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Dr U Singh

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Editor's Note

It has been our endeavour to bring the journal to the one of the international standard. Nothing can be achieved overnight save maybe a windfall. I am sure that the readers would find it not far from our commitment of transition towards the better. I hope that the quality of the papers would entice compared to the previous issues. The credit goes to the contributors, the editors can only prioritize and lay them out. It is no doubt a reflection of the research work our resolute members are doing. It is our IAPMR members and those interested in speciality, who can keep up the tempo and contribute towards the advancement by constantly exploiting quality research and more importantly write quality papers and of course send it for publication. I am happy to proclaim that the editorial office is having a good flow of incoming papers for publication. We are grateful !

We shall highly appreciate if our members continue to pour in papers and other articles or even a letter of interest to the clinicians in the speciality and we all can see our vow realized of having two issues per year or even more. Doing all this requires a lot of resources, specially financial, where we are sadly impoverished. This was one of the reasons why we were forced to take the harsh decision of restricting our publication back to once a year and on top of that miss one issue as well. Abutting, there have been many extraneous distractions beyond our control, that prevented us from working to our utmost attainment. I hope that the readers would over look our restraints and accept the current issue to bring the journal up-to date.

I am very much optimistic that if the members make a little extra effort to fetch a couple to advertisement or donations for the journal to fortify our financial position, we shall be able to conjure the ecstatic face of our adored journal more frequently.

Dr U Singh

Perspectives of Physical Medicine and Rehabilitation

Dr. K. Janardhanam, B. Sc., MBBS, D. Orth., D. Phys. Med. (London)

'Rehabilitation Medicine' an unique speciality though practiced in India for more than three decades is not known to many/any doctors, medicos, patients and the public. The only two terms known to them in this regard are 1) Physiotherapy and 2) Orthopaedics. Physiotherapy, a modality to treat diseases by physical means and agents has been practiced for much longer time, much earlier than the speciality of Physical Medicine and Rehabilitation which was introduced in the medical field at a much later date. The first Physiotherapist, Mary Mc Millan who was an American Physical educationist-turned-therapist advocated massage, manipulation and exercises on patients with musculoskeletal disorders during world war I, and found them very useful.

The speciality of orthopaedics is also a well known recognised branch of surgery which aims at treating patients with musculoskeletal disorders, and was practiced by many for a very long time.

The word 'Physical Medicine' was coined in 1931, in England by the Physicians who treated the locomotor disorders particularly rheumatism with hydrotherapy, movements and electrotherapy following certain physical laws, and using physical methods such as exercises and physical agents such as heat, light, electricity, magnetism and sound. They designated themselves as "PHYSIATRISTS" (Physio=Physical agents;

IATROS=Physician). The term 'physiatry' is often misleading and confused with 'physiotherapy' or 'psychiatry'.

'Rheumatological diseases' were the main cause for development of deformities and disabilities in England. Efforts to restore physical ability, activities of daily living to the disabled patients paved the way to use the word 'Rehabilitation' which means restoration and the speciality of 'Physical Medicine and Rehabilitation' was thus born. But in modern practice the term 'Rehabilitation Medicine' is preferable and appropriate.

In the wake of the second world war 1941-42, as many armed forces personnel were affected with disability due to many causes, it was Dr. Howard Rusk, a physician of Internal Medicine who took the initiative to establish this speciality in U.S.A. by the opening of Institute of Rehabilitation Medicine, New York, where rehabilitation was imparted in the form of physiotherapy, occupational therapy, Prosthetic-orthotic fittings, psychotherapy, speech therapy, social assistance, vocational evaluation and vocational guidance (a programme of TOTAL REHABILITATION). He can be rightly called the father of 'Rehabilitation Medicine'.

In India the starting of Rehabilitation services was done by the Ministry of Defence for the Armed Forces personnel by the opening of the army artificial limb centre and the spinal injuries (Paraplegia centre), kirkee, during the same time in 1941-42.

For the civilian population, a total comprehensive rehabilitation programme was instituted

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by the starting of All India Institute of Physical Medicine and Rehabilitation, Bombay by Govt. of India, in 1950 by its founder-Director Dr. M.V. Sant. Though Dr. Sant was an orthopaedic surgeon, for the major part of his life he dedicated himself to the cause of the development of the speciality of 'Rehabilitation Medicine' by practicing only that speciality and by training the paramedical personnel such as Physiotherapists, occupational therapists prosthetists- orthotists, social workers etc. He conducted many short term training courses in his Institute for the doctors and the paramedical personnel and taught them the subject of 'Rehabilitation Medicine'. Following his example some orthopaedic surgeons also abandoned their parent speciality and took up the new speciality and devoted and dedicated themselves for the cause of Rehabilitation of the disabled of this country.

In other parts of the country - a few orthopaedic surgeons developed only physiotherapy services to treat their own patients suffering from trauma and orthopaedic disorders, as the results of their treatment of these conditions would not be successful and complete without physiotherapy.

In the study of modern medicine which comprises of the three phases, namely 1) Community Medicine 2) Curative Medicine and 3) Rehabilitation-Medicine, the branch of 'Curative medicine' is most attractive and very glamorous to the younger generation of doctors and the other two branches though very important and have potentialities are not well recognised and well received. In 1971, WHO came out with the definition of doctor of modern medicine as a medical graduate who has undergone a 4½ year duration course and an internship of one year and becomes independent in 1) Prevention 2) Diagnosis 3) Treatment and 4) Rehabilitation. The word 'Rehabilitation' was added recently showing that this trend is modern. Though 'Rehabilitation' was thus added to the programme of medical education no efforts have been taken to include this subject in the undergraduate curricu-

lum in this country.

India is now a developing country as all modern technology in all fields including medicine have been introduced. There are 35 countries in the world practicing the speciality of Physical Medicine and Rehabilitation and India is one of the countries where this speciality is not well known and well recognised. There are many reasons for this state of affairs.

The wrong notions held by many that this speciality is only for chronically ill patients, for patients with incurable diseases, a dumping ground for the abandoned, a place only for distribution of aids, crutches, calipers and wheelchairs, a place where limbs are moved this way and that way, have all to be condemned. It should be realised by all that even patients with acute musculoskeletal disorders are treated by this scientific means and rehabilitation starts even from the time of the injury or the onset of disease.

Rehabilitation is distinctly not a separate phase of care following diagnosis of acute disorders and their treatment like a dessert at the end of a 3 course meal. It is a part and parcel of the main meal. It is an integral part of all medical management throughout the period of active care, reactivation and readaptation.

The Speciality of 'Rehabilitation Medicine' should be developed as an independent speciality and not as a sub-speciality under another well known speciality. A Rehabilitation Medicine specialist is preferably a Physician well versed in internal medicine, including subjects such as cardiopulmonary, rheumatology, neurology, pediatrics, geriatrics, Orthopaedic MEDICINE and also he should be familiar with physical and other paramedical therapies and drugs used for various ailments with a view for total care of the disabled. He should know the basic fundamentals of physiotherapy, occupational therapy, psychotherapy and speech therapy. He should be familiar with the instrumentation, application of therapies and handling of the equipments used in his department. Prescription and check up of prosthetic and

orthotics fittings and gait training should be precisely known to him. A definite daily programme should be charted out by him for the patients and he should be able to meet the medical emergencies arising in the outpatients and wards.

Apart from training of doctors in this new field, it is also necessary to train paramedical personnel. Hence degree courses in physiotherapy, occupational therapy and prosthetics-orthotics Engineering should be started in Dept. of Physical Medicine & Rehabilitation in all the medical colleges. This could be done only under the leadership of Rehabilitation Medicine specialists. There should be cordial relationship between the doctors and the paramedical personnel. The physiotherapists are the masters of their art and due value should be given to their opinion and suggestions to modify the treatment prescribed, though the final decision may be the doctor's.

The Rehabilitation Medicine specialist is a clinician an expert in clinical examination, assessment, diagnosis, prescription application of therapies, follow up and total care of the patients. He works with a team of dedicated paramedical personnel. Since it is a multidisciplinary approach, he has a complete knowledge of all therapies advocated to the patient and hence most suitable to be the leader of the team. social and vocational rehabilitation, though may form a part of his responsibility may be entrusted to non-medical personnel who may have more time and expertise to spend on this particular aspect so that the rehabilitation medicine specialist can devote all his time in advocating medical technology so that he can gain a better place in the midst of his other medical colleagues. Modern medical technology such as 1) Laser therapy 2) Functional Electrical Stimulation 3) Computerised gait analysis 4) Iontophoresis and 5) Geriatrics are some of the areas on which he can concentrate.

Pain and spasticity are still unsolved problems and attention to devise new technics of treatment in these areas are necessary.

Rehabilitation medicine being a medical speciality, there is no place for 'Surgery'. Practice of surgery which may be called as 'Rehabilitation Surgery' or corrective surgery can be done by other specialists such as Orthopaedic surgeons, neurosurgeons and plastic surgeons who may have more time to spend on this aspect. If the rehabilitation medicine specialist spends his time in the operation theatre he is not devoting 100% of his time in imparting the other aspects of rehabilitation which is not justifiable and reasonable. He should of course know the indications, contraindications and the appropriate stage at which the patient should be referred for surgery. Many of the musculoskeletal conditions can be treated by conservative means and when surgery is absolutely needed, the concerned specialist surgeon may be consulted and requested to do the same and return the patients to rehabilitation department so that further care and follow-up can be done. Thus the specialities of orthopaedics, neurosurgery and plastic surgery, to some extent, can become a part of rehabilitation medicine, instead of Rehabilitation being a part of those specialities. The status of the speciality of Rehab. Medicine can thus be elevated and made as a interdisciplinary approach to problems.

However, minor surgical procedures such as aspirations, local hydrocortisone injections and injections of other drugs such as phenol can be done by doctors in Physical Medicine & Rehabilitation. Application of P.O.P. and making of small splints can also be undertaken by them.

To propagate this speciality, the doctors in PMR should be active and dynamic. They should attend all clinical meetings, conferences, present papers and write articles on their speciality and impress the audience on the new aspects which can be done only by them. The postgraduates in this speciality should continue to attend such meetings and conferences even after completion of their academic course, to keep in touch with the subject and to come in contact with their colleagues of the

same speciality.

