



AMRITA
VISHWA VIDYAPEETHAM

PROGRAM
DM RHEUMATOLOGY

(With effect from 2017-2018 onwards)

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Curriculum – D.M. Rheumatology – Three Years Program

The schedule of Posting and training programme for three years period of study: year wise training programme for D.M. Rheumatology.

Eligibility for admission: MD Medicine, MD Pediatrics

Program Outcomes

- PO1 Competence to clinically diagnose, investigate and manage a whole spectrum of immune-mediated and other rheumatological disorders
- PO2 Utilize the knowledge and skills acquired in allied specialties.
- PO3 Keeping abreast of all recent developments and emerging trends in the field of Rheumatology
- PO4 Evaluate own professional activities, educational needs and select appropriate learning resources periodically.
- PO5 Contribute as an individual/ or in a group or institution towards the fulfillment of national objectives concerning diseases.
- PO6 Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.
- PO7 Effectively communicate with colleagues.

Program Specific Outcomes

- PSO1 Competence to plan and undertake research in Rheumatology in the clinic, laboratory and community
- PSO2 Ability to manage common emergencies.
- PSO3 Perform out patient services including patient screening and disease determination.
- PSO4 Participate in community out reach activities like camps, school screening and public education.
- PSO5 Competence to teach the subject to undergraduates and postgraduates
- PSO6 Prescribe medications for various ailments and follow up patients to understand outcomes.
- PSO7 Present academic papers in State/National conference.

PSO8 To participate in department research activities and clinical audit.

Training Program

First Year:

Rheumatology Department

Out-patient/Wards/Laboratory One Year

Laboratory – 2 months included in one year

Second Year:

Peripheral Posting-3 months

- 1) Nephrology Two Weeks
- 2) Dermatology Two Weeks
- 3) Orthopaedics One Week
- 4) Radiology Four Weeks
- 5) Ophthalmology One Week
- 6) Physical Medicine & Rehabilitation One Week
- 7) Pulmonary medicine One Week

Students who are posted outside should attend Theory classes, Journal club and case presentation daily at the Department of Rheumatology in the afternoon.

Rheumatology Department:

OP/Wards/Laboratory Nine Months

Muskuloskeletal Ultrasonography 2 months & Clinical immunology Laboratory posting 2 months included in nine months

Third Year:

Rheumatology Department-

OP/Wards/Laboratory One year

Laboratory – 2 months included in one year

Besides the above, Synovial aspirations, Intra articular injections, Kidney biopsies, interpretation of X-rays, CT Scan, M.R.I, and Ultrasound are to be undertaken.

Academic Activities:

- Journal Club (once a week)
- Seminar (once a week)
- Subject Review (once a week)
- Clinical case presentation and discussion (once a week)
- Clinical grand rounds (once a week)
- Interdepartmental discussions (Radiology, Pathology etc)
- Basic training courses in Biostatistics, Research methodology, Scientific writing, Laboratory Immunology and Molecular biology.
- Conferences/Workshop/symposia in the relevant areas
- Guest lectures by external subject specialists

Maintenance of log book/portfolio: Every D.M. Rheumatology student should maintain a log book

DISSERTATION:

Every D.M. Rheumatology student should do a Dissertation in Rheumatology and Immunology. Submission of Dissertation to the University is mandatory for appearing. D.M. Rheumatology University Examination.

