ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 14, Issue, 02 (A), pp. 2855-2860, February, 2023

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

STUDY OF HEMATOLOGICAL AND COAGULATION PROFILE IN PATIENTS OF MALARIA

[1]Nirmit Patel*, [2]Poojan Kapashi., [3]Parth Patel., [4]Rutvij Patel., [5]Konark Patel, [6]Dhrushi Patel, [7]Harshil Patel and [8]Parth Patel

[1, 2, 5,7]GCS Medical College, Hospital and Research Centre, Ahmedabad
[3,6] B.J. Medical College and Civil hospital, Ahmedabad
[4]AMC Met Medical College, Ahmedabad
[8]General Medicine, Geetanjali Medical College and Hospital, Udaipur

DOI: http://dx.doi.org/10.24327/ijrsr.2023.1402.0587

ARTICLE INFO

Article History:

Received 12th November, 2022
Received in revised form 23rd December, 2022
Accepted 7th January, 2023
Published online 28th February, 2023

Keywords:

Malaria, Anemia, PT, aPTT, FDP, D-dimer

ABSTRACT

Objective:

1. To study the spectrum of changes in haematological and coagulation parameters in patients of malaria.
2. To determine the prevalence of anaemia, thrombocytopenia and disseminated intra –vascular coagulation in malaria patients.
3. To correlate the severity of malaria with haematological and coagulation dysfunction.
4. To note, if any, species-specific haematological and coagulation changes exist

Materials and Methods:

The present study was conducted in tertiary care centre in India. The study was carried out on 100 patients admitted during the period from June 2020 to October 2022 in the hospital. It was a prospective observational study. A detailed history was taken followed by a thorough clinical examination to assess clinical severity and complications. All the patients in this study were confirmed cases of malaria either by Peripheral smear examination (both thick and thin smear) or malaria rapid antigen test. These investigations were ordered before the antimalarial treatment was started.

Results:

In this prospective study of 1 0 0 patients withwithfever who were proven to have malaria either by Peripheralsmearorantigenassay; Anemia was seen in 88%ofthe total patients, severe anemia was seen in 17% of the patients. Severe anemia (Hb < 8 gm%) was more common in falciparum and mixed infection. Thrombocytopenia is common in almost all species of malaria. It was seen in 72% of total patients. PT was increased in 22% of the cases and APTT was increased in14% of the cases who had moderate to severe thrombocytopenia. BT was increased in 5% of the patients and 4% had bleeding manifestations.

Conclusions:

Anemia is an important complication and cause of high morbidity and mortality in acute malaria and its severity correlates with high parasitemia. Hb <8 gm% is a poor prognostic factor. Bleeding manifestations are not commonly seen even in severe complicated falciparum malaria. Elevated values of PT, aPTT, FDP, D-dimer and BT, indicating activation of coagulation cascade and consumptive coagulopathy may lead to fatal outcome. Deaths in malaria are mainly due to P falciparum and mixed infection and are attributable to severe anemia, hyperparasitemia, intravascular coagulopathy and multi organ dysfunction.

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain may persist despite successful management of the condition that initially caused it, or because the underlying medical condition cannot be treated successfully. Chronic knee pain is pain that persists or recurs for longer than three months. Such pain often becomes the predominant clinical problem in most of the patients. Chronic knee pain is a common condition, which affects an estimated 46.5% of the population worldwide.[1]

Myofascial trigger points are very commonly found in the Quadriceps femoris in subjects with knee pain which refers pain to the knee joint.[2,3,4] The percentage prevalence of Quadriceps myofascial trigger points in subjects with knee pain is approximately 30%.[2] Due to the pain and fatigue produced by myofascial trigger points, the patient tries to avoid activity which leads to disuse weakness.[5]

Corresponding author:* **Nirmit Patel
GCS Medical College, Hospital and Research Centre, Ahmedabad

Myofascial trigger points (MTrP's) are frequently a source of pain and subsequently result in dysfunction which may predispose the individual to injury and further disability. In our clinical practice, MTrP's around the knee are rarely assessed in cases of knee pain. As stated by Simmons and Travell, an active MTrP may radiate pain to a joint, which may be confused to be a joint pathology. Trigger points are associated with accelerated muscle fatigability, due to accumulation of waste metabolites like lactate, calcitonin related gene peptide (CGRP) and substance P.[6]

A myofascial trigger point is a hyperirritable spot, usually within a taut band of skeletal muscle, which is painful on compression and can give rise to characteristic referred pain, motor dysfunction, and autonomic phenomena. Ischemic compression is a mechanical treatment of myofascial trigger points that consists of application of sustained pressure for a long enough time to inactivate the trigger points.[7]

Subjects with anterior knee pain have been found to have prevalence of MTrP's in the thigh muscles pointing towards an association between anterior knee pain and MTrP's.[2] It is still unanswered whether myofascial pain coexists with knee pain and enhances pain and disability or causes it. There is a dearth of literature pertaining to the immediate effect of trigger point release of Quadriceps femoris in subjects with chronic knee pain and the researcher intends to research about the same so as to ascertain the immediate effect of MTrP release on pain, peak isokinetic torque and functional performance.