The institution of "National Professorship" in this regard by this Association is a welcome feature. By this it will be possible for the senior members of the speciality to travel to places and talk to the medical personnel exposing this new speciality. Institution based rehabilitation for the population in the urban areas and community Based rehabilitation for those in the rural areas are both very essential.

The following are the specific areas in which the rehabilitation Medicine specialist can outstand others:

- 1) Disability evaluation
- 2) Community Based Rehabilitation
- 3) Paramedical therapies Education
- 4) Consultancy in the design of Mobility Aids
- 5) Field of Prosthetics - Orthotics
- 6) Gait Evaluation
- 7) Total care of the disabled.

No one except a Rehabilitation Medicine specialist can do these. "Electrodiagnosis", though an important duty of them, the neurologists and physiologists also carry out this investigation. Action to be taken :

- 1) Create awareness among all
- 2) Include in M.B.B.S. curriculum
- 3) Develop paramedical therapies education
- 4) Organise CME programmes
- 5) Invite colleagues of other specialities and general practitioners.
- 6) Keep abreast with advances
- 7) Explore New Areas for study and Research.

Rehabilitation is everybody's concern. But cannot be done by everybody as it requires involvement, devotion and dedication - 100% for the welfare of the patient. None other, than the Rehab. Medicine specialist has got them.

To identify as Rehab. Medicine specialist, practice only 'Rehabilitation Medicine.' Do not co-practice other specialities.

- 1) It has a wide application and potentialities
- 2) It is remunerative
- 3) It has a good scope for Expansion & research
- 4) It is a new field

We belong to the noblest speciality of the noble profession as we: 1) Add life to years; 2) Improve quality of life 3) Make the patient live with activity and dynamism

FUTURE IS PROMISING.

Epidural Steroid in Conservative Treatment of Prolapse Disc and Lumbar Canal Stenosis

L. Nilachandra and Kunjabasi Wangjam

Abstract :

Epidural steroid injection as a standard method of treatment for low back pain syndrome was established in 1960's. Since then, this form of treatment has been used by many authors with varying degree of success. 530 cases of prolapse disc and 446 cases of lumbar canal stenosis making the total of 976 cases were studied in the series. After proper diagnosis 2 ml of methyl-prednisolone is injected in the epidural route without any dilution with the patient lying on affected side : 3 doses were given in the interval of 4 to 7 days and patients are followed up upto 3 years or more. The overall success rate in case of prolapse disc is 81.2 percent and 71.9 percent in case of lumbar canal stenosis. In this study there are no complications as less volume is used for the injection, patients are treated as outpatient. Epidural steroid (methyl-prednisolone) is effective and safe method for the conservative treatment of the prolapse disc and lumbar canal stenosis syndrome prior to operative intervention.

Introduction

The administration of intradural steroids for the treatment of conditions causing low backache was known since 1960's.^{3,7} Various investigators have tried this method of conservative treatment in prolapse disc, lumbar canal stenosis, etc., with variable success rate. The efficacy of the treatment is around 30 to 77% according to most authors^{1,2,4,8,9}. Most of the authors use corticosteroids diluted with 10 to 20 ml of other fluid like local anaesthetic solution, opiates or plain saline solution. These epidural injections result in some complications in 5% cases like infection, paresis of the limbs, bladder dysfunction, sensory abnormalities in a few cases. We have undertaken the study with view to eliminate these complications by injecting minimum volume of the corticosteroid solution without any dilution.

Materials

Patients who attended the Regional Rehabilitation Centre O.P.D. between January, 1991 to December, 1994 (4 years) for the complaint of

backache constitute our materials. Of these patients, the cases which were clinically diagnosed as suffering from prolapse disc (PID) or Lumbar canal stenosis were selected for the study. They numbered 976 (male 563 & female 413). Their age group ranges from 18 years to 80 years. With maximum number coming from the age group of 31 to 50 years as shown in Table-I

Age	No. of Cases	Percentage
18-30 Years	180	18.4
31-50 Years	505	51.7
51 & above	291	29.8

Table -I

(Age distribution in low backache)

Diagnosis of prolapse disc was based on clinical examination and radiological investigations. The other causes of backache like lumbosacral strain, infections, etc. were excluded by proper clinical, radio-logical haematological investigations. Those patients who were presented with low backache with or without sciatica or sciatica alone were carefully examined by SLR,

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sciatic tenderness and focal neurological deficits. The clinical diagnosis was confirmed by radiological investigations which include plain roentgenogram of L.S. Spine in all cases and lumbar myelogram in selected cases.

Diagnosis of lumbar canal stenosis is based on the

paucity of signs against the complaint of neurological claudication with or without sciatica. Some of the cases were confirmed by plain roentgenogram/myelogram. Table-II shows the distribution of signs & symptoms.

Symptoms	No. of Cases	Signs	No. of Cases
Lowbackache	637	SLRT: Ipsilateral	611
		Contraileteral	269
Sciatica	542	FNS : Ipsilateral	238
		Contraileteral	81
Claudication Pain	462	Neurological Deficit :	
		Sensory Hypoaesthesia	386
		EDL/EHL weakness	249
		DTR - Ankle	239
		Knee	87
		ROM L.S. Spine restriction:	
		Flexion	331
		Extention/Rotation	312
		Claudication Distance :	
		50 metres or less	162
		51-100 metres :	257
		Tenderness	
		Sciatic Nerve	461
		Spine	227
		Paraspinal	287
		X-Ray L.S. Spine :	
		I.V. Space Reduction	399
		Narrowed Canal	180
		Osteophytes Present	207
		Spondy lolisthesis	71
		Lumbar Myelogram:	
		Indentation of	
		Dye Column.	74
		Amputation of	
		Root Slips	62

Table -II
(Distribution of Symptoms, Signs & X-Ray)

Methods :

The patient is positioned in lateral position with affected side (more affected side in case of bilateral lesion) down in usual lumbar puncture position. The appropriate space mostly L 4-5 Or L₅S₁ is localised by palpation. After routine aseptic preparation of the part, No. 20 L.P. needle is inserted for about 1.5 to 2 cm. in the selected interspinous space. Epidural space is located by using a syringe attached to the needle. Sudden loss of resistance of the plunger is felt when epidural space is reached.

2ml of methyl prednisolone without dilution is administered through the needle with bivel tip facing downwards. Patient is rested for 15 to 30 minutes in the same position then allowed to go home. Review is done on the 3rd day of injection. Usually, three doses are given in the interval of 4 to 7 days.

For evaluation of the patients with lumbar canal stenosis the improvement in claudication pain/distance and also the relief of sciatica if present are examined. And for the patients with prolapse disc the evaluation is done mainly based on the improvement of the lowbackache, sciatica, SLR and also improvement in the focal neurological deficits if it is there. Pain evaluation is done by visual analogue scale and verbal pain score. The improvement is divided into 3 categories.

These are basic parameters on which our assessment of the improvement is based. However, in the overall assessment of a patient, we depend upon many more parameters as listed in the Table-IV.

Patients are reviewed at 1 to 2 monthly intervals in the first year, then once or twice a year for 2 years.

Group	Prolapse Disc	Lumbar Canal Stenosis
1	2	3
Group - I (Excellent)	<ul style="list-style-type: none"> - 90% or more relief of pain-lowbackache and/or sciatica. - Negative SLR, Significant regression of focal neurological deficits. - No tenderness in sciatic nerve or paraspinal area. 	<p>90% or more relief of pain either sciatica and/or claudication pain. Claudication distance above 1 Km. or no claudication pain. Spine Rom L.S. becomes free specially in extension.</p>
Group - II (Good)	<ul style="list-style-type: none"> - Above 50% pain relief, SLR better i.e. +ve at the angle which is 2 times of the initial angle. - 50% regression of focal neurological deficits. - Patient resumes to his/her normal duty. 	<ul style="list-style-type: none"> - Above 50% relief of pain - Claudication distance more than 2 times of the original C/D. - Spine movements are free in moderate range. - Patient resumes to his/her normal duty.
Group - III (Poor)	<ul style="list-style-type: none"> - Less than 50% relief of pain - No/minimal improvement in SLRT or focal neurological deficit 	<ul style="list-style-type: none"> - Less than 50% relief of pain - minimal improvement in claudication distance.

Methods :

The patient is positioned in lateral position with affected side (more affected side in case of bilateral lesion) down in usual lumbar puncture position. The appropriate space mostly L 4-5 Or L₅S₁ is localised by palpation. After routine aseptic preparation of the part, No. 20 L.P. needle is inserted for about 1.5 to 2 cm. in the selected interspinous space. Epidural space is located by using a syringe attached to the needle. Sudden loss of resistance of the plunger is felt when epidural space is reached.

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Group - II (Good)	<ul style="list-style-type: none"> - Above 50% pain relief, SLR better i.e. +ve at the angle which is 2 times of the initial angle. - 50% regression of focal neurological deficits. - Patient resumes to his/her normal duty. 	<ul style="list-style-type: none"> - Above 50% relief of pain - Claudication distance more than 2 times of the original C/D. - Spine movements are free in moderate range. - Patient resumes to his/her normal duty.
Group - III (Poor)	<ul style="list-style-type: none"> - Less than 50% relief of pain No/minimal improvement in SLRT or focal neurological deficit 	<ul style="list-style-type: none"> - Less than 50% relief of pain minimal improvement in claudication distance.

Observations and Results

Out of 1976 cases 882 patients were reviewed for assessment, according to the above mentioned criteria. 94 patients are lost to follow-up due to reasons beyond our knowledge. The follow-up period is given in Table - III.

Duration	No. of Cases
Upto 1 year	645
1-2 years	176
2 years & above	61

Table -III

(Period of follow-up and number of cases)

Of the 530 cases of prolapse disc, 61 patients are lost to follow-up and 381 patients (81.2%) are in excellent or good category. Of the 446 cases of lumbar canal stenosis, 33 patients are lost to follow-up and 297 (71.9%) cases shows excellent or good recovery.