DM Training Curriculum

Theoretical training

1. Basic Principles in Rheumatology:-

- a) Biology of Joints
- b) Articular Structures:- Hands - Wrists - Elbows –Shoulders – Neck - Low Back- Spines - Hip joint and Pelvic Girdle - knees – ankles-feet.
- c) Connective tissue:- Normal and Pathological synovial tissue - collagen - collageneses - proteoglycans – mediators derived from polyunsaturated fatty acids – prostaglandins –thromboxanes - leukotrienes - mediators of acute and chronic inflammation - vascular endothelium – interleukins – free radicals - nitric oxide - apoptosis.
- d) Formation and resorption of bone - bone as a tissue and an organ.
- e) Muscle: Anatomy - contractile proteins - ultrastructure of the muscle fibre - neuro muscular junction -physiology of motor unit- excitation - contraction coupling – biochemistry of contraction — muscle energy metabolism — pharmacology of the motor unit.
- f) Nerve: Neuropathies of special interest in Rheumatology - laboratory investigations – pain pathways
- g) Synovial physiology
- h) Collagen in normal and diseased connective tissue:- Chondrocyte structure and function - articular cartilage.
- i) Immunology: Immunology – cells involved in auto immune diseases and inflammation – Antigen presenting cells- Innate immunity – T-cells – B-cells- Synoviocytes – Fibroblast function & fibrosis – chondrocytes – Neutrophils & eosinophils – platelets and rheumatic diseases. Effector mechanisms in auto immunity & inflammation –auto immunity – Genetics of rheumatic diseases – Rheumatoid factor – ANA – Immune complexes –complement system – prostaglandins, Leucotrienes & related compounds – Endothelial cell biology, angiogenesis and requirement of cells – cytokines – Apoptosis

Diagnostic Procedures:

- a. Synovial fluid aspiration
- b. Aspiration and injection of joints and soft tissue
- c. Rheumatoid factor - latex, Rosewaller, Elisa, Nephelometry
- d. Antinuclear antibodies

- e. Antiphospholipid antibodies
- f. Nuclear and Cytoplasmic antibodies - ANCA
- g. Anti Streptococcal antibodies
- h. Acute phase reactants
- i. Synovial biopsy
- j. Radiology of joints
- k. Radio Isotopic assessment of joints and bones - C.T.; MRI in Rheumatology - Ultrasonogram of joints and soft tissues.
- l. Arthrography - Thermography - Arthroscopy
- m. HLA Typing
- n. Immuno Fluorescence
- o. Elisa
- p. Immunoblotting
- q. Polymerase Chain Reaction (PCR)
- r. Neuromuscular testing, Electrophysiology
- s. Biological markers of rheumatic diseases

1. **Differential approach to major rheumatic syndrome:**

Examination of Joints:- Acute and chronic monoarticular arthritis - Polyarthrits - temporomandibular joint diseases-shoulder and neck pain -low back pain - foot pain - the fibro-myalgia syndrome – skin and rheumatic diseases - eye and rheumatic diseases – neurologic manifestations - cardiac manifestations pulmonary manifestations of connective tissue diseases - arthritis and gastrointestinal and liver diseases - nutrition and rheumatic diseases -Psychosocial aspect of rheumatic diseases - kidney and rheumatic diseases.

2. **Clinical Pharmacology in Rheumatic diseases:-**

Developing a clinical trial design - salicylates – nonsteroidal anti inflammatory drugs - anti malarials - gold compounds - D.Penicillamine - methotrexate - glucocorticoids - sulfasalazine - leflunomide immunoregulatory agents -cytotoxic agents – therapeutic apheresis - Ionizing radiation - antilymphocyte antibodies - Cyclosporine A and other agents NSAID gastropathy -antihyperuricemic drugs - tetracyclines - intravenous – immunoglobulin -autologous stemcell transplantation - leflunomide – Biologicals.

3. **Specific articular and connective tissue diseases:-**

Rheumatoid arthritis - Felty's syndrome – Sjogren's syndrome - spondyloarthropathy - ankylosing spondylitis - Reiter's syndrome, reactive arthritis - HLA B 27 related and non-related arthritis – Adult Still's disease. Psoriatic arthritis - enteropathic arthritis – systemic lupus erythematosus - mixed connective tissue disease - overlap syndromes - vasculitic syndrome - vasculitides and related disorders - polyarteritis - vasculitis associated with rheumatic diseases - hypersensitivity -vasculitis - Churg - Strauss Vasculitis - Wegener's Granulomatosis - Takayasu's arteritis, Cogon's syndrome - Kawasaki's disease -giant cell arteritis - polymyalgia rheumatica - Behcet's disease Scleroderma - localised fibrotic disorders - eosinophilic fasciitis -scleroderma - inflammatory disease of muscle - polymyositis - dermatomyositis - gout and related disorders of purine metabolism - diseases associated with deposition of calcium pyrophosphate or hydroxyapatite - osteoarthritis – relapsing polychondritis – amyloidosis - sarcoidosis -iron storage disease - multicentric reticulohistiocytosis - Ochronosis - infectious arthritis - bacterial arthritis – mycobacterial and fungal infections - lymes disease -viral arthritis haemophilic arthropathy - Hemoglobinopathies and arthritis –arthropathies associated with endocrine disorders - hypertrophic osteoarthropathy - neuropathic joint disease musculoskeletal syndrome associated with malignancy -heritable disorders of structural proteins - metabolic bone disease - osteoporosis osteonecrosis osteomalacia involving joints - rheumatic fever - childhood S.L.E. and dermatomyositis - Scleroderma, vasculitis, antiphospholipid antibody syndrome, soft tissue rheumatism - rheumatic, complications of drugs - ANCA related vasculitis - panniculitis - hyper lipidemias -tumours and tumor like lesions involving joints - hypermobility syndromes, reflex sympathetic dystrophy - familial mediteranean fever - Paget's disease.