To evaluate the efficacy of a particular protocol, outcome measures are used and in patients with knee dysfunction, pain was be assessed using numeric pain rating scale, muscle strength was assessed using isokinetic dynamometer and functional performance using 30 seconds chair stand test. Isokinetic testing is an accommodating variable-resistance testing which is performed at a fixed speed with the resistance matching the muscle force at that speed of movement.[8] Functional performance testing of the patients can determine physical limitations that may affect activities of daily living. Optimal functional performance testing simulates the patient's daily activity.[9]

MATERIALS AND METHODS

This study was conducted at KJ Somaiya College of Physiotherapy, Mumbai, which comes under the Maharashtra University of Health Sciences (MUHS, Nashik), state of Maharashtra, India. The study was approved by the Institutional Ethics Committee. The duration of the study was 18 months, during the period of postgraduate course (MPTh).
It was a Quasi-experimental intervention-based pre-post study & purposive sampling was used to recruit subjects.

Lacrosse ball, Isokinetic dynamometer, Plinth, Data record sheet, Pen & Chair without armrest were used for conducting the study. The sample size was calculated and thirty participants were included in the study based on the following inclusion and exclusion criteria.

Males or females in the age group of 30-60 years with chronic knee pain lasting more than 3 months & having one or more trigger points in Quadriceps femoris was included in this study.

Subjects having current systemic illness like uncontrolled diabetes, neuromuscular disease affecting the knee musculature e.g.: post-polio residual paralysis (PPRP), Duchene's Muscular dystrophy (DMD), etc, prolapsed intervertebral disc or sciatica, congenital deformities of the lower limb, neuropathies, injuries or surgeries of spine and/or lower limb& autoimmune conditions viz., Rheumatoid arthritis, Systemic lupus erythematosus, etc. were excluded.

Institutional ethics committee approval was taken prior to the commencement of the study.30 subjects fulfilling the inclusion and exclusion criteria and willing to participate in the study were selected. The purpose of the study & study procedure was explained to these individuals. Informed written consent was obtained from individuals who participated in the study.

Data record sheet including demographic details of participants, intensity of knee pain on numeric pain rating scale (NPRS), quadriceps femoris concentric isokinetic strength [peak torque (N.m)] and functional performance assessed with the help of 30 seconds chair test was completed for each participant. Forpatients who complained of bilateral knee pain, the more painful knee reported by the patient was selected to be a part of the intervention.

All the testing and intervention procedure was carried out by following appropriate COVID-19 safety precaution guidelines. The assessment of myofascial trigger points in quadriceps femoris[4] was done with the patient in a relaxed comfortable supine position on a treatment plinth with the thigh region exposed. Patient was asked to report the site of maximal tenderness during the palpation procedure and the identified point was marked with a pen. Three identified methods were used for trigger point palpation: flat palpation, pincer palpation, and deep palpation. [2]

Muscles viz., Vastus Medialis, Rectus Femoris, and Vastus Lateralis which harbored the trigger point were noted. Muscles which harbored more than two MTrP's, the two most painful trigger points were selected for release by compression.Each subject was assessed for pain, Quadriceps femoris peak isokinetic torque and lower limb functional performance using NPRS, Isokinetic dynamometer and 30 seconds chair sit to stand test respectively.

Numeric Pain Rating Scale [10]

The scale was shown to the patient and was asked to rate his/her pain. Pain rating was taken before and after the intervention.

Isokinetic dynamometry (Peak isokinetic torque)[11]

The patient was made to sit on the isokinetic dynamometer chair with hip and knee in 90̊-90̊ position and with hands holding the hand grips and thorax fixed with the back rest using buckle strap, non-tested side was immobilized using a contralateral limb stabilizer, thigh of the limb under test was stabilized using a thigh strap to eliminate any trick movements which may be performed by the patient.

Flexion and extension stop were adjusted according to the patient's knee range of motion. The axis of the knee joint was aligned to be in line with the axis of the lever arm of the dynamometer. Shin pad was secured to the lever arm of the dynamometer positioned just above the ankle joint and secured with a Velcro strap. (Fig.2)

Fig. 1 Quadriceps peak isokinetic torque testing

Parameters

I. Chair

a. Rotation scale: 40
b. Back angle: 85
c. Fore/Alt Position: 15
d. Seat position: Up

II. Dynamometer

a. Dyna tilt: 0
b. height: 8
c. Dyna rotation: 40
d. Monorail: 38

Program was selected from the menu for 180⁰/s concentric/eccentric extension/flexion of the knee. Patient was asked to perform one trial to make him/her acquainted with the procedure. The test included one repetition of knee flexion and extension to make it sensitive to record the slightest change in the peak torque of Quadriceps femoris and to avoid fatigue due to the testing procedure. Pre and post readings intervention were recorded using same procedure.

