The Effect of Various Interventions on Patients Outcome In Peripheral Arterial Disease

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Abstract:--- Background: Peripheral artery disease (PAD) is defined as impairment of the blood flowing to the extremities which is a result of atherosclerotic occlusive disease. The most classic symptom is pain over limbs on walking which resolves with rest (intermittent claudication) which occurs due to poor oxygenation of muscles of lower extremities. Objectives: Mainly to classify patients of PAD as per Fountain and Rutherford's classification, Compare efficacy of various interventions based on treatment arms, Monitor response of treatment on claudication pain and claudication distance, Determine response of treatment on quality of life as assessed by SF-36 questionnaire and, Monitor short and long term effects of these interventions. Methodology: It is a prospective cohort study design studied for a duration of 2 years. Study Setting: Dept of Surgery, AVBRH, Sawangi(M), wardha. AMPLE SIZE: 75 (25 in each group). Groups: 1) PAD patients undergoing medical/ conservative management (N=25) 2) PAD patients treated or managed with intervention radiology (N=25). 3) PAD patients treated with combination of any of the two modalities like, IR and surgical (debridement/amputation) OR, Medical management followed by IR OR, Medical management followed by surgical management (debridement/amputation) (N = 25). Expected Results: All patients admitted with diagnosis of PAD will undergo comparison between medical, interventional radiological and surgical management which claims to improve the quality of living of patients with peripheral arterial disease. This study is basically inclined to prove that surgical management is the better form of management for improving quality of living of patient with PAD. Conclusion: Peripheral arterial disease is defined as a progressive disease with significant morbidity and mortality rate. The prevalence of this disease in general population is about 10–14%, affecting up to approximately 25% of those over 70 years; 65%–85% of affected individuals are asymptomatic with only a minority of population requiring revascularization or amputation. Keywords: Peripheral arterial disease, claudication pain, ankle brachial index, peripheral vascular disease, intermittent claudication, rest pain, thrombosis of arteries, gangrene.

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I   INTRODUCTION:

I.I. Background/rationale:

Peripheral artery disease (PAD) in leg aka peripheral vascular disease (PVD) is most commonly said to be caused by atheroma or in simpler words fatty deposition in walls of the arteries. The deposition of fatty substances in the vessel wall leads to blood flow reduction or insufficiency to the muscles and other tissues. It's a term used to determine impairment of blood that is flowing to the limbs commonly due to result of atherosclerotic occlusive disease changes. In short, it's a manifestation of systemic atherosclerosis. The experience of various symptoms depends on various demands of ischemic tissues metabolically like during workout/ exercise. Symptoms may also depend on various collateral circulation degrees and/or the location of deposits in the affected artery (1-8).

Most classical symptom in PAD is pain in limbs which is experienced during walking. This pain subsequently resolves with rest. Such pain is termed as intermittent claudication which is said to be a result of poor oxygenation of lower extremity muscles. Poor oxygenation to muscles is expressed by patients with PAD as dull aching pain, cramping type of pain or feeling of numbness in calf or buttock or hip or thigh or at the arch of foot which aggravates while walking and is comparatively relieved with rest. Various other symptoms experienced includes skin ulcers, or poor structured nail growth and hair growth, bluish discoloration of skin or cold clammy skin over the affected leg (9-17).

The most common risk factor that contributes to PAD is smoking. Other risk factors include – older age group, comorbid diseases like diabetes, heart diseases, stroke, high blood cholesterol and high blood pressure. However, many people who have been diagnosed with peripheral arterial disease (PAD) may not have any features or symptoms (18-22).

The various type of symptoms that can be seen in association with PAD are:

- Pain, numbness or heaviness in the legs which aggravates on walking or while climbing stairs (aka claudication)
- Weak or absent pulsations felt over extremities
- Decreased hair growth over the affected limb
- Pale or bluish discoloration of skin
- Wound or sores over toes or feet or legs that heals slowly or poorly or not at all
- Lower temperature over the affected limb
- Erectile dysfunction, especially among men who have diabetes

I.II. Objectives:

- Mainly to classify patients of PAD as per Fountain and Rutherford's classification,
- Compare efficacy of various interventions based on treatment arms,
- Monitor response of treatment on claudication pain and claudication distance,
- Determine response of treatment on quality of life as assessed by SF-36 questionnaire and

- Monitor short and long term effects of these interventions.

Trial design: It is a single blind and comparative study

II METHODOLOGY:

It is a prospective cohort study, done on the patients of Peripheral arterial disease requiring medical and / or surgical interventions. It will be conducted at Dept.of surgery, J.N.M.C and AVBRH hospital, Sawangi (Meghe), Wardha of DMIMS (DU).