4. **Medical orthopaedics and rehabilitation:-**

Sports Medicine - entrapment neuropathies - chronic pain syndromes and management - Physiotherapy - occupational therapy - health outcome assessment -rehabilitation of patients with rheumatic diseases

5. **Reconstructive surgery in rheumatic diseases:**

Principles of reconstructive surgery – pre-operative evolution – choice of procedure – post operative management and follow up –surgery in children. Disease Activity scoring

Practical Knowledge

I. Laboratory techniques (hands-on experience)

- a) Indirect immunofluorescence method for detection of
 - a. anti-nuclear, anti-smooth muscle, anti-parietal cell and anti-mitochondrial antibodies by using rat liver, stomach and kidney sections as substrates
 - b. ANA and antacentromere antibodies on Hep-2 cell line and
 - c. ANCA
- b) Nephelometry for the estimation of serum complements (C3, C4) and immunoglobulins (IgG, IgM, IgA, IgE)
- c) ELISA technique for the estimation of ANA, anti-ds-DNA, ACLA and ANCA
- d) Immunoblot for ANA profile
- e) Serum electrophoresis and immunofixation for myeloma screening
- f) Polarizing microscopy for detection of crystals in synovial fluid
- g) Lupus anticoagulant assay
- h) HLA typing (serological and molecular)
- i) Multitest CMI testing
- j) NBT test for evaluation of phagocytic function
- k) Enumeration of lymphocyte subsets in peripheral blood using flow cytometry
- l) Lymphoproliferation assay
- m) PCR standardization and optimization

II. Management of patients with autoimmune rheumatic disorders, allergic diseases and immunodeficiency

III. Practical skills in Rheumatology

- a) Clinical examination with special reference to immunological diseases
- b) Rational use and interpretation of immunological tests

- c) Diagnostic synovial fluid aspiration and examination including polarized light microscopy
- d) Joint and soft-tissue injections with steroids
- e) Diagnosis of allergic diseases by skin prick test (SPT) / patch test
- f) Proficiency in the use of immunomodulators and immunosuppressive agents
- g) Practical experience in immunotherapeutic procedures (immunosuppression, Plasma exchange, immunoglobulin therapy, allergen immunotherapy (SCT/SLIT) and treatment with monoclonal antibodies and cytokines
- h) Basic physiotherapy and rehabilitation skills
- i) Tissue biopsies like bone marrow, synovial, skin, liver, kidney, muscle, minor salivary gland, sural nerve etc.
- j) Clinical evaluation of primary and secondary Immunodeficiency
- k) Handling of Flow-cytometer, PCR, Electrophoresis, Gel documentation, Nephelometer, ELISA, Polarising and Florescence microscope and Scintillation counter

COURSES AND COURSE OUTCOMES

Course– I Applied Basic sciences and Diagnostic Procedures in Rheumatology and Clinical Immunology (Code: DMRH1)

CO1: Knowledge of the biology of joints, articular structures, connective tissue and formation and resorption of bone as applicable in the practice of rheumatology.

CO2: Knowledge of muscle, nerve, synovial physiology, collagen in normal and diseased connective tissue and immunology as applicable in practice of rheumatology.