These results are based on the assessment of the improvement in signs and symptoms as shown in Table - IV.

Signs & Symptoms	No. of Cases
Pain Reduced	444
Claudication Improved	312
SLRT Improvement	305
FNS Improvement	99
Tenderness Reduced	
Sciatic Nerve	168
Spine	75
Paraspinal	132
ROM L.S. Spine:	
Flexion Free	123
Extension/Rotation Free	108
Neurological Improvement :	
EHL/EDL	47
Knee Jerk	17
Ankle Jerk	57
Sensory Hypoaesthesia	108

Table -IV

(Results after the injection (Improvement))

Discussion

In our study we have used small volume i.e. 2 ml of methyl-prednisolone (depomedrol) preparation compared to large volume 3,4,9 used by other authors. We have made special arrangement, so that the drug is deposited as near to the affected root as possible positioning the patient and bivel of the needle. No local anaesthetics or opiates were given. It was found that in most patients the relief is felt on the second day or third day of the injections. Usually, three doses are needed for optimum effect².

There was no incidence of infection, paresis, bladder & bowel involvement. There were two cases of vasovagal attacks which were not directly related with the drugs. The patients were treated as out-patients. After 10 to 15 minutes observation in the post-injection period, the patients were discharged.

Better effects were observed in case of prolapse disc. Of the 88 patients who did not respond to treatment, 71. patients improved with constant pelvic traction or GLRT traction, 11 patients were ultimately subjected to discectomy. Few cases of prolapse disc did not come for further treatment. Of the 116 cases of lumbar canal stenosis, only 53 cases improved with further conservative treatment in the form of traction, lumbosacral corset/brace, etc. 32 cases were subjected to surgery i.e. laminectomy with or without de-compression of the lateral recess, root canal. 31 cases which did not improved with conservative line of treatment were advised to undergo decompression surgery. However, due to other factors they did not come to us for surgery.

Conclusion

Epidural methyl-prednisolone injection is safe and effective conservative method of treatment for both prolapse disc and lumbar canal stenosis. This can be recommended before deciding to subject the patient to operative form of treatment.

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Heterotopic Ossification in Patients with Spinal Cord Injury

Dr. Rajendra Sharma, Dr. Dharmendra Kumar, Dr H.C. Goyal , Dr. Sanjay Sharma

Abstract

A retrospective study of 45 patients of Spinal Cord Injury (SCI) with Heterotopic ossification (HO) who were admitted to Spinal Injury Ward, Department of Rehabilitation, Safdarjang Hospital, New Delhi and managed conservatively was undertaken. Thorough clinical history with emphasis on massage, manipulation, pressure sores, urinary tract infection (UTI): roentgenographic studies done at frequent intervals, and routine conservative managements strategies were tools used. This study revealed male predominance of the condition particularly in adult age group, with lesion around dorsolumbar spine and predilection for hip and knee joint involvement. It was found equally common in spastic and flaccid paraplegics. Infected pressure sores, massage and manipulation seems to have variable contribution in genesis of HO. This study emphasise significance of UTI in pathogenesis of HO. With conservative management, it was possible to retain functionally useful ROM in all cases of present series.

Introduction

Heterotopic ossification is one of the common complication encountered in spinal cord injury patients. Its incidence has been reported to be 16-53% in different studies. 48.7% Dejerine & Callier^{2,3} (1919), 37.0% Soule¹⁹(1945), 41.0% Abramson (1948), 16.0% Harday et al (1963). Heterotopic ossification is formation of new bone in the connective tissue surrounding the major joints as a result of metaplastic transformation of mesenchymal cells to bone forming cells (Subbarag J.V. 1990). It has been described by various names in the literature like myositis ossificans (Dejerin et al)². Osteosis neurotica paraarticularis or paraossitis (Geldmachar 1925)⁵. Pathological ossification (Hardy et al 1963)⁷, neurogenic ossify-

ing fibromyopathy (Soule 1945)¹⁸ and paraosteoarthropathy (Rossier et al 1973)¹⁶ but the term heterotopic ossification or ectopic bone formation seems the most appropriate because it cover the bone formed in muscle and other soft tissue whether of inflammatory or non inflammatory origin.

Aetiology of heterotopic bone formation in paraplegics is not known but various theories like arteriovenous malformation, some unknown hormonal substance liberation and mesenchymal cells metaplastic transomation into bone forming cells are described in literature. Various contributing factors for new bone formation have been reported in literature like:

- Excessive manipulation/massage
- Spasticity
- Pressure sores
- Urinary tract infection and
- Septicemia.

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New Delhi*

**(Note : Part of this paper was presented in 23rd IAPMR
conference at Trivendrum and was awarded Gold Medal),**

Objective

This study was undertaken with aim to study pattern of HO in spinal cord injury cases, magnitude of ossification, predilection for specific joints or sites, to identify and relate various causative and preprecipitating factors mentioned in literature, difference of incidence between spastic and flaccid lesion and to find out management, strategies most suitable in our conditions.

Review of Literature

Modern concept of Heterotopic ossification complicating SCI and other neurological disorders derives from thesis on the subject by Dejerine & Ceilier (1918)^{2,3} which remains single most important reference till date, although Reidel (1983) is usually credited with first description followed by Echhous (1895), Konig (1906), Potzl (1908) and Kutiner (1908).

Dejerine and Ceilier postulated factors responsible for formation of HO, one essential local factor was lowering of resistance of connective tissues by persistent oedema. Functional immobilisation following neurological deficit which caused altered vasomotor outflow¹⁶ was thought to be important as it caused altered blood flow, venous stasis tissue hypoxia, altered pH, and oedema^{13,16}. Other local factors i.e. muscle trauma¹⁴ and chemical mediators were also implicated. Second factor was thought to be central neurogenic perhaps due to irritability of intermedio lateral column of grey matter causing changed autonomic activity.^{2,3}

Leri (1919)^{9,12,14} believed pressure and traction during massage, forceful manipulation resulted in formation of tissue bone which could sustain it, but various other authors^{4,6,7,16, 21,22,23} discounted this observation. Lhermite (1919) added a belief in the necessity of super-imposed factor of local infection.^{4,5,7}

Lerice & Pollcard¹⁰ suggested that heterotopic ossification in general develops in an ossifiable connective tissue near a depot of calcareous salt based as it was on concept of non specificity of

various type of connective tissue derived from mesenchyme.

Abramson¹ found no relationship between ossification and level or pattern paralysis. Which was supported by others.^{4,7,22,27} for HO appears only with in area of neurologic deficit i.e. below the level of cord lesion^{2,7,8} with predilection for hip and knee joint^{1,4,7,12} either unilateral or bilateral. Involvement of upper extremity is infrequent and HO below elbow is rarely reported.²²

Hardy & Dickson⁷ apparently ruled out any co-relation between occurrence of HO spastic or flaccid lesion and were supported by Wharton et al²³. Ceilier² Damanski⁴ etc. Damanski⁴ (1961) in a clinical study stressed importance of skin ulceration, hypoproteinemia, severe UTI in pathogenesis of HO. But others believed^{7,8,11,15} these factors to be associated with bone formation arising as a secondary process in necrotic area.

The mass of new bone were either single or multiple and showed variation in size and extent. When large, mass of bone was preceded by palpable soft tissue swelling, sign of inflammation^{1,2,3,6-8} in varying number of cases and limitation of passive ROM of involved joint. In most patients bone appears early rapidly increased in size then remains unchanged. Rising serum alkaline phosphatase level in blood receded roentographic appearance of ectopic bone and is a useful indicator of osteoblastic activity¹⁶. Usually appears by 3-4 months and time taken for maturation is 18-24 months^{1,2,7,16,23}.

Wharton²² reported that 3-8 percent who develop HO progress towards complete ankylosis although 20% of patient with HO suffer severe functional limitation causing difficulty in self care, transfer, ability to sit in wheelchair.

Other neurological disorders in which HO is known to occur include myelitis, encephalomyelitis, CVA, cerebral tumour, various meningitis Head injury, MS, spinal cord tumour etc. some of which were discussed in papers by Lorber (1946), Mcneur (1954), Irvin et al (1954), Storey²⁰ and Splele (1959).

There are number of reports in literature regarding management of this condition although no effective treatment exist till date. Good prophylactic care including maintenance of good general condition, avoidance of pressure sore, constant change of position, early passive and active mobilisation, avoidance of UTI reduced risk of HO substantially⁴. Early diagnosis, timely intervention with passive ranging of joints with or without use of drugs i.e. etidronate sodium, indomethacin are likely to minimise functional loss^{19,21}.

Surgical intervention after maturation of ectopic bone in ankylosed or restricted joint may be helpful^{17,22,23}.

Material & Method

We have reviewed 45 patients of HO who were admitted to SCI ward of Rehabilitation Department over a period of 10 years. These patients developed signs/symptoms suggestive of HO during their rehabilitation programme and were studied in detail. History of excessive unsupervised exercises and massage was taken, restriction of passive ROM noted and patients screened with plain X-rays. Other associated factors reported in literature to be contributing to pathogenesis of HO noted. On diagnosis these patients were managed conservatively.

Observations/Results

HO was found to be more common in adult males who were in 3rd decade of life with male female ration of 5.5:1. It was more commonly seen in patients with injury around dorsolumbar region with no patient having injury below L₂ vertebra.

HO was more common in paraplegics (86.7%) who had complete injury (80%) with 55% flaccid and 44% spastic cases (Table-I). The duration between SCI and development, of HO between 9 to 36 weeks with average of 16 weeks. Majority of patients 72% developed HO between 13-20 weeks of post injury period (Table I & Table-II).