30 seconds chair sit to stand test[9]: (Fig 2&3)

This test was performed after the isokinetic dynamometer strength testing test both, pre and post intervention to assess the functional performance.

- The patient was made to sit in the middle of a chair without armrests, with a seat height of 17 inches, with rubber ferrules on its legs to stop it from moving.
- He/she asked to keep the arms crossed at the wrist and held against the chest and back straight, feet were placed on the floor approximately shoulder width apart and at angle slightly behind the knees.
- The test was demonstrated and patient was made to perform a trial to get him/her acquainted with the test. He/she was then asked to do as many sits to stands as possible in 30 seconds without using support from the hands. If the patient used hand support during the test, the test was halted, and patient was scored 0 for that repetition.
- More than halfway up at the end of 30 seconds was counted as a full stand. Incorrectly executed stands were not considered.

Fig.2 Start position

(**Fig 3** End position)

Myofascial Trigger Point Release Using Ischemic Compression[7]

Patient was in a relaxed supine lying position with the treatment area adequately exposed to access the myofascial trigger point. Ischemic compression was applied using a lacrosse ball over the trigger point with the pressure directed perpendicular to the muscle fibers. Intervention consisted of compression at the trigger point which was administered by the primary investigator certified in myofascial release therapy. (Fig.4)

Up to five compressions of sufficient pressure to just elicit referred pain were applied at the trigger point using lacrosse ball. Duration of each trigger point compression lasted for a maximum of 60 seconds or until the therapist detected loss of referred pain phenomenon. In between compressions a 10 seconds rest was given to allow blood re-perfusion into the treatment site. The total duration of the treatment was approximately 6 minutes.

(Fig.4 Quadriceps femoris myofascial trigger point ischemic compression)

Data was entered in Microsoft Excel 2019 and data was analyzed using the software Graph Pad InStat (version 3.10). Parametric test within group (paired-t test) was used for data passing normality test. Non-parametric test within group (Wilcoxon signed rank test) was used for data not passing normality test. Mean(X) and standard deviation (S.D) were used as a measure of variability & p-value of less than 0.05 was considered to be statistically significant.

RESULTS

Table 1 Gender distribution

Gender	Percentage
Males	13.33%
Females	86.67%

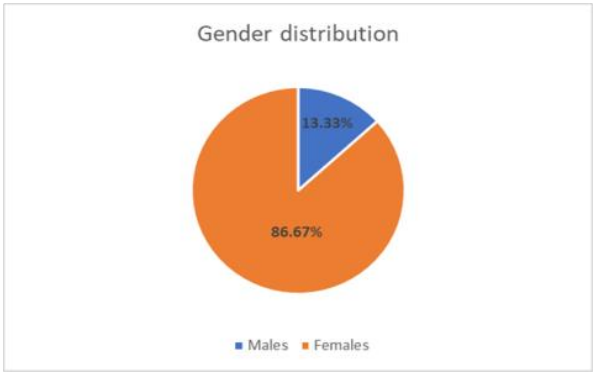

Table 2 Knee dysfunction

Dysfunction	Percentage
Osteoarthritis	80%
PFPS	20%

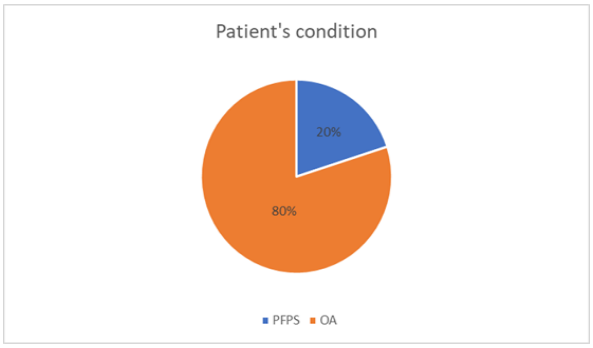

Fig 6 Knee dysfunction

Table 3 Number of trigger points

No. of MTrP	Percentage
One	33.33
Two	50
Three	16.66

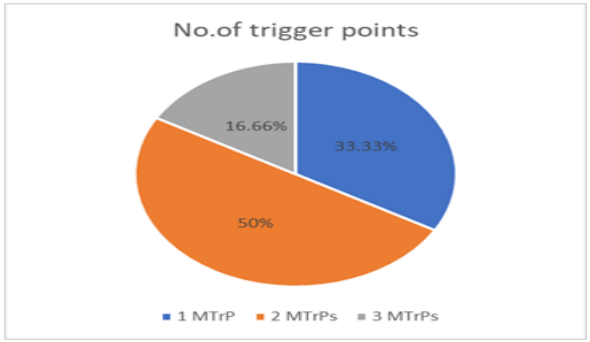

Fig 7 No. of trigger points

Table 4 Muscle harboring TrP's

Muscle	Percentage
Rectus femoris	20%
Vastusmedialis obliquus	24%
Vastus lateralis	56%