CO3: Skill in diagnostic procedures such as synovial fluid aspiration, aspiration and injection of joints and soft tissue.

CO4: Knowledge about Rheumatoid factor, Antinuclear antibodies, antiphospholipid antibodies, nuclear and cytoplasmic antibodies, anti streptococcal antibodies and acute phase reactants.

CO5: Skill in synovial biopsy.

CO6: Knowledge about the radiology of joints, radio isotopic assessment of joints and bones, CT, MRI, Ultrasonogram, Arthrography, Thermography and Arthroscopy.

CO7: Knowledge about HLA typing, Immuno Fluorescence, ELISA, Immunoblotting, PCR, Neuromuscular Testing, Electrophysiology and Biological markers of Rheumatic diseases.

- a) Biology of Joints
- b) Articular Structures:- Hands - Wrists - Elbows –Shoulders – Neck - Low Back- Spines - Hip joint and Pelvic Girdle - knees – ankles-feet.
- c) Connective tissue:- Normal and Pathological synovial tissue - collagen - collageneses - proteoglycans – mediators derived from polyunsaturated fatty acids – prostaglandins –thromboxanes - leukotrienes - mediators of acute and chronic inflammation - vascular endothelium – interleukins – free radicals - nitric oxide - apoptosis.
- d) Formation and resorption of bone - bone as a tissue and an organ.
- e) Muscle: Anatomy - contractile proteins - ultrastructure of the muscle fibre - neuro muscular junction -physiology of motor unit- excitation - contraction coupling – biochemistry of contraction — muscle energy metabolism — pharmacology of the motor unit.
- f) Nerve: Neuropathies of special interest in Rheumatology - laboratory investigations – pain pathways
- g) Synovial physiology
- h) Collagen in normal and diseased connective tissue:- Chondrocyte structure and function - articular cartilage.
- i) Immunology: Immunology – cells involved in auto immune diseases and inflammation – Antigen presenting cells- Innate immunity – T-cells – B-cells- Synoviocytes – Fibroblast function & fibrosis – chondrocytes – Neutrophils & eosinophils – platelets and rheumatic diseases. Effector mechanisms in auto immunity & inflammation –auto immunity – Genetics of rheumatic diseases – Rheumatoid factor – ANA – Immune complexes –complement system – prostaglandins, Leucotrienes & related compounds – Endothelial cell biology, angiogenesis and requirement of cells – cytokines – Apoptosis

Diagnostic Procedures:

- a. Synovial fluid aspiration

- b. Aspiration and injection of joints and soft issue
- c. Rheumatoid factor - latex, Rosewaller, Elisa, Nephelometry
- d. Antinuclear antibodies
- e. Antiphospholipid antibodies
- f. Nuclear and Cytoplasmic antibodies - ANCA
- g. Anti Streptococcal antibodies
- h. Acute phase reactants
- i. Synovial biopsy**
- j. Radiology of joints**
- k. Radio Isotopic assessment of joints and bones - C.T.; MRI in Rheumatology - Ultrasonogram of joints and soft tissues.
- l. Arthrography - Thermography - Arthoroscopy
- m. HLA Typing
- n. Polymerase Chain Reaction (PCR)
- o. Neuromuscular testing, Electrophysiology
- p. Biological markers of rheumatic diseases
- q. Immuno fluroscene – elisa – immunoblotting

Course – II Clinical Rheumatology and Clinical Immunology (DMRH2)

CO1: Skill in examination of joints.

CO2: Knowledge about specific articular and connective tissue diseases.

CO3: Skill in the use of laboratory techniques in the practice of rheumatology.

CO4: Competence in management of patients with autoimmune rheumatic disorders, allergic diseases and immunodeficiency

CO5: Skill in clinical examination with special reference to immunological diseases

CO6: Rational use and interpretation of immunological tests

CO7: Proficiency in the use of immunomodulators, immunosuppressive agents and immunotherapeutic procedures.