This study will be conducted on patients of Peripheral arterial diseases requiring medical and / or surgical interventions. Informed and signed consent will be obtained from all the patients and prior approval from institutional ethical committee, DMIMS (DU) will be taken.

II.I. Eligibility criteria:

All patients admitted with the diagnosis of peripheral arterial disease will be evaluated for participation in the study on various criteria given above. The patient population will be divided into following groups.

Group A: patients with PAD undergoing medical/ conservative treatment

Group B: patients with PAD undergoing surgical intervention

Group C: Patients with PAD treated with combination of any two modalities like medical/ conservative, surgical and/or Intervention Radiology

After enrollment, patients will be randomized into respective groups based on the treatment modality selected as per standard treatment guidelines.

II.II. Inclusion criteria:

- Patients with PAD undergoing medical/ conservative management
- Patients with PAD undergoing surgical interventions
- Patients with PAD treated with combination of any two modalities like medical/ conservative, surgical and/or Intervention Radiology.

II.III. Exclusion criteria:

- Patients already diagnosed with PAD and on treatment
- Patients who have already undergone some interventional radiology procedure
- Patients not fit for any of the above procedures.
- Patient refusal

II.IV. Variables:

The patients with the symptoms s/o PAD will be evaluated. The basic investigations like CBC, KFT, LFT, lipid profile, will be done. The arterial and venous studies will be done using color Doppler. The patients will be randomized into medical/ surgical treatment. The patients requiring surgical treatment will be evaluated further with angiography.

Based on the lesion and/ or the LEVEL OF OBSTRUCTION, the treatment option of medical/ conservative treatment, surgical intervention like debridement, amputation, PRP infiltration, or procedures using IR like stenting, intra-arterial thrombolysis, etc will be done.

The patients will be monitored for the treatment response based on following parameters:

- Claudication pain
- Claudication distance
- Level of gangrenous changes
- Rest pain
- Status of postoperative wounds
- Status of amputation flap
- Intervention radiology related parameters like flow velocity

All the patients will be assessed on the basis of SF-36 quality of life index questionnaire.

The study will be conducted on patients of Peripheral arterial diseases requiring medical and / or surgical interventions.

75 participants will be enrolled under medical, intensive radiological and surgical trial depending on the inclusion and exclusion criterias.

III FOLLOW UP:

The patients will be followed for next 6 months after the medical/ surgical intervention. At 6 months follow up, following investigations will be done:

- Repeat color Doppler
- Quality of life questionnaire
- Claudication pain
- Claudication distance

Sample size Participants: 75 (25 in each group)

Groups:

1) Patients with PAD undergoing medical/ conservative management (N=25)

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2) Patients with PAD treated or managed with intervention radiology (N=25)

3) Patients with PAD treated with combination of any of the two modalities like

IR and surgical (debridement/amputation)

OR

Medical management followed by IR

OR

Medical management followed by surgical management (debridement/amputation) (N = 25).

III.I. Classification:

Common staging is done by the **Fontaine staging,** introduced by René Fontaine for chronic limb ischemia

Another classification by the Society for Vascular Surgery and International Society of Cardiovascular Surgery (SVS/ISCVS), known as the **Rutherford classification**.

TABLE 3. Classification of Peripheral Artery Disease

Rutherford Classification			Fontaine Classification	
Grade	Category	Description	Stage	Description
0	0	Asymptomatic	I	Asymptomatic
I	1	Mild claudication	IIa	Mild claudication
I	2	Moderate claudication	IIb	Moderate to severe claudication
I	3	Severe claudication		
II	4	Ischemic rest pain	III	Ischemic rest pain
III	5	Minor tissue loss	IV	Ulceration or gangrene
III	6	Major tissue loss		

The TASC (and TASC II) classification is suggested for treatment of PAD based on the severity of disease as seen on angiogram findings.

Table 1 TASC II classification of SFA occlusions	
Type A	Single occlusion <5 cm in length
Type B	Single occlusion <5 cm but heavily calcified or multiple occlusions each <5 cm or single occlusion <15 cm
Type C	Multiple occlusions >15 cm
Type D	Chronic total occlusion >20 cm
TASC, TransAtlantic Inter-Society Consensus; SFA, superficial femoral artery.	

Moderate to severe degree of PAD in Fontaine's stage III to IV, or in Rutherford's category 4 to 5, is considered to present as a presence of threat to the limbs affected with a high risk of loss of limb and is found to present in the form of critical limb ischemia.

