit in India: A Reappraisal." *Journal of Indian Society of Pedodontics and Preventive Dentistry* 37, no. 2 (2019): 113–14. <https://doi.org/10.4103/1319-2442.261335>.
75. Swarnkar, K., S. Gaikwad, P. Uke, K. Vagha, and Y. Dalal. "Apert Syndrome Presenting with Omphalocele." *Journal of Krishna Institute of Medical Sciences University* 8, no. 1 (2019): 95–99.
76. Swarnkar, M. "Giant Calcifying Aponeurotic Fibroma of Web Space: Case Report with Review of Literature." *Journal of Krishna Institute of Medical Sciences University* 8, no. 2 (2019): 99–102.
77. Swarnkar, M., and R. Jindal. "Obstructed Obturator Hernia: A Diagnostic Dilemma." *Journal of Krishna Institute of Medical Sciences University* 8, no. 3 (2019): 115–17.
78. Varyani, U.T., N.M. Shah, P.R. Shah, V.B. Kute, M.R. Balwani, and H.L. Trivedi. "C1q Nephropathy in a Patient of Neurofibromatosis Type 1: A Rare Case Report." *Indian Journal of Nephrology* 29, no. 2 (2019): 125–27. https://doi.org/10.4103/ijn.IJN_353_17.
79. Walinjkar, R.S., S. Khadse, S. Kumar, S. Bawankule, and S. Acharya. "Platelet Indices as a Predictor of Microvascular Complications in Type 2 Diabetes." *Indian Journal of Endocrinology and Metabolism* 23, no. 2 (2019): 206–10. <https://doi.org/10.4103/ijem.IJEM-13-19>.
80. Wankhade, A., S. Vagha, S. Shukla, A. Bhake, S. Laishram, D. Agrawal, N. Rastogi, and M. Wankhade. "To Correlate Histopathological Changes and Transvaginal Sonography Findings in the Endometrium of Patients with Abnormal Uterine Bleeding." *Journal of Datta Meghe Institute of Medical Sciences University* 14, no. 1 (2019): 11–15. https://doi.org/10.4103/jdmimsu.jdmimsu_70_18.
81. Wasnik, R.R., and N.R. Akarte. "Evaluation of Serum Zinc and Antioxidant Vitamins in Adolescent Homozygous Sickle Cell Patients in Wardha, District of Central India." *Journal of Clinical and Diagnostic Research* 11, no. 8 (2017): BC01–3. <https://doi.org/10.7860/JCDR/2017/30855.10320>.
82. Gaikwad, K.B., N.G. Joshi, and S.P. Selkar. "Study of Nitrosative Stress in 'Pregnancy Induced Hypertension.'" *Journal of Clinical and Diagnostic Research* 11, no. 3 (2017): BC06–8. <https://doi.org/10.7860/JCDR/2017/23960.9396>.
83. Baliga, S., M. Chaudhary, S. Bhat, P. Bhatiya, N. Thosar, and P. Bhansali. "Determination of Total Antioxidant Capacity of Saliva in Sickle Cell Anemic Patients - A Cross-Sectional Study." *Journal of*

Indian Society of Pedodontics and Preventive Dentistry 35, no. 1 (2017): 14–18.
<https://doi.org/10.4103/0970-4388.199219>.

84. Yadav, S., M. Agrawal, C. Hariharan, D. Dewani, K. Vadera, and N. Krishna. “A Comparative Study of Serum Lipid Profile of Women with Preeclampsia and Normotensive Pregnancy.” *Journal of Datta Meghe Institute of Medical Sciences University* 13, no. 2 (2018): 83–86.
https://doi.org/10.4103/jdmimsu.jdmimsu_70_17.