Neurological status of patients

Status	No. of Patients	% Age
I. Quadriplegia	6	13.33
Paraplegia	39	86.67
II. Complete	36	80.00
Incomplete	9	20.00
III. Spastic	20	44.44
Flaccid	25	55.56

Table I

Duration between spinal cord injury and Development of heterotopic ossification

Duration in weeks	No. of cases	% Age
Less than 8 weeks	-	-
9 - 12 weeks	3	6.66
13 - 16 weeks	20	44.44
17 - 20 weeks	12	26.66
21 - 24 weeks	4	8.88
25 - 28 weeks	4	8.88
More than 28 weeks	2	4.48
Total	45	100.00

Table II

In our series only 20 patients (44.44%) had definite history of strenuous manipulation or exercises and massage (Table-III). Majority of patients had sign of acute inflammation like rise in local temperature 62%, swelling of joints in 32 patients with restriction of passive ROM in 39 (86.66%). In 13 Patients (29%) sign of local inflammation were absent.

As far as radiological observation are concerned, all patients were screened with plain X-ray. We have quantified HO in our observation of these X-ray into three groups. Mild-ectopic bone in form of

History and clinical observation

History and Clinical observation	No. of Cases			Total
	Definite	Doubtful	Absent	
Forcible Manipulation or Excessive Exercise	20	14	11	45
Massage	20	14	11	45
Local Rise Temperature	28	-	17	45
Swelling	32	-	13	45
Restriction of Passive ROM	39	-	6	45

Table III

thin needles, flakes or thin plate. Moderate-thick plate of ectopic bone localised to one particular region and not crossing joints; Severe - In the form of sheets or large masses of bone crossing the joints or not localised to one region alone (Table-IV).

HO was most common around hip joint 28 cases (20 unilateral & 8 bilateral). Most common site in incidence & severity of HO were lesser trochanter (28 cases) Greater trochanter (26 cases). 17 cases had HO around knee joint, 13 unilateral and 4 bilateral. No HO was observed in upper extremities even in case of quadriplegia. UTI was present in 66% of cases. Infection with E.coli was seen in 48.88% of cases either singly or in combination. Most common combination was E. coli+Pseudomonas which was isolated in 26.6%

cases (Table-V). 77.77% of patient had pressure sores; 32 patients had pressure sores in sacral region out of which 14 had large pressure sores (Grade III & IV), 10 patients had multiple sores and 10 patients did not have any pressure sores (Table-VI)

All these cases were treated on line of acute traumatic myositis ossificances in early stages with rest, NSAID, antibiotics to contain infection and supportive specific therapy wherever need for UTI, pressure sore or spasticity etc. was given. Once sign of acute inflammation subsided, gentle passive ROM exercises were given.

We observed that following this treatment regime, we were able to give all patients a 90-90 position needed for wheel chair ambulation.

Radiological Observation

Site of Heterotopic Ossification	Extent of Heterotopic - Ossification			Total Cases
	Mild	Moderate	Severe	
Around HIP Joint (28)				
- Near Greater Trochanter	8	8	10	26
- Near Lesser Trochanter	8	10	10	28
- Ischial	1	-	-	1
Around Knee Joint (17)				
- Medial Femoral Condyle	6	3	8	17
- Lateral Femoral Condyle	3	3	3	9
- Supra Patellar	-	2	4	6

Table IV

Associated Urinary Tract Infection

Name of Bacteria	No. of Patients	%Age
No Infection	6	13.37
E. Coli	8	17.77
Pseudomonas	8	17.77
Klebsella	5	11.11
Staph Pyogenes	2	4.44
E. Coli+Pseudomonas	12	26.66
E. Coli+Klebsella	2	4.44
Mixed or more than 2 bacteria	2	4.44
Total	45	100.00

Table V

Pressure Sores

Site of Pressure	Size of Pressure Sore No. of Patients			Total
	Small	Medium	Large	
No Pressure Sore	-	-	-	10
Sacral	10	8	14	32
Trochanteric	4	2	3	9
Malleolar	2	2	-	4
Calcaneal	6	2	-	8

Table VI

Discussion

Our study revealed HO to be more common in adult male in the age group of 20-30 as reported by earlier authors^{2,3,4} also. In this series all the changes were found below the level of cord lesion. HO was seen more in the patients with lesion around dorsolumbar spine. In conformity with the finding of Damanski⁴, we did not find HO in patient with injury below L₂. There was in general little difference in the incidence of HO between those with spastic and those with flaccid paralysis^{2,3,4,7}.

In our series most commonly involved joints were hip joint and knee joint. No HO was observed in upper extremity even in cases of quadriplegia. These findings confirm earlier views of Hardy & Dickson⁷, Damanski⁴, Ceillier², Wharton²² et al. The average duration between SCI and development of HO was sixteen weeks. Massage and manipulation did seem to have an influence though inconclusive in our series of patients with 44.4% accounting for a definite and 29% doubtful history of manipulation. But majority of cases were unilateral (76%) although paralysis was symmetrical and physiotherapy was given to both legs.

Contrary to the views of Damanski⁴, we do not believe in pressure sores contribution to the pathogenesis of HO as 24% of patient in our series never had any pressure sore and 41% had grade-I pressure sore. In 14% of cases, there was no correlation between site of pressure sore and site of HO.

34% of patient never had significant UTI but majority of the patients with severe UTI had severe HO. This could be explained on the basis of impaired renal function thereby impaired ability to excrete calcium and phosphate whose levels in blood are higher because of osteoporotic changes occurring in the bone following functional immobilisation^{4,7,16}.

Hardy et al⁷, Wharton²³ and others have underlined importance of surgical intervention in patients with complete ankylosis of major joints

(hip & knee) to gain functional independence. However none of 45 patients in our series required surgical intervention and maintain useful ROM with conservative management.

Conclusions

HO is common in adult age group male patients with injury around dorsolumbar spine with complete lesion and is equally common in spastic and flaccid paraplegics. Hip and knee joints are commonly involved and involvement of upper extremity joints is infrequent even in case of quadriplegia. Massage and manipulation seems to have a variable contribution in genesis of HO. HO may or may not be associated with typical sign of inflammation like local rise of temperature and swelling so progressive restriction of ROM in paraplegics should arouse suspicion of HO. Urinary tract infection seems to play a significant role whereas pressure sores do not seem to cause genesis of HO at local sites. Treatment of HO in acute stage on the lines of acute myositis ossificans followed by passive ROM exercises retain at least functionally useful ROM even in severely affected joints.

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Usefulness of Ambulatory Aids in the Spinal Cord Injury Cases at Community Level - a retrospective study of 50 cases

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Abstract

Spinal cord injury is a devastating injury that often leads to permanent paralysis and the patient loses his function of ambulation. To restore it, he is prescribed various kinds of ambulatory aids. It has been observed that in the hospital set up, the patients find these appliances quite useful for his ambulation but in home environment he is not able to utilise these aids fully due to various environmental and other factors. In this study the usefulness of the ambulatory appliances at the community level has been analysed.

(Key Words:- Spinal injury, Ambulation ADL, Rejection)

Introduction

Spinal cord injury is a devastating injury that often leads to permanent paralysis and the individual loses his function of ambulation.

To restore it, he is prescribed various kinds of ambulatory aids.

There were several studies conducted previously: Abramson, 1949; Edberg, 1967; Hussey & Stanffer, 1973; Kent 1958; Long & Lawton, 1955; Munro, 1951, 1954; Hating & Mc Adam in 1978 which showed advantage of ambulatory aids in making these patients functional again.

Whereas there were other studies Coghlan etal, 1980, Hanu 1970; Kaplan etal, 1973; Mikelberg & leid, 1981; Rosman & Apira, 1974; Sposito etal, 1984, which showed that rejection rate of these ambulatory aids was high once, these patients were discharged from showed these patients were discharged from rehabilitation set up and sent into the community.

Objective

The present study envisages usefulness of ambulatory aids by follow up survey of 50 patients of spinal cord injury who were prescribed ambulatory aids. While prescribing the ambulatory aids due consideration was given to physical, psychological and socio-environmental factors and they were trained to use these aids fully in the community after discharge from the rehabilitation institute.

The present study shows encouraging results in the continuous use of these aids in the home set up. These aids add much to the patient's sense of body image and improve their moral as these patients are again able to work on their own.

Material & Method

A reply paid letter questionnaire consisting of demographic data, home situations, work status, social activities, status in activities of daily living (ADL), medical status and mode of ambulation was sent to 250 patients who had been prescribed the ambulatory aids in the rehabilitation department of Safdarjang Hospital, New Delhi from Jan, 1986 to May 1989.

50 patients whose reply were found adequate and complete were included in the present study. Medical treatment, follow up records were also reviewed to obtain the medical information as necessary.

All the 50 patients who were included in this present study were prescribed ambulatory aids in the course of their treatment and sent to their community after full achievement of physical rehabilitation.

Results & Discussion

In the present study 75% of cases were in the age group of 20-40 years. This is because the persons of this age group are mostly engaged in out door activities.

The 37 of 50 patients were male, giving a male female ratio of 4:1. The high incidence of male patients in this series is because, in our society female are mostly busy in the home and they do not go for out door working (Table No. 1)

Table No. 1

Sex Incidence

Sex No. of Cases	%	
Male	37	74
Female	13	26
Total	50	100

31 (62%) out of 50 cases were from rural areas as 70% of our population resides in the villages (Table No. 2)

Table No. 2

Rural & Urban Distribution

Residence	Male	Female	Total
Rural	23	8	31
Urban	14	5	19
Total	37	13	50

41(92%) cases had complete injury while 9 (18%) cases had incomplete spinal cord lesion 2 at cervical level, 2 at lower thoracic, 1 at throaco lumber and 4 at lumber level) (Table No. 3 & 4).