Based on the above classification the patient is graded and accordingly divided into various groups as decided by the eligibility criteria. These patients will then undergo treatment allotted under medical management that is with drugs, interventional radiological management as in thrombolysis and plasty and finally surgical management that is amputation and PRP dressings. This study is basically inclined to prove that surgical management is the better form of management for improving quality of living of patient with PAD.

IV METHODS: ASSIGNMENT OF INTERVENTIONS (FOR CONTROLLED TRIALS):

All patients admitted with the diagnosis of peripheral arterial disease will be evaluated for participation in the study on the various criteria discussed. Written informed Consent will be taken from the patient prior to the enrollment.

The patient population will be divided into following groups.

Group A: patients with PAD undergoing medical/ conservative treatment

Group B: patients with PAD undergoing surgical intervention

Group C: Patients with PAD treated with combination of any two modalities like medical/ conservative, surgical and/or Intervention Radiology

After enrollment, patients will be randomized into respective groups based on the treatment modality selected as per standard treatment guidelines.

The patients with the symptoms s/o PAD will be evaluated. The basic investigations like CBC, KFT, LFT, lipid profile, will be done. The arterial and venous studies will be done using color Doppler. The patients will be randomized into medical/ surgical treatment. The patients requiring surgical treatment will be evaluated further with angiography.

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The patients will be monitored for the treatment response based on following parameters:

- Claudication pain
- Claudication distance
- Level of gangrenous changes
- Rest pain
- Status of postoperative wounds

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- Status of amputation flap
- Intervention radiology related parameters like flow velocity

All the patients will be assessed on the basis of SF-36 quality of life index questionnaire

Implementation: the author will be in sole control of allocation of sequence.

V DATA COLLECTION, MANAGEMENT, AND ANALYSIS METHODS:

Variables: The patients with the symptoms s/o PAD will be evaluated. The basic investigations like CBC, KFT, LFT, lipid profile, will be done. The arterial and venous studies will be done using color Doppler. The patients will be randomized into medical/ surgical treatment. The patients requiring surgical treatment will be evaluated further with angiography.

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All the patients will be assessed on the basis of SF-36 quality of life index questionnaire.

VI DATA SOURCES/ MEASUREMENT   :

A pretested structural Performa will be made to collect information regarding detailed clinical history and examination, laboratorial and follow up of the patients. Cases will be selected consequently with the above mentioned inclusion and exclusion criteria.

VII ETHICS AND DISSEMINATION:

Institutional ethical committee clearance will be obtained before the start of the study. Confidentiality will be maintained in all stages of the study. The investigations performed in the study are otherwise necessary for the management of the underlying clinical condition. So the participants are not forced to undergo any extra investigations or procedures and hence the study will not cause any financial burden on the subjects.

VIII EXPECTED OUTCOMES/RESULTS:

VIII.I. Outcome data:

Peripheral arterial disease is defined as a progressive type of disease with significant morbidity and mortality rate. The prevalence of this disease in general population is estimated to be about 10–14%, affecting up to approximately 25% of those over 70 years; 65%–85% of affected individuals are asymptomatic with only a minority of population requiring revascularization or amputation.

The incidence of PAD patients complaining of symptoms increases with age, with an incidence of about 0.4% per year for male group aged between 40 – 60 years to about 2% per year for male group aged above 70 years. These prevalence calculated varies considerably depending on how peripheral arterial disease is described. It also depends on the various age groups of the study population.

Diagnosis of these diseases is critical because people with PAD have a higher risk fold of four to five times for heart attack and/ or stroke and it is seen to affects 1 out of 3 diabetic population above the age of 45 years.

Claudication is seen as the most common type of symptom experienced and is seen to deteriorate in about 20 - 25% of all the patients affected, with a rate of about 5%–10% in the 1st year and then subsequently seen to deteriorate to a rate of 2%–5% per year, out of these, an incidence of about 0.25–0.45/1000 people/years results in an eventual critical limb ischemia.

Besides taking relevant and appropriate history, clinical tests such as Doppler scans, MR Angiography and contrast angiography is advised in few doubtful cases. Ankle brachial index (ABI) is seen to be a highly useful investigation in patients with previously unrecognized PAD.

ABI is the ratio of ankle systolic blood pressure to brachial systolic blood pressure. A value of <0.9 is considered to be abnormal.

Many pharmacological agents that are tried include rheological agents, vasodilators, antiplatelets, anticoagulants and prostaglandins. FDA has however approved only two drugs, i.e., Pentoxifylline and Cilostazol claiming to treat intermittent claudication.