CO8: Skill in clinical evaluation of primary and secondary Immunodeficiency

1. Differential approach to major rheumatic syndrome:

Examination of Joints:- Acute and chronic monoarticular arthritis - Polyarthrititis -

temporomandibular joint diseases-shoulder and neck pain -low back pain - foot pain - the fibro-myalgia syndrome – skin and rheumatic diseases - eye and rheumatic diseases – neurologic manifestations - cardiac manifestations pulmonary manifestations of connective tissue diseases - arthritis and gastrointestinal and liver diseases - nutrition and rheumatic diseases -Psychosocial aspect of rheumatic diseases - kidney and rheumatic diseases.

Articular and Connective Tissue Diseases.

Rheumatoid arthritis - Felty's syndrome – Sjogren's syndrome - spondyloarthropathy - ankylosing spondylitis - Reiter's syndrome, reactive arthritis - HLA B 27 related and non-related arthritis – Adult Still's disease. Psoriatic arthritis - enteropathic arthritis – systemic lupus erythematosus - mixed connective tissue disease - overlap syndromes - vasculitic syndrome - vasculitides and related disorders - polyarteritis - vasculitis associated with rheumatic diseases - hypersensitivity -vasculitis - Churg - Strauss Vasculitis - Wegener's Granulomatosis - Takayasu's arteritis, Cogon's syndrome - Kawasaki's disease -giant cell arteritis - polymyalgia rheumatica - Behcet's disease Scleroderma - localised fibrotic disorders - eosinophilic fasciitis -scleroderma - inflammatory disease of muscle - polymyositis - dermatomyositis - gout and related disorders of purine metabolism - diseases associated with deposition of calcium pyrophosphate or hydroxyapatite - osteoarthritis – relapsing polychondritis – amyloidosis - sarcoidosis -iron storage disease - muticentric reticulohistiocytosis - Ochronosis - infectious arthritis - bacterial arthritis – mycobacterial and fungal infections - lymes disease -viral arthritis haemophilic arthropathy - Hemoglobinopathies and arthritis –arthropathies associated with endocrine disorders - hypertrophic osteoarthropathy - neuropathic joint disease musculoskeletal syndrome associated with malignancy -heritable disorders of structural proteins - metabolic bone disease - osteoporosis osteonecrosis osteomalacia involving joints - rheumatic fever - childhood S.L.E. and dermatomyositis - Scleroderma, vasculitis, antiphospholipid antibody syndrome, soft tissue rheumatism - rheumatic, complications of drugs - ANCA related vasculitis - panniculitis - hyper lipidemias -tumours and tumor like lesions involving joints - hypermobility syndromes, reflex sympathetic dystrophy - familial mediteranean fever - Paget's disease.

Course – III Clinical Pharmacology, Rehabilitation Surgery, Special problems relating

to Rheumatic Diseases, Paediatric Rheumatology, Pregnancy and Rheumatic Diseases (Code DMRH3)

CO1: Knowledge about medical orthopedics, rehabilitation and reconstructive surgery in rheumatic diseases.

CO2: Competence in the application of clinical pharmacology in rheumatic diseases.

CO3: Skill in the management of rheumatology problems in the pediatric age group.

CO4: Competency to manage rheumatologic problems associated with pregnancy.

CO5: Skill in synovial fluid aspiration and examination, tissue biopsies, skill in joint and soft tissue injections with steroids, skin prick test.

CO6: Handling of Flow-cytometer, PCR, Electrophoresis, Gel documentation, Nephelometer, ELISA, Polarising and Florescence microscope and Scintillation counter

CO7: Basic physiotherapy and rehabilitation skills.

Clinical Pharmacology in Rheumatic diseases:-

Developing a clinical trial design - salicylates – nonsteroidal anti inflammatory drugs - anti malarials - gold compounds - D.Penicillamine - methotrexate - glucocorticoids - sulfasalazine - leflunomide immunoregulatory agents -cytotoxic agents – therapeutic apheresis - Ionizing radiation - antilymphocyte antibodies - Cyclosporine A and other agents NSAID gastropathy -antihyperuricemic drugs - tetracyclines - intravenous – immunoglobulin -autologous stemcell transplantation - leflunomide – Biologicals.