Period of institutional rehabilitation ranged from 1-7 months with an average period of 3 months (Table No. 5)

Table No. 5

Duration of Institutional Rehabilitation

Duration (Month)	Male	Female	Total
1-2	1	1	2
2-3	8	4	12
3-4	6	5	11
4-5	8	2	10
5-6	8	1	9
More than 6	6	-	6
Total	37	13	50

37 patients were provided with A/K caliper, axillary crutches, wheel chair and tri cycle, 10 patients were proved with B.K. Caliper and elow crutches along with wheel chair to 5 patients and tri cycle to 5 patients . Remaining 3 patients were provided with walker to 1, wheel chair to 1, wheel chair & tri cycle to 1 patient (Table No. 6)

Table No. 6
Rehabilitation Aids & Appliances

Name of Rehabilitation Aid	Male	Female	Total
Crutches	-	-	-
Calipers & Crutches	-	-	-
B/K Calipers & Elbow	1	4	5
Wheel Chair Crutches & B/K Caliper & elbow	5	-	5
Tricycle Crutches & A/K Calipers & Axillary	28	9	37
Wheel Chair & Tricycle crutches &			
Wheel Chair	1	-	1
Walker	1	-	1
Wheel Chair & Tricycle	1	-	1
Total	37	13	50

Subjective opinion

22 (44%) & 12 (24%) patients described the aids fully useful and satisfactorily useful respectively 4 patients found them useful at times while 12(24%) patients found them not useful at all. (Table No. 7)

Among the 34 (68%) functional walker 28(56%) were community ambulator, 6(12%) were household ambulator while in the 16(32%) cases of non functional ambulation four were occasional Indoor ambulator and 12 were therapeutic ambulators. (Table No. 8)

Activities of Dailly living A.D.L.

34 patients retained full independence in A.D.L. in their community, while 4 patients could retain partial independence in A.D.L. in community, and 12 patients became completely dependent in A.D.L. when they went back to community (Table No. 9)

The main reason for becoming dependent in A.D.L. for these 12 patients were deterioration in the Physical status of the patients, lack of toilet facilities in the home etc.

34(68%) patients were using their ambula-

tory aids independently for ambulation to perform their indoor activities, while 4 patients were using them with the assistance of another person.

12 patients were totally dependent on others to do their indoor activities mainly because of the deteriorated physical status and unsuitable home environment. (Table No. 10)

28 (56%) patients were going for the outdoor activities independently with the help of ambulatory aids, while 22(44%) cases were not using their ambulatory aids for outdoor activities. (Table No. 11) It became evident on further evaluation that majority of the patients who discarded their ambulatory aids having wheel chair or tricycle in addition to calipers & crutches. They found caliper & crutch walking more laborious and tire some & energy consuming, also conditions in the Community tend to encourage wheel chair or tricycle mobility as faster and more in tune with the pace of modern living (Table No. 12)

Repair

On analysing the repair of these ambulatory aids, it was observed that out of 146 appliances provided to these patients 82 were repaired by local artisan of the community, 15 were repaired by patients themselves and 11 were repaired in the rehabilitation unit, while 38 did not require repair. It become clear with these observation that enough skill is available in the community for dealing with the problems of minor wear & tear of appliances. (Table no. 13).

Rejection Table No. 14

Vocational Achievements

Two patients of this study were students & they resumed their studies after being discharged from rehabilitation institute. 13 house wives resumed their house hold activities with the help of ambulatory aids.

13 were self employed successfully using ambulatory aids. 22 patients who could not perform functional community ambulation were still unemployed as the main reason was not being able to ambulate independently using ambulatory aids and appliances.

Conclusion

This follow up study of 50 spinal cord injury cases has shown that 34 patients were functional walker and 16 cases were non functional ambulators. Out of total 50 patients 28 were vocationally useful and 22 patients could not engage themselves in any useful vocation.

The main reason for them to be not employed in the vocation was being able to ambulate independently using ambulatory aids. It was also felt that an important reason of rejection of an appli-

ance was the belief of the patients that the use of the brace would help in neurological recovery and that it was for short term use only.

It can therefore be concluded that all efforts should be made to make the patient ambulatory and maintain the erect posture as far as possible with the help of the ambulatory appliances from the vocational as well as from the Medical point of view as one would expect less discuse osteoporosis, Decubitus ulcer and urinary tract infection (Table No. 15).

Table No. 3
Type of Neurological lesion

Vertebral level	Complete	%	Incomplete	%
Cervical C1-C7	-	2	2	4
Thoracic T1-T6	3	6	-	-
Thoracic T7-T12	19	38	2	4
Thoraco Lumbar T12-L1	5	10	1	2
Lumbar L1-L5	14	28	4	8
Total	41	82	9	18

Table No. 4
Level of injury (Vertebral)

Vertebral level	Male	Female	Total	%
Cervical C1-C7	2	-	2	4
Thoracic T1-T6	3	-	3	6
Thoracic T7-T12	18	3	21	42
Thoraco Lumbar T12-L1	4	2	6	12
Lumbar L1-L5	10	8	18	36

Table No. 7
Subjective Opinion on utility of Ambulatory Aids in Community

Utility	Male	%	Female	%	Total	%
Fully useful	22	44	6	12	28	56
Satisfactorily Useful	3	6	3	6	6	12
Useful at Times	2	4	2	4	4	8
Not useful	10	20	2	4	12	24

Table No. 8
Relationship between Age & group & status of ambulators

Age Group	10-19	20-29	30-39	40-49	50 & above
Community ambulators	3	16	3	1	1
House hold ambulators	-	6	3	1	-
Exercise ambulators	1	1	2	-	-
Non ambulators	-	2	4	4	2
	4	25	12	6	3 = 50

Table No. 9

Activities of Daily Living

ADL	Walker	Calipers + Crutches	Wheel Chair	Calipers Crutches + Wheel Chair	Calipers Crutches + Tricycle	Calipers Crutches + Wheel Chair + Tricycle	Wheel Chair	Total
Fully Independent	1	-	-	5	5	23	-	34
Partially Independent	-	-	-	-	-	3	1	4
Dependent	-	-	1	-	-	11	-	12

Table No. 10
Use of Rehabilitation aid for Indoor Activites

	Calipers + Crutches	B/K Calipers + Elbow Crutches + Wheel Chair	B/K Calipers + Elbow Crutches + Tricycle	A/K Calipers + Axillary Crutches + Wheel Chair + Tricycle	Wheel Chair	Wheel Chair + Tricycle	Walker	Total
Using Independently	-	5	5	23	-	-	-	34
Using with Partial help	-	-	-	4	-	-	-	4
Not using	-	-	-	10	1	1	-	12

Table No. 11
Use of Rehabilitation Aid for Out Door Activities

	Walker	Caliper	Calipers Crutches	Wheel Chair	Calipers Crutches + Tricycle	Calipers Crutches + Wheel Chair + Tricycle	Wheel Chair + Tricycle	Total
Yes	-	-	2	1	2	23	-	28
No	1	-	3	-	3	14	1	22

Table No. 12
Status of Ambulation in the community

	Calipers + Crutches	B/K Calipers + Elbow Crutches + Wheel Chair	B/K Calipers + Elbow Crutches + Tricycle	A/K Calipers + Wheelchair + Tricycle	Wheel Chair	Wheel Chair + Tricycle	Walker	Total
Community Ambulators	-	5	5	18	-	-	-	28
House Hold Ambulators	-	-	-	5	-	-	1	6
Exercise Ambulators	-	-	-	4	-	-	-	4
Non Ambulator	-	-	-	10	1	1	-	12
Total	-	5	5	37	1	1	1	50

Table No. 13
Repair of Rehabilitation Aids

Place	Crutches	Calipers	Wheel Chair	Tricycle	Total
No Repair	15	8	10	5	38
Self Repair	5	2	5	3	15
Local Artisan	14	19	27	22	82
Rehab. Unit.	3	3	2	3	11
Total	37	32	44	33	146

Table No. 14
Reason for Rejection of Rehabilitation Aids

Rehabilitation	Appliance defect	Patient's Factor	Architectural barrier	Total
Calipers & Crutches	-	4	-	4
Wheel Chair	-	-	9	9
Tricycle	-	2	1	3
Total	-	6	10	16

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Role of Motor Nerve Conduction Velocity and 'H' Reflex & 'F' wave Latency in diabetic Neuropathy

Dr. S. Ramar

Abstract

A study on role of "Motor nerve conduction velocity and 'H' reflex & 'F' wave latency" was undertaken to evolve the relative merits of the said methods by EMG study for early detection of subclinical neuropathy. IDDM and NIDDM including newly diagnosed diabetics were included along with age matched control cases. The observations revealed that (1) subclinical neuropathy in diabetes mellitus can be identified by motor nerve conduction velocity of all the peripheral nerves, and "H" reflex & "F" wave latency, (2) the delay in motor nerve conduction is much pronounced in distal segment than proximal segment of ulnar and median nerves, (3) the delay in motor conduction was greater in lower limbs than upper limbs, (4) IDDM patients exhibited statistically significant reduction in motor conduction velocity in the proximal segment of ulnar nerve and distal segment of median nerve the NIDDM, (5) newly diagnosed diabetics showed significant delay in motor nerve conduction of all the peripheral nerves except terminal latency of tibial nerve, and "H" reflex & "F" wave latency, (6) "H" reflex & "F" wave latency evinced good correlation with severity of diabetes.

Key words : MNCV = Motor Nerve Conduction Velocity; IDDM = Insulin Dependent Diabetes Mellitus; NIDDM = Non Insulin Dependent Diabetes Mellitus.

Introduction

The prevalence of diabetes mellitus is variable in the global population. The prevalence of diabetes mellitus in India is about 9%. The rising prevalence of diabetes mellitus from 2.5% to about 9% in urban India is related to the replacement of traditional cooking oil such as ghee, cocount oil, mustard oil containing low ratio of free radicals viz., omega 6 and omega 3 fatty acids with polyunsaturated fatty acids such as sunflower and safflower oil containing high ratio of free radicals and reduced intake of antioxidants - vitamin "C" and vitamin "E". The prevalence of diabetes in rural India is unchanging and is around

2.5%. This wide difference in prevalence of diabetes mellitus in rural India is due to the habit of cooking with traditional cooking oil containing low ratio of omega 6 and omega 3 fatty acids¹. In 1990 it was estimated that there were 15 million people with diabetes in India. It may rise to 35 million by the year 2000. This hiking prevalence of diabetes mellitus demands improved strategy to curb and control diabetes mellitus.

The commonest complication of diabetes mellitus is polyneuropathy. The diabetic polyneuropathy is due to metabolic derangement caused by chronic hyperglycemia². Poor glycemic control is an essential permissive factor in the early development of diabetic neuropathy³. In the early phase of diabetic polyneuropathy there is a functional rather than structural damage of the nerve⁴. Hence early detection of polyneuropathy

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during the subclinical stage can permit reversal of pathological process by good glycemic control.