IX DISCUSSION:

All patients admitted with diagnosis of PAD will undergo comparison between medical, interventional radiological and surgical management which claims to improve the quality of living of patients with peripheral arterial disease. This study is basically inclined to prove that surgical management is the better form of management for improving quality of living of patient with PAD. Peripheral arterial disease is a progressive disease with significant morbidity and mortality rate. The prevalence of this disease in the general population is about 10–14%, affecting up to approximately 25% of those over 70 years; 65%–85% of affected individuals are asymptomatic with

only a minority of population requiring revascularization or amputation. Many articles were reviewed no different aspects of factors associated with this study (23-82).

REFERENCE:

[1]   Recommended standards for reports dealing with lower extremity ischemia: Revised version Rutherford, Robert B et al; Journal of Vascular Surgery, Volume 26, Issue 3; 517- 38.
[2]   SemininterventRadiol 2014; 31(04): 292-299 DOI: 10.1055/s-0034-1393964
[3]   Timothy P. Murphy, Medical Outcomes Studies in Peripheral Vascular Disease, Journal of Vascular and Interventional Radiology, Volume 9, Issue 6,1998;879-88.
[4]   ACC/AHA 2005 Practice Guidelines for the Management of Patients With Peripheral Arterial Disease (Lower Extremity, Renal, Mesenteric, and Abdominal Aortic); Alan T. Hirsch, Ziv J. Haskal, Norman R. Hertzer et al. Circulation. 2006; 113: e463-e654.
[5]   Stem Cell Therapy in PA; Sprengers, R.W et al; European Journal of Vascular and Endovascular Surgery, Volume 39, S38 - S43.
[6]   Medical treatment of peripheral arterial disease and claudication; W.R. Hiatt; N Engl J Med, 344 (2001), pp. 1608-1621.
[7]   J.M. Capla, D.J. Ceradini, O.M. Tepperet al; Skin graft vascularization involves precisely regulated regression and replacement of endothelial cells through both angiogenesis and vasculogenesis; PlastReconstrSurg, 117 (2006), pp. 836-844.
[8]   C. Gensch, Y.P. Clever, C. Werner et al; The PPAR-gamma agonist pioglitazone increases neoangiogenesis and prevents apoptosis of endothelial progenitor cells; Atherosclerosis, 192 (2007), pp. 67-74.
[9]   C.H. Wang, M.K. Ting, S. Vermaet al; Pioglitazone increases the numbers and improves the functional capacity of endothelial progenitor cells in patients with diabetes mellitus; Am Heart J, 152 (2006), pp. 1051-1058
[10] L. Norgren, W.R. Hiatt, J.A. Dormandyet al; Inter-society consensus for the management of peripheral arterial disease (TASC II); Eur J VascEndovascSurg, 33 (Suppl 1) (2007), pp. S1-75.
[11] R.F. Gillum; Peripheral arterial occlusive disease of the extremities in the United States: hospitalization and mortality; Am Heart J, 120 (1990), pp. 1414-1418.
[12] Guidelines for percutaneous transluminal angioplasty. Standards of Practice Committee of the Society of Cardiovascular and Interventional Radiology; Radiology, 177 (1990), pp. 619-626.
[13] Taksande, A. "A New Scoring System for the Diagnosis of Pulmonary Arterial Hypertension." *EUROPEAN HEART JOURNAL* 38, no. 1 (August 2017): 158–59.
[14] Jain, Jyoti, Shashank Banait, Iadarilang Tiewsoh, and Madhura Choudhari. "Kikuchi's Disease (Histiocytic Necrotizing Lymphadenitis): A Rare Presentation with Acute Kidney Injury, Peripheral Neuropathy, and Aseptic Meningitis with Cutaneous Involvement." *INDIAN JOURNAL OF PATHOLOGY AND MICROBIOLOGY* 61, no. 1 (March 2018): 113–15. https://doi.org/10.4103/IJPM.IJPM_256_17.
[15] Papalkar, P., S. Kumar, S. Agrawal, N. Raisinghani, G. Marfani, and A. Mishra. "Heterotaxy Syndrome Presenting as Severe Pulmonary Artery Hypertension in a Young Old Female: Case Report." *JOURNAL OF GERONTOLOGY AND GERIATRICS* 66, no. 2 (2018): 59–61.
[16] Choudhari, Mangesh Sudhakar, Manish I. Sonkusale, and Rashmi A. Deshpande. "Sudden Cardiac Arrest on 5th Day after Coronary Artery Bypass Graft Surgery: Diagnostic Dilemma." *ANNALS OF CARDIAC ANAESTHESIA* 21, no. 3 (September 2018): 341–42. https://doi.org/10.4103/aca.ACA_214_17.
[17] Schwartz, G. G., P. G. Steg, M. Szarek, D. L. Bhatt, V. A. Bittner, R. Diaz, J. M. Edelberg, et al. "Alirocumab and Cardiovascular Outcomes after Acute Coronary Syndrome." *NEW ENGLAND JOURNAL OF MEDICINE* 379, no. 22 (November 29, 2018): 2097–2107. https://doi.org/10.1056/NEJMoa1801174.
[18] Jain, Jyoti, Shashank Banait, Iadarilang Tiewsoh, and Madhura Choudhari. "Kikuchi's Disease (Histiocytic Necrotizing Lymphadenitis): A Rare Presentation with Acute Kidney Injury, Peripheral Neuropathy, and Aseptic Meningitis with Cutaneous Involvement." *INDIAN JOURNAL OF PATHOLOGY AND MICROBIOLOGY* 61, no. 1 (March 2018): 113–15. https://doi.org/10.4103/IJPM.IJPM_256_17.
[19] Gondivkar, Shailesh M., Rahul R. Bhowate, Amol R. Gadbail, Sachin C. Sarode, and Shankargouda Patil. "Quality of Life and Oral Potentially Malignant Disorders: Critical Appraisal and Prospects." *WORLD JOURNAL OF CLINICAL ONCOLOGY* 9, no. 4 (August 13, 2018): 56–59. https://doi.org/10.5306/wjco.v9.i4.56.