Medical orthopaedics and rehabilitation:-

Sports Medicine - entrapment neuropathies - chronic pain syndromes and management - Physiotherapy - occupational therapy - health outcome assessment -rehabilitation of patients with rheumatic diseases

Reconstructive surgery in rheumatic diseases:

Principles of reconstructive surgery – pre-operative evaluation – choice of procedure – post operative management and follow up –surgery in children. Disease Activity scoring

Course – IV Recent Advances in Rheumatology and Immunology (Code DMRH4)

CO1: Familiarity with recent advances in the diagnostic and therapeutic methods in

rheumatology and immunology.

CO2: Familiarity with the recent advances in rheumatology and immunology.

CO3: Attitude to be a lifelong learner.

Soft Skills (Code DMRH5) – Elective Course

CO1: Competence to do clinical research.

CO2: Attitude to work as a member of a healthcare team.

CO3: Skill in teaching graduate and post graduate students.

CO4: Communication skills - with patients, caregivers and colleagues.

CO5: Knowledge of medical ethics and etiquette.

Performance evaluation during the period of training:

Performance of the student will be evaluated continuously during the course of the DM training program. This will include evaluation of the clinical skills through assessment of proficiency acquired in patient management, therapeutic procedures, clinical case presentations and laboratory work. It will include the following:

1. Regular internal assessment of the performance in teaching programs.
2. Assessment of day to day clinical activities by log book evaluation. This Log Book would be scrutinised and certified by the Head of Department and other Consultants and presented to the external examiners at the time of the final examination.
3. The seminars and the subject reviews presented by the candidate during the training would also be scrutinised and certified by the Head of the Department and other Consultant and presented to the External Examiners at the time of the final examination.
4. Feedback from the external training institutes during external rotation.
5. Six monthly evaluation of academic and clinical competence by theory and practical examination

PATTERN OF EXAMINATION: (As per MCI rule)

Theory – 4 Papers, 100 Marks each Duration: Three hours each

Question Papers (100*4 = 400)

Practical

Clinical and viva voce

Long case

Short cases

Viva voce

Criteria for declaring pass

Minimum (separate)

50% for theory (aggregate of four papers)

50% for clinical

50% for viva voce

acceptance of thesis / dissertation

Paper – I Applied Basic sciences and Diagnostic Procedures in Rheumatology and Clinical Immunology

Paper – II Clinical Rheumatology and Clinical Immunology

Paper – III Clinical Pharmacology Rehabilitation Surgery, Special problems relating to Rheumatic Diseases, Paediatric Rheumatology, Pregnancy and Rheumatic Diseases.

Paper – IV Recent Advances in Rheumatology and Immunology

Distribution of Marks: *

Two Essays 20 Marks each (20 x 2) 40 Marks

Ten short notes 6 Marks each (10 x 6) 60 Marks

Total 100 Marks

Practical / clinical and oral examination **

	<u>No.Of Cases</u>	<u>Duration</u>	<u>Marks</u>
LONG CASE	One	One Hour	75
SHORT CASES (30 Mts Each)	Two	One Hour	75
WARD ROUNDS	Four (Minimum)	One Hour	50
			200
Practical			100
Oral / Viva Examination			100
Total			400

PRACTICAL:

The candidate can be asked to do less time consuming tests like latex agglutination tests like Rheumatoid factor, C.Reactive protein, Anti Streptolysin O titre and the knowledge of the principles and methodology of any one of the following tests can be evaluated:

1. Rose – Waller Test
2. Immuno fluorescence Tests
3. Enzyme Linked Immuno Sorbent Assay (Elisa)
4. Single Radial Immuno Diffusion
5. Electrophoresis
6. S.D.S PAGE
7. Immuno Blot
8. HLA Typing / Cross Matching
9. Synovial fluid Analysis

10. Crystal Identification

ORAL:

1. Pathology Slides
2. X-ray, Ultrasound, CT & MRI interpretation
3. Clinical Oriented problems
4. Topic Discussion
5. Discussion about dissertation

DISSERTATION: Approved/Not approved

MARKS QUALIFYING FOR A PASS:

	Maximum Marks	Qualifying Marks for a pass (50%)
Theory	400	200
Practical	300	150
Oral/ Viva	100	50
Aggregate	800	400