The electrophysiological studies of peripheral nerves viz., motor nerve conduction velocity, sensory nerve conduction velocity, "H" reflex study, "F" wave study, distribution of motor nerve conduction velocity using nerve impulse collision method and single fibre EMG are used to evaluate peripheral neuropathy both during its subclinical and clinical phases of neuropathy both during its subclinical and clinical phases of neuropathy. Nerve conduction velocity of dorsal nerve of penis and bulbocavernosus reflex are performed to assess the diabetic impotence. Visual evoked potential study are useful to assess diabetic optic neuropathy. Each method of electrophysiological study has its own merits and demerits:

The study on motor nerve conduction velocity of median, ulnar, popliteal and tibial nerves; "H" reflex and "F" wave study were undertaken to assess its significance for early detection of subclinical neuropathy because of its simplicity.

Method

The criteria laid down by WHO expert group 1980 and American Diabetic Association⁵: (1) in nonpregnant adult patients with classic symptoms such as polyuria, polydipsia, rapid loss of weight and random blood sugar more than 200mg % (or) (2) in asymptomatic patients above value is certainly adequate as well found more than one occasion (or) (3) if hyperglycemia is not marked but fasting blood sugar more than 120 mg% (7 m.mols/litre) and post glucose level (done 2 hours after taking 75 gms of oral glucose) more than 200 mg% (10 m.mols/litre) were used to select 50 cases each for the study on motor nerve conduction velocity and "H" reflex & "F" wave latency. A 20 age matched controls were included in the study on "Motor nerve conduction velocity" after excluding diabetes mellitus, peripheral neuropathy of any origin and factors triggering peripheral neuropathy.

Similarly 25 age matched controls were included in the study on "H" reflex and "F" wave latency.

Operational Definition

The cases under study were classified into diabetes with clinical neuropathy and those without it based on the clinical parameters: (1) history of paresthesia (2) impaired (or) absent pain sensation (3) dull (or) absent vibration sensation (4) diminished (or) absent postural sensation (5) dull (or) absent ankle jerk.

The duration of diabetes mellitus was calculated in months from the onset of symptoms (or) from the time of detection whichever may be earlier. The diabetes mellitus was also divided into IDDM and NIDDM. The severity of diabetes mellitus was graded into I if fasting blood sugar is below 150 mg%, II if fasting blood sugar is between 150 mg% and 200 mg% and III if fasting blood sugar is above 200 mg%. Newly diagnosed diabetes mellitus patients were also included.

EMG study was done by using ECIL MDM 30 two channel Storage Myograph. Motor nerve conduction velocity of all the peripheral nerves viz., median, ulnar, peroneal and tibial nerves were studied by using silver disc surface electrodes kept at 3 cm apart over the distal most accessible muscle⁶. The ground electrode was applied between stimulating and recording electrodes. In motor nerve conduction velocity study, the median nerve and ulnar nerve were stimulated at axilla, elbow and wrist and the compound motor action potentials were recorded from the abductor pollicis brevis for median nerve and abductor digiti minimi for ulnar nerve. The peroneal nerve was stimulated at the level of neck of fibula and at flexor retinaculum behind the medial malleolus and the compound motor action potentials were recorded from abductor hallucis longus. Proximal, distal and terminal latencies and segmental length of all the nerves were recorded for computing the motor nerve conduction velocity.

The "H" reflex study was done by stimulating the tibial nerve at the popliteal fossa. Supramaximal stimulus was used to elicit "M" response. Its latency and amplitude was measured. The latency of "M" response represents the time taken for the impulse to travel from the popliteal fossa distally to the soleus muscle. Subsequently submaximal stimulus was used to stimulate selectively group I A fibres to elicit "H" reflex. Its latency represents the time taken for the impulse to travel from the popliteal fossa proximally to the spinal cord and then to the soleus muscle through the alpha fibres⁷. "F" wave was elicited by stimulating the tibial nerve in the popliteal fossa. It was recorded in the soleus muscle using supra maximal stimulation. When supramaximal stimulus was used to elicit "M" response, some of the impulses travel antidromically i.e., proximally to the first node of Ranvier and reflected back distally along the same motor fibres to the soleus muscle. This explains the delayed response. "F" wave amplitude is usually below 200 microvolts in contrast to higher amplitude of "H" response which is as high as 10,000 micro volts. The frequency of "F" response is one per ten antidromic stimuli where as "H" response is elicited for every stimulus.

Enumeration and percentage were used for the discussion of clinical data. "t" tests and Pearson's correlation coefficient were calculated to assess the level of association of various electromyographic readings. The mean value of motor nerve conduction velocity, "H" reflex latency and "F" wave latency were taken for correlation of severity and duration of diabetes.

EMG readings of individual nerves were taken for comparison with control in 't' tests.

Results

Among the 50 cases of diabetes mellitus

included in the group on motor nerve conduction velocity, 24% were between 10-29 years of age, 20% were between 30-49 years of age and 56% were above 50 year of age. Among the 50 cases included under "H" reflex and "F" wave latency study, 18% were between 10-25 years of age, 30% were between 30-49 years of age and 42% were above 50 years of age. The prevalence of diabetes showed male preponderance i.e., 80% and 72% respectively in the study on motor nerve conduction velocity and "H" reflex & "F" wave latency. IDDM constitutes 32% of population in the group on motor nerve conduction velocity study and 24% in the group on "H" reflex & "F" wave latency study. NIDDM constitutes 68% in the group on motor nerve conduction velocity study and 76% in the group on "H" reflex & "F" wave latency study. Patients with clinical evidence of peripheral neuropathy forms 56% in the group on motor nerve conduction velocity and 48% in the group on "H" reflex & "F" wave latency study. Patients with grade I diabetes constitutes 6% in the group on motor nerve conduction velocity and 22% in the group on "H" reflex & "F" wave latency; grade II diabetes, 16% in the group on motor nerve conduction velocity, 32% in the group on "H" reflex & wave latency; and grade III diabetes, 68% in the group on motor nerve conduction velocity and 46% in the group on "H" reflex & "F" wave latency.

There was significant delay in motor nerve conduction velocity of all the peripheral nerves studied in both groups with and without clinical neuropathy. Nerve conduction delay was much pronounced in distal segments than in proximal segments of upper limb. The delay in motor nerve conduction velocity was greater in lower limb than upper limb (Table-1).

Table 1
Motor Nerve Conduction Velocity Control Vs Diabetes Mellitus

Nerve Studied	Control Metres/second	With Neuropathy Metres/second	Without Neuropathy Metres/second
Peroneal	51.04 ± 5.08	41.41 ± 6.65 *****	41.15 ± 6.39 *****
Tibial	50.01 ± 4.19	40.23 ± 5.91 *****	39.57 ± 5.88 *****
Median			
Axilla to Wrist	63.03 ± 4.20	54.93 ± 4.07	53.22 ± 5.09
Axilla to elbow	69.47 ± 10.38	62.98 ± 9.84 *****	64.23 ± 11.19 *****
Elbow to Wrist	59.26 ± 6.77	49.09 ± 6.11 *****	45.20 ± 5.92 *****
Ulnar			
Axilla to Wrist	60.65 ± 5.24	52.22 ± 5.37 *****	51.25 ± 5.67 ***
Axilla to elbow	60.77 ± 7.00	55.98 ± 8.78 *****	53.50 ± 7.98 *****
Elbow to Wrist	60.53 ± 6.43	49.65 ± 7.03	50.20 ± 6.55

Significant at * - p less than 0.05 *** p less than 0.01, ***** - p less than 0.0001.

Terminal latency in all the peripheral nerves were also prolonged both in the group with and without neuropathy except in tibial nerve in the group without neuropathy (Table-2) There was a relative reduction in motor nerve conduction velocity in IDDM than in NIDDM with a statistically significant reduction in proximal segment of ulnar nerve and distal segment of median nerve (Table-3). The delay in motor nerve conduction velocity was also observed in newly diagnosed diabetics with reference to control cases with significant "P" value in all the peripheral nerves. Similarly the terminal latency was also prolonged in newly diagnosed diabetics with significant "P" value except in tibial nerve (Table-4). The duration and severity of diabetes mellitus did not show statistically significant correlation with motor nerve conduction velocity.

"H" reflex latency was prolonged in both group with and without clinical neuropathy. Similar delay in motor nerve conduction velocity of tibial nerve was observed in both groups with and without clinical neuropathy. Where as statisti-

cally significant delay was observed in "F" wave latency study only in the group with clinical neuropathy (Table-5) "H" reflex reflex latency was prolonged both in IDDM and NIDDM without any significant difference between them. Tibial nerve conduction velocity and "F" wave latency showed statistically significant delay in both IDDM and NIDDM (Table-6) Newly diagnosed diabetes also showed a statistically significant delay in all the three parameters viz. "H" reflex, "F" wave latency and tibial nerve conduction velocity (Table-7). Age of the patient and duration of diabetes did not show any correlation with "H" reflex latency, "H" wave latency and tibial nerve conduction velocity. However severity of diabetes showed correlation with "H" reflex latency and "F" wave latency but not with tibial nerves conduction velocity (Table-8,9,10)

Discussion

The prevalence of diabetes mellitus in this study showed usual male preponderance. Though the incidence of diabetes mellitus is more after 50

Table 2
Terminal latency
Control Vs Diabetes Mellites

Nerve Studied	Control Metres/Second	With Neuropathy Metres/Second	Without Neuropathy Metres/second
Peroneal	4.44 ± 0.60	4.75 ± 0.76 * *	5.18 ± 1.03 * *
Tibial	4.63 ± 0.73	4.74 ± 0.76 ****	5.03 ± 1.07 ***
Median	3.65 ± 0.40	4.02 ± 0.71	4.22 ± 0.56
Ulnar	2.92 ± 0.42	3.25 ± 0.56	3.43 ± 0.74

Significant at * - p less than 0.05, **** p less than 0.001, ***** - p less than 0.0001.