[20] Gupta, Rahul Kumar, and Meena Deogade. "A Critical Review on Ethnobotanical, Phytochemical and Pharmacological Investigations of Martynia Annua Linn." *INTERNATIONAL JOURNAL OF AYURVEDIC MEDICINE* 9, no. 3 (September 2018): 136–43.

[21] Charan, Nameirakpam, Mangesh Chaudhary, Manish Sonkusale, and Rashmi Deshpande. "A PROSPECTIVE STUDY OF INTRAOPERATIVE COMPARISON BETWEEN GENERAL ANAESTHESIA WITH CONVENTIONAL OPIOID AND THORACIC EPIDURAL ANAESTHESIA FOR OFF PUMP CORONARY ARTERY BYPASS SURGERY." *JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS* 8, no. 20 (May 20, 2019): 1667–77. https://doi.org/10.14260/jemds/2019/368.

[22] Rathi, Nikhil, Bharati Taksande, and Sunil Kumar. "Nerve Conduction Studies of Peripheral Motor and Sensory Nerves in the Subjects With Prediabetes." *JOURNAL OF ENDOCRINOLOGY AND METABOLISM* 9, no. 5 (October 2019): 147–50. https://doi.org/10.14740/jem602.

[23] Jukema, J. Wouter, Michael Szarek, Laurien E. Zijlstra, H. Asita de Silva, Deepak L. Bhatt, Vera A. Bittner, Rafael Diaz, et al. "Alirocumab in Patients With Polyvascular Disease and Recent Acute Coronary Syndrome ODYSSEY OUTCOMES Trial." *JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY* 74, no. 9 (September 3, 2019): 1167–76. https://doi.org/10.1016/j.jacc.2019.03.013.

[24] Jain J, Banait S, Tiewsoh I, Choudhari M. Kikuchi's disease (histiocytic necrotizing lymphadenitis): A rare presentation with acute kidney injury, peripheral neuropathy, and aseptic meningitis with cutaneous involvement. Indian J Pathol Microbiol 2018;61(1):113-115.

[25] Jain V, Waghmare L, Shrivastav T, Mahakalkar C. SNAPPS facilitates clinical reasoning in outpatient settings. Educ Health 2018;31(1):59-60.

[26] Bains SK, John P, Nair D, Acharya S, Shukla S, Acharya N. Aptitude of medical research in undergraduate students of a medical university - Miles to go before we sow. J Clin Diagn Res 2017;11(12):JC07-JC11.

[27] Taksande A, Meshram R, Yadav P, Lohakare A. Rare presentation of cerebral venous sinus thrombosis in a child. J Pediatr Neurosci 2017;12(4):389-392.

[28] Choudhari MS, Charan N, Sonkusale MI, Deshpande RA. Inadvertent diversion of inferior vena cava to left atrium after repair of atrial septal defect - Early diagnosis and correction of error: Role of intraoperative transesophageal echocardiography. Ann Card Anaesth 2017;20(4):481-482.

[29] Swarnkar M, Jain SC. Heterotopic subserosal pancreatic tissue in Jejunum-an incidental rare finding. J Krishna Inst Med Sci Univ 2017;6(4):105-108.

[30] Taksande A, Meshram R, Yadav P, Borkar S, Lohkare A, Banode P. A rare case of Budd Chiari syndrome in a child. Int J Pediatr 2017;5(10):5809-5812.