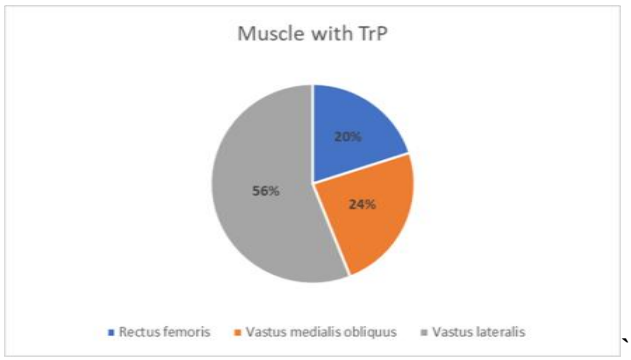

Fig 9 uscle with MTrP

Table 5 Baseline and post-myofascial trigger point release – Numeric Pain Rating Scale (NPRS

Baseline (mean ± s.d)	Post-intervention (mean ± s.d)	Significance (p-value)
6.13±1.52	2.77±1.194	Extremely significant (p=0.0001)

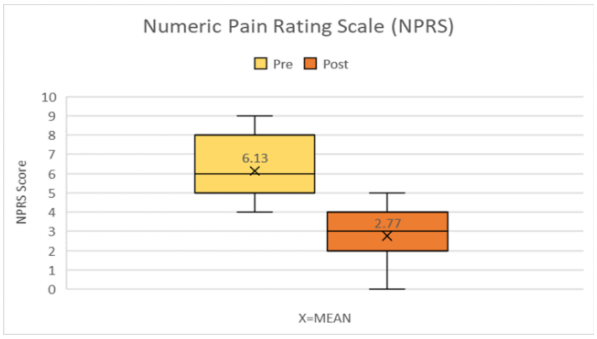

Fig 10 Box plot comparing baseline and post-intervention NPRS score

Table 6 Baseline and post-myofascial trigger point release - Quadriceps peak isokinetic torque (N.m**)**

Baseline (mean±s.d)	post-intervention (mean±s.d)	significance (p-value)
11.3±7.37	16.1±10.0	Significant (p=0.0236)

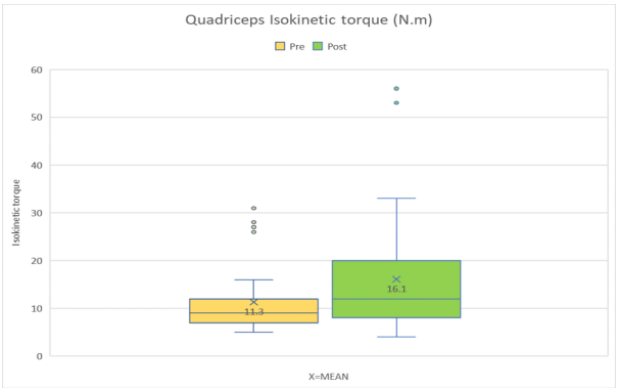

Fig 11 Box plot comparing baseline and post-intervention Quadriceps peak isokinetic torque

Table 7 Baseline and post-myofascial trigger point release – 30 seconds chair sit to stand test

Baseline (mean±s.d)	post-intervention (mean±s.d)	significance (p-value)
11.56 ± 2.208	13.03±2.173	Extremely significant (p=0.0001)

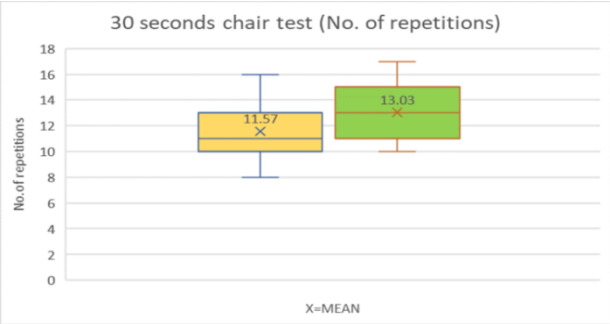

Fig 12 Box plot comparing baseline & post-intervention 30 seconds chair sit to stand test

DISCUSSION

The purpose of this study was to examine the immediate effect of Quadriceps femoris myofascial trigger point release on pain, isokinetic strength and functional