Table 3
IDDM Vs NIDDM - Motor nerve conduction velocity

Types of Diabetes	Ulnar nerve		Median nerve		Tibial nerve	Peroneal nerve
	Proximal	Distal	Proximal	Distal		
IDDM n-16	53.1875 ± 9.53	46.3125 ± 5.74	58.1875 ± 6.83	47.875 ± 6.45	40.4375 ± 14.55	38.125 ± 7.16
NIDDM n-34	65.3529 ± 7.86 ***	47.5588 ± 4.81	55.9118 ± 5.18	51.4412 ± 5.18 *	42.7059 ± 4.98	41.2353 ± 4.82
"t"	4.767	0.8030	1.3061	2.0969	0.8203	1.8123

Significant at * - p less than 0.05, ** p less than 0.02, *** p less than 0.01, ***** - p less than 0.0001.

Table 4
Motor Nerve Conduction Velocity
Control Vs Newly diagnosed Diabetes Mellitus

Nerve Studied	Control Metres/Second	Newly diagnosed Diabetics Metres/second
Peroneal	51.04 ± 5.08	39.42 ± 3.42 *****
Tibial	50.01 ± 4.19	39.71 ± 3.19 *****
Median Axilla to Wrist	63.03 ± 4.20	53.77 ± 3.50 *****
Axilla to elbow	69.47 ± 10.38	56.40 ± 6.50 *****
Elbow to Wrist Ulnar Axilla to Wrist	59.26 ± 6.77	51.14 ± 3.53 *****
Axilla to elbow	60.77 ± 7.026	55.41 ± 5.90 *****
Elbow to Wrist	60.53 ± 6.43	46.00 ± 5.79

Significant at * - p less than 0.05, *** p less than 0.01, ***** p less than 0.0001

Table 5
'H' Reflex & 'F' wave latency - control Vs Diabetes Mellitus

EMG Study	Control (1)	With Neuropathy (2)	Without Neuropathy (3)
'H' Reflex Latency (milli sec.)	28.464 ± 2.55314	33.468 ± 3.34358	31.372 ± 3.56762
'F' wave Latency (milli sec)	29.523 ± 3.60609	37.868 ± 7.82880	32.45 ± 4.07693
MNCV of Tibial nerve (m/sec)	51.357 ± 3.59956	39.004 ± 7.18295	44.514 ± 6.45477

EMG Study	t ¹⁻²	t ¹⁻³
	****	****
'H' Reflex Latency	7.1382914	4.0171957

'F' wave latency	3.4526670	1.9214
	****	****
MNCV of Tibial nerve	9.94960688	5.9719749

n for 'H' reflex (1) 38 (2) 33 (3) 34
n for 'F' wave (1) 12 (2) 19 (3) 14
n for MNCV (1) 40 (2) 52 (3) 48

Significant at * - p less than 0.05, ** p less than 0.02, *** p less than 0.01, **** p less than 0.0001

Table 6
'H' Reflex & 'F' wave latency - control Vs IDDM NIDDM

EMG Study	Control (1)	IDDM (2)	NIDDM (3)
'H' Reflex Latency (milli sec.)	28.464 ± 2.55314	33.546 ± 3.24021	32.127 ± 3.64662
'F' wave Latency (milli sec)	29.523 ± 3.60609	38.500 ± 10.89025	34.193 ± 3.42172
MNCV of Tibial nerve (m/sec)	51.357 ± 3.59956	39.659 ± 6.63575	42.443 ± 7.58357

EMG Study	t ¹⁻²	t ¹⁻³
'H' Reflex Latency	**** 5.7782159	**** 5.3361034 *
'F' wave latency	** 2.7034769	**** 3.7332835
MNCV of Tibial nerve	**** 9.1283503	**** 7.58357

n for 'H' reflex (1) 38 (2) 13 (3) 54
n for 'F' wave (1) 12 (2) 11 (3) 22
n for MNCV (1) 40 (2) 24 (3) 76

Significant at * - p less than 0.05, ** p less than 0.02, *** p less than 0.01, ***** p less than 0.0001

Table 7
'H' Reflex & 'F' wave latency -
Control Vs Newly diagnosed Diabetics

EMG Study	Control (1)	Newly diagnosed (2)	diabetics t ¹⁻² (3)
'H' Reflex Latency (milli sec.)	28.464 ± 2.55314	29.900 ± 3.16012	1.6036599 **
'F' wave Latency (milli sec)	29.523 ± 3.060809	35.850 ± 4.32262	2.9061875 ****
MNCV of Tibial nerve (m/sec)	51.357 ± 3.59956	43.939 ± 6.39179	5.5113811

n for 'H' reflex (1) 38 (2) 12
n for 'F' wave (1) 12 (2) 4
n for MNCV (1) 40 (2) 16

Significant at * - p less than 0.05, ** p less than 0.02, *** p less than 0.01, ***** p less than 0.0001

Table 8
Correlation of severity of Diabetes
Motor nerve conduction velocity

Types of Diabetes	Ulnar nerve		Median nerve		Tibial nerve	Peroneal nerve
	Proximal	Distal	Proximal	Distal		
IDDM	-0.017 *	0.041 ***	0.004	-0.039	0.209	0.461
NIDDM	-0.362	-0.482	0.197	-0.005	-0.039	-0.235

Significant at * - p less than 0.05, ** p less than 0.02, *** p less than 0.01, ***** - p less than 0.0001.

Table 9
**Correlation of duration of Diabetes
 Motor nerve conduction velocity**

Types of Diabetes	Ulnar nerve		Median nerve		Tibial nerve	Peroneal nerve
	Proximal	Distal	Proximal	Distal		
IDDM	-0.050	-0.048	-0.159	-0.197	-0.173	-0.027
NIDDM	0.132	-0.158	-0.328	-0.086	-0.074	-0.136

p value for Pearson's correlation coefficient

None of the above reaches statistically significant level

Table 10
**EMG parameters Vs Age, Duration and Severity of Diabetes
 Pearson's Correlation Coefficient**

Diabetic status	'H' reflex latency n = 35	'F' wave latency n = 18	MNCV in meters/second n = 50
Age	0.0525798	-0.3150161	0.0406479
Duration	0.0407047 ***	-0.1765840 *	-0.0320639
Severity	0.4354969	0.4280908	-0.1698256

Significant at * - p less than 0.10, ** p less than 0.05, *** p less than 0.02.

years of age, distribution of cases showed patients also between 10 years to 50 years of age. Motor nerve conduction velocity of all the peripheral nerves viz., median, ulnar, peroneal and tibial nerve and "H" reflex latency study explored subclinical neuropathy with statistically significant delay in motor nerve conduction and "H" reflex latency. The delay in motor nerve conduction velocity was significant greater in the distal segment of median and ulnar nerve than in the proximal segment. Severe delay in motor nerve conduction velocity was observed in lower limb than upper limb. IDDM patients exhibited statistically significant reduction in motor nerve conduction velocity in the proximal segment of ulnar nerve and distal segment of median nerve than NIDDM. However IDDM patients did not show statistically significant delay in "H" reflex & "F" wave latencies. Evaluation of terminal latency in all the peripheral nerves showed statistically significant delay in latency except in ulnar nerve in the group without neuropathy. Newly diagnosed diabetics also showed significant delay in motor nerve conduction, "H" reflex and "F" wave latency except terminal latency of tibial nerve. The motor nerve conduction velocity did not evince correlation with severity of diabetes. Whereas "H" reflex and "F" wave latency evinced statistically significant correlation with severity of diabetes. However all the three parameters viz., motor nerve conduction velocity, "H" reflex and "F" wave latency did not show any correlation with duration of diabetes. In the study by Vijayan et al, significant delay was observed in motor nerve conduction velocity in the distal segment than proximal segment of upper limb as well as greater reduction

in motor nerve conduction velocity in lower limb than upper limb. They also explored no correlation with duration of diabetes mellitus and however obtained correlation with severity of diabetes⁸. Stephan C and associates have also observed that there was no correlation between motor nerve conduction velocity and duration & severity of diabetes mellitus⁹. Lamontagne and Buchthal described reduction in motor nerve conduction velocity in neuropathic group only¹⁰. JD Ward et al also identified reduction in motor nerve conduction velocity in newly diagnosed diabetics¹¹. Comi G et al also showed electrophysiological abnormality of peripheral nerves in newly diagnosed diabetic children¹².

Conclusion

This study emphasizes the following inferences : (1) subclinical neuropathy in diabetes mellitus can be identified by motor nerve conduction velocity of all the peripheral nerves, and "H" reflex & "F" wave latency, (2) the delay in motor nerve conduction was much pronounced in distal segment than proximal segment of ulnar and median nerves, (3) the delay in motor conduction was greater in lower limbs than upper limbs, (4) IDDM patients exhibited statistically significant reduction in motor conduction velocity in the proximal segment of ulnar nerve and distal segment of median nerve than NIDDM, (5) newly diagnosed diabetics showed significant delay in motor nerve conduction of all the peripheral nerves except terminal latency of tibial nerve, and "H" reflex & "F" wave latency, (6) "H" reflex & "F" wave latency evinced good correlation with severity of diabetes.

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Clinical and Immunogenetic Profile of Rheumatoid Arthritis Patients in Kashmir

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Abstract

Two hundred and five patients of Rheumatoid arthritis, seen over a period of 4 years were studied. The majority of the patients had relatively mild disease at the time of presentation. The disease is seen more commonly in females, and frequent in fourth decade. Small joints are mostly affected and commonest radiological finding was soft tissue swelling and osteoporosis. Extra articular manifestations are uncommon and vasculitis is very rare. Mid expiratory flow rate is the commonest lung function abnormality. 68 patients of classic and definitive Rheumatoid arthritis patients were typed for four HLA-Loci, A,B,C and DR. Out of these 40 patients (58.82 percent) had DR4 positive test. 52 patients (76.47 percent) were Rheumatoid factor positive. Out of 142 control subjects 7 cases (4.9 percent) were RF positive and 31.69 percent were DR4 positive.