[31] Gupta V, Bhake A. Diagnosis of clinically suspected and unsuspected tubercular lymphadenopathy by cytology, culture, and smear microscopy. Indian J Tuberc 2017;64(4):314-317.

[32] Gupta V, Bhake A. Clinical and cytological features in diagnosis of peripheral tubercular lymphadenitis – A hospital-based study from central India. Indian J Tuberc 2017;64(4):309-313.

[33] Sharma SK, Chaubey J, Singh BK, Sharma R, Mittal A, Sharma A. Drug resistance patterns among extra-pulmonary tuberculosis cases in a tertiary care centre in North India. Int J Tuberc Lung Dis 2017;21(10):1112-1117.

[34] Jyoti J, Nitin V, Shashank B, Pradeep D. Gamma glutamyl transferase levels in patients with acute coronary syndrome: A cross-sectional study. J Cardiovasc Dis Res 2017;8(4):121-125.

[35] Saoji V, Madke B. Use of low-dose oral warfarin in three cases of livedoid vasculopathy. Indian J Dermatol 2017;62(5):508-511.

[36] Dhamgaye TM, Bhaskaran DS. An unusual pulmonary metastatic manifestation of gestational choriocarcinoma: A diagnostic dilemma. Lung India 2017;34(5):490-491.

[37] Jagzape A, Jagzape T, Pathak S. Medical education terminologies: Do these really percolate to the level of medical students? A survey. J Clin Diagn Res 2017;11(9):JC01-JC05.

[38] Taksande A, Meshram R, Lohakare A. A rare presentation of isolated oculomotor nerve palsy due to multiple sclerosis in a child. Int J Pediatr 2017;5(8):5525-5529.

[39] Behere PB, Mansharamani HD, Kumar K. Telepsychiatry: Reaching the unreached. Indian J Med Res 2017;146(August):150-152.

[40] Belekar V. A comparative study to evaluate the efficacy of butorphanol as an adjuvant to epidural analgesia for rib fractures. J Datta Meghe Inst Med Sci Univ 2017;12(3):166-169.

[41] Sahu S, Kher KS, Wagh DD, Swarnakar M, Pandey P, Agnihotri I. Endoscopic evaluation of patients presenting with dysphagia at rural hospital AVBRH. J Datta Meghe Inst Med Sci Univ 2017;12(3):196-205.

[42] Roy M, Gajbe UL, Singh BR, Thute P. Morphometric measurement of fetal femur length for the prediction of gestational age in the iind and iiird trimester of pregnancy by ultrasonography. J Datta Meghe Inst Med Sci Univ 2017;12(3):187-190.

[43] Nitnaware AS, Vagha J, Meshram R. Clinical profile of pediatric head injury. J Datta Meghe Inst Med Sci Univ 2017;12(3):191-195.

[44] Taksande K, Chatterjee M, Jain V. A case report of prolonged apnea during electroconvulsive therapy in a patient with suicidal attempt by organophosphorus poison. J Datta Meghe Inst Med Sci Univ 2017;12(3):223-225.

[45] Jham R, Shukla S, Acharya S, Dhote S, Tamhane A, Bhake A. Correlation of the proliferative markers (AgNOR and Ki-67) with the histological grading of the glial tumors. J Datta Meghe Inst Med Sci Univ 2017;12(3):211-217.

[46] Modi L, Shivji IA, Behere PB, Mishra KK, Patil PS, Goyal A. A clinical study of self-stigma among the patients of schizophrenia and alcohol dependence syndrome. J Datta Meghe Inst Med Sci Univ 2017;12(3):161-165.

[47] Taneja S, Pande V, Kumar H, Agarkhedkar S. Correlation of various maternal factors with exaggerated hyperbilirubinemia of the newborn. J Datta Meghe Inst Med Sci Univ 2017;12(3):218-222.

[48] Singhania S, Singhania A, Khan S, Kumar V, Singhania P. Prenatal diagnosis of cross-fused renal ectopia: Still a dilemma. Donald Sch J Ultrasound Obstet Gynecol 2017;11(3):225-226.

[49] Jain S, Sharma SK. Challenges & options in dengue prevention & control: A perspective from the 2015 outbreak. Indian J Med Res 2017;145(June):718-721.

[50] Gupta V, Bhake A. Molecular Diagnosis of Tubercular Lymphadenopathy from Fine-Needle Aspirates in Pediatric Patients. Acta Cytol 2017;61(3):173-178.

[51] Varghese LA, Taksande K. A comparison between intrathecal dexmedetomidine with hyperbaric bupivacaine and intrathecal fentanyl with hyperbaric bupivacaine in lower abdominal surgeries: A prospective double-blinded study. J Datta Meghe Inst Med Sci Univ 2017;12(2):99-109.

[52] Khan KI, Jalgaonkar PD, Agrawal S. A case of phenytoin induced multiple toxicities. J Datta Meghe Inst Med Sci Univ 2017;12(2):157-158.

[53] Bhalerao NS, Modak A, Belekar V. Comparison between magnesium sulfate (50 mg/kg) and lignocaine (2 mg/kg) for attenuation of intubation response in hypertensive patients. J Datta Meghe Inst Med Sci Univ 2017;12(2):118-120.

[54] Phadnis P, Kamble MA, Daigavane S, Tidke P, Gautam S. Prevalence and risk factors – Hemoglobin A1c, serum magnesium, lipids, and microalbuminuria for diabetic retinopathy: A rural hospital-based study. J Datta Meghe Inst Med Sci Univ 2017;12(2):121-132.

[55] Kuthe S, Sonkusale M, Wanjari A, Panbude P. Large right ventricular fibroma. J Datta Meghe Inst Med Sci Univ 2017;12(2):154-156.

[56] Gupta K, Mahakalkar C, Kaple M, Deshpande S, Ladhha P, Jain N. A comparative study of cilostazol and pentoxifylline in intermittent claudication in peripheral arterial disease. J Datta Meghe Inst Med Sci Univ 2017;12(1):11-16.

[57] Swarnkar M, Agrawal A. Kimura's disease: A case report and review of literature. J Krishna Inst Med Sci Univ 2017;6(3):118-120.

[58] Swarnkar M, Jain SC. Web space lipoma causing separation of toes - a rare case report with review of literature. J Krishna Inst Med Sci Univ 2017;6(2):107-110.

[59] Tendulkar MP, Ninave SS. Prospective comparison of pressor and airway responses to IV esmolol and IV dexmedetomidine during emergence from general anaesthesia and extubation. J Krishna Inst Med Sci Univ 2017;6(1):49-56.

[60] Taksande AB, Jagzape AT, Deshpande VK. Study of motor nerve conduction velocity in patients of thyroid dysfunction in central India. J Datta Meghe Inst Med Sci Univ 2017;12(4):229-233.

[61] Majumdar MR, Sune MP, Mohod P. Helmet-induced ocular trauma: A rare mechanism. J Datta Meghe Inst Med Sci Univ 2017;12(4):292-293.

[62] Bhattacharjee J, Jogdand S, Goswami S, Shinde R, Padhye MR. Evaluation of analgesic activity of simvastatin and atorvastatin in Wistar rats: An experimental study. Natl J Physiol Pharm Pharmacol 2017;7(10):1031-1035.

[63] Gade SA, Chari SN, Chalak A. Use of mini-CEX as a teaching learning method in physiology for undergraduate medical students. Natl J Physiol Pharm Pharmacol 2017;7(5):482-485.

[64] Garg S, Chakravarti A, Singh R, Masthi NRR, Goyal RC, Jammy GR, et al. Dengue serotype-specific seroprevalence among 5- to 10-year-old children in India: a community-based cross-sectional study. Int J Infect Dis 2017;54:25-30.

[65] Jagzape AT, Jagzape T, Rawekar A. Patient-based integrated teaching program with the inclusion of psychomotor and affective domains. Natl J Physiol Pharm Pharmacol 2017;7(8):788-792.

[66] Tendolkar VD, Behere P, Quazi Z, Gaidhane A. Heterogeneous group discussion to improve reliability and validity of data tool: A global mental health assessment tool – primary care version study. J Datta Meghe Inst Med Sci Univ 2017;12(1):45-50.

[67] Yunati MS, Deshpande V, Yuwanate AH, Sorte SR, Sirsam SS. Sahaja yoga meditation as a tool to enhance aging pulmonary functions. Natl J Physiol Pharm Pharmacol 2017;7(3):333-338.

[68] Bajaj A, Kumar S, Inamdar AH, Agrawal L. Noninvasive ventilation in acute hypoxic respiratory failure in medical intensive care unit: A study in rural medical college. Intl J Crit Illn Inj Sci 2019;9(1):36-42.

[69] Aglawe PB, Jha RK, Mishra V, Sakore KM, Chetan A, Shrivastava DS. Appraisal of core therapy, supportive therapy, and alternative therapy in a tertiary care rural hospital of vidarbha region in correlation to plethora of menopausal problems. J Mid-Life Health 2019;10(1):14-21.

[70] Wankhade A, Vagha S, Shukla S, Bhake A, Laishram S, Agrawal D, et al. To correlate histopathological changes and transvaginal sonography findings in the endometrium of patients with abnormal uterine bleeding. J Datta Meghe Inst Med Sci Univ 2019;14(1):11-15.