Introduction

Rheumatoid arthritis is a chronic multisystem disease, although there are a variety of systemic manifestations, the characteristic feature of the disease is persistent inflammatory synovitis, usually involving peripheral joints in symmetric distribution.

Rheumatoid arthritis is highest in incidence among arthritides, and exact the great toll in crippling. This comprise a group of diseases of high morbidity and low mortality, with high potential for crippling disability among a relatively younger age group.

Despite advances in our understanding of the immunological process, leading to articular inflammation and connective tissue destruction, the cause of this malady remains an engima. Indeed it is still not clear whether Rheumatoid arthritis is one disease with multiple etiologies or a symptom complex produced by a single causative factor. A wide clinical spectrum of Rheumatoid arthritis is recognized, thus the patients selected may not represent

a true cross section of disease presentation or clinical profile. In addition environmental, social, genetic and economic factors may play a role in the expression of the disease. Thus a pattern of illness may appear particularly severe in rather homogeneous isolated populations.

Family studies indicate a genetic predisposition. The role of genetic influences in the etiology of Rheumatoid arthritis was established by demonstration of a association with class II major histocompatibility gene complex antigen HLA-DR4.

Severe Rheumatoid arthritis is found at approximately four times the expected rate in first degree relatives of individuals with sero-positive disease.

Since the etiopathogenesis of Rheumatoid arthritis is unknown. Geographical variations in clinically, immunological and immunogenetic pattern may provide some clues towards the etiopathogenesis of this disease. The present study describes these features in patients with Rheumatoid arthritis from Kashmir.

Material and Methods

Over 4 years period (October 1987-October 1991) 205 adult patients with Rheumatoid Arthri-

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tis attending the out patient department of Institute of Medical Sciences were studied. The diagnosis of Rheumatoid Arthritis was established according to the American Rheumatism Association criteria.

In clinical evaluation special stress was placed on the topography of joint involvement and extrarticular manifestation. The patients in addition were assigned anatomical class according to the criteria of Steinbroker

Serological Studies:

Rheumatoid factor was screened in all the patients and controls using latex kits, Auto-antibodies were studied by standard indirect immunofluorescence technique.

Immunogenetic studies:

68 patients with unequivocal deforming and erosive disease were typed for four major HLA Loci A,B, C and DR. 142 control subjects were also typed for HLA, A,B,C, and DR.

HLA-A, B and C were typed by two stage microlymphocyto-toxicity technique and DR typing was done by Nylong wool separation of B cells and typing method.

Results

Clinical Observation.

The patients were in the age range of 11-55 years and the median age of onset of Rheumatoid arthritis was 37.19 years and the female to male ratio was 3.5 : 1.

The average joint count on the first visit was 7. The joints involved and their frequency is given in Table I.

Table :2

Anatomical Stage at which the patients presented

Stage I	27 (13.17)
Stage II	122 (59.51)
Stage III	36 (17.56)
Stage IV	20 (09.75)
	205

(Figures in brackets show % age)

Extra-articular Manifestations:

There were 32 patients (15.60%) who showed typical Rheumatoid nodule. Detailed pulmonary assessment including lung function test were performed only in 60 representative patients. Of these 47 patients had normal skiagram while 7 showed evidence of pulmonary infiltrates, and 6 had pleural effusion.

The pulmonary function studies revealed a number of abnormalities. These included reduced vital capacity in 21 patients (35%), reduced mid expiratory flow rate in 39 patients (65%) diminished forced expiratory volume in first second in 12 patients (20%).

Cardiac involvement was sought clinically and by electro-cardiogram, 7 patients had prolonged. PR interval and 4 patients had pericarditis and 2 had aortic regurgitation clinically.

8 patients had spleenomegaly and 40 patients are found to have mild to severe anemia.

The anatomical stages assigned in these patients according to Steinbroker et al² is shown in Table II.

Serology:

Using the commerical latex fixation test kit 52 (76.47%) patients had Rheumatoid factor titer range 1:48 to 1:92 by the dilution technique Anti-nuclear antibody was positive in titre of 1:8 or more in 27 patients.

Table III shows the results of HLA typing in 68 classical and definite Rheumatoid arthritis patients and 142 control subjects.

Discussion

There are some important differences in clinical presentation of Rheumatoid Arthritis patients in Kashmir and Northern India on one side and the patients of European origin on the other. First the anatomic Stage at which our patients presented indicates a milder form of joint disease than that seen in the west. The present study also shows that the extent of severity of extra-articular manifestations of Rheumatoid Arthritis in patients from Kashmir and Northern India is less than that seen

in the west. Only 32 (15.60%) of our patients had subcutaneous nodules in contrast to the accepted figures from the white race reported in the range of 20% to 35% systemic vasculitis was not found in any of our patients. Malaviya et al³ have reported subcutaneous nodule in 8.5% patients and Walker, W.C. and Wright,⁴ have reported subcutaneous nodules in 44% male and in 24% of female patients. Though pulmonary function tests were abnormal in a large population of our patients, the paucity of radiologically demonstrable disease is in contrast to the western figures. Eye involvement in the form of episcleritis was noted in 5.8% of our patients. Similar results have been reported by Walker and Wright⁴ Reddy, S.C. et al⁵ Examined 50 patients of Rheumatoid arthritis and reported 33% patients having one or more ocular changes. Cardiac involvement was found in 19% patients. 10.29% patients had electro-cardiographic evidence of cardiac involvement in the form of PR prolongation. Nearly 3% patients had aortic regurgitation. These patients did have any history of Rheumatic heart disease or any other cause of aortic regurgitation. Pericarditis was clinically diagnosed in 5.88% patients and was substantiated by electrocardiogram. These patients had no evidence of any other disease giving rise to pericarditis. Malaviya et al³ found mitral regurgitation in two patients out of total of 258 patients studied. Lebowitz, W.B.⁶ reported pericarditis in 50% of patients at autopsy. Pulmonary involvement was seen in 6.34 percent of cases in our patients. Pleural effusion was present in 6 patients and interstitial lung disease was seen in 7 patients in our series, diagnosed clinically, substantiated by radiology and lung function test, which revealed restrictive pattern. Lung function tests revealed reduced vital capacity in 35% patients, reduced mid expiratory flow rate in 65% and diminished forced expiratory volume in first second in 20% patients. Malaviya et al³ have found reduced vital capacity, reduced mid expi-

ratory flow rate and reduced forced expiratory volume in first second in 36% 92% and 30% patients respectively. Walker, W.C. and Wright, V⁴ have reported interstitial pulmonary fibrosis in 1.6% Patients. Splenomegaly was noticed in 8 (11.76%) patients. Walker and Wright⁴ have found splenomegaly in 3 percent patients. The frequency of seropositivity and the association of disease with DR4 is comparable to that reported in caucasians. 40 (58.82%) out of 68 patients in our study were DR4 positive which was highly significant whereas 31.69% control subjects had DR4 positive test. 52 (76.47%) patients were RF positive as compared to 7 (4.9%) control subjects. 31.69% patients were DR4 positive in control group. No significant difference was found in antigen frequencies of HLA-A B and C loci in patients and Control group. The high frequency of HLA-DR4 antigen detected in representative group of Kashmir^{3,7} population correlates well with North Indian population as shown by Malaviya, A.N et al and Mehra NK et al^{3,7} as well as white caucasoid population as shown by others⁸⁻¹³. The HLA-DR4 association of Rheumatoid Arthritis in our study is in conflict with observations of Michol and Woodrow^{14,15} who reported a strong association of DRI with Rheumatoid arthritis in Indians from Liver pool.

Summary & Conclusion

Rheumatoid arthritis affects females about twice as commonly as the males. The onset of disease is most frequent during fourth decade of life in females and fifth decade of life in males. Small joints of hands with exception of distal interphalangeal joints are more frequently involved as compared to other joints. Joint deformities are found most frequently in wrist joints. Extra-articular manifestation are uncommon, vasculites is very rare. Commonest radiological findings are soft tissue swelling and osteoporosis. Reduced mid-expiratory flow rate is the commonest lung func-

Table No. 1
Comparison of Joint Involvement in Rheumatoid Arthritis in patients from Kashmir, Northern India and White Race.

Joints	Frequency of Involvement in present study. (Percent)	Frequency of Involvement in Northern India (Percent)	Frequency of Involvement in White Race. (Percent)
Wrist	73.17	95	82
PIP	76.09	90	63
MCP	71.70	87	87
Knee	76.09	75	50
Ankle	34.14	55	53
MIP	29.26	47	48
Shoulder	29.26	40	47
Elbow	26.82	35	21
Hip	08.29	15	Not mentioned
Cervical spine	07.80	0.8	Not mentioned

PIP = Proximal Interphalangeal Joint
MCP = Metacarpophalangeal Joint.
MTP = Metatar sopal angeal Joint.

Table No. 3
HLA-DR Antigen in the patients & Control subjects

Antigen	Patient (n=68) No %	Control (n=142) No. %	PR	X2	P
DR1	08 (11.76)	16 (11.27)	1.05	0.008	HS
DR2	29 (42.15)	62 (43.66)	0.76	0.019	NS
DR3	09 (13.24)	21 (14.79)	0.878	0.0394	NS
DR4	40 (58.82)	45 (31.69)	3.08	14.03	HS .001
DR5	08 (11.76)	20 (14.08)	0.81	0.2153	NS
DR6	09 (13.24)	24 (16.90)	0.75	0.4687	NS
DR7	13 (19.12)	54 (38.03)	0.385	7.57	.005
DR8	-	09 (06.34)	0	5.22	.025
DR9	02 (02.94)	06 (04.23)	0.686	0.46902	NS
DR10	06 (08.82)	04 (02.82)	3.34	3.34	NS
DQW1	50 (73.53)	102 (71.83)	1.089	0.066	NS
DQW2	19 (27.94)	73 (51.41)	0.366	10.28	.005
DQW3	51 (75.00)	72 (50.70)	2.926	11.18	.005

tion abnormality. Majority of the patients are seropositive. Extracutaneous manifestations are found in seropositive patients only. HLA-DR4 is found more frequently in rheumatoid arthritis patients as compared to controls.

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