[71] Patond S, Nagrale N, Jain K. Correlation between stature and skull dimensions in the population of central india: A cross sectional study. J Forensic Med Toxicol 2019;36(1):56-58.

[72] Nagrale N, Patond S, Jain K. Estimation of cephalic index of chhattisgarhi population: An anthropometric study from central India. J Forensic Med Toxicol 2019;36(1):9-12.

[73] Shrivastava D, Master A. Fetal Growth Restriction. J Obstet Gynecol India 2019.

[74] Khanam N, Wagh V, Gaidhane AM, Quazi SZ. Assessment of work-related musculoskeletal morbidity, perceived causes and preventive activities practiced to reduce morbidity among brick field workers. Ind J Community Health 2019;31(2):213-219.

[75] Swarnkar M, Jindal R. Obstructed obturator hernia: A diagnostic dilemma. J Krishna Inst Med Sci Univ 2019;8(3):115-117.

[76] Marfani G, Phatak SV, Madurwar KA, Samad S. Role of sonoelastography in diagnosing endometrial lesions: Our initial experience. J Datta Meghe Inst Med Sci Univ 2019;14(1):31-35.

[77] Gulve SS, Phatak SV. Parathyroid adenoma: Ultrasonography, Doppler, and elastography imaging. J Datta Meghe Inst Med Sci Univ 2019;14(1):47-49.

[78] Bhayani P, Rawekar R, Bawankule S, Kumar S, Acharya S, Gaidhane A, et al. Profile of urinary tract infection in a rural tertiary care hospital: Two-year cross-sectional study. J Datta Meghe Inst Med Sci Univ 2019;14(1):22-26.

[79] Laishram S, Gupta V, Bhake A, Wankhede A, Agrawal D. To assess the utility of proliferative marker Ki-67 in surface epithelial ovarian tumor. J Datta Meghe Inst Med Sci Univ 2019;14(1):6-10.

[80] Swarnkar K, Gaikwad S, Uke P, Vagha K, Dalal Y. Apert syndrome presenting with omphalocele. J Krishna Inst Med Sci Univ 2019;8(1):95-99.

[81] Balwani MR, Pasari A, Tolani P. Widening spectrum of renal involvement in psoriasis: First reported case of C3 glomerulonephritis in a psoriatic patient. Saudi J Kidney Dis Transpl 2019;30(1):258-260.

[82] Balwani MR, Bawankule CP, Pasari A, Tolani P, Vakil S, Yadav R. Minimal change disease and Kimura's disease responding to tacrolimus therapy. Saudi J Kidney Dis Transpl 2019;30(1):254-257.

[83] Ali, A., Hulipalled, V. R., Patil, S. S., & Kappaparambil, R. A. (2019). DPCCG-EJA: Detection of key pathways and cervical cancer related genes using enhanced Johnson's algorithm. International Journal of Advanced Science and Technology, 28(1), 124-138. Retrieved from www.scopus.com

[84] Anitha, R., Ramesh, K. V., & Sudheerkumar, K. H. (2019). Synthesis, characterization of CeO2 nanoparticles via eco-friendly green combustion technique and its antimicrobial, anticancer activities. International Journal of Advanced Science and Technology, 28(7), 74-96. Retrieved from www.scopus.com

[85] Bindu Madhavi, G., & Rakesh Reddy, J. (2019). Detection and diagnosis of breast cancer using machine learning algorithm. International Journal of Advanced Science and Technology, 28(14), 228-237. Retrieved from www.scopus.com

[86] Kingsly, A. A. S., & Mahil, J. (2019). Effective approach of learning based classifiers for skin cancer diagnosis from dermoscopy images. International Journal of Advanced Science and Technology, 28(20), 1016-1026. Retrieved from www.scopus.com

[87] Kumar, A., Sushil, R., & Tiwari, A. K. (2019). Feature extraction and elimination using machine learning algorithm for breast cancer biological datasets. International Journal of Advanced Science and Technology, 28(20), 425-435. Retrieved from www.scopus.com

[88] Lakshmi Prasanna, K., & Ashwini, S. (2019). Automatic breast cancer detection and classification using deep learning techniques. Test Engineering and Management, 81(11-12), 5505-5510. Retrieved from www.scopus.com

[89] Shin, B., Wang, B., & Lim, J. S. (2019). Feature selection and machine learning method for classification of lung cancer types. Test Engineering and Management, 81, 2307-2314. Retrieved from www.scopus.com

[90] Ghuge, K. S., Korabu, K. S., & Somani, A. (2020). Breast cancer detection using clustering and SVM. Test Engineering and Management, 83, 2196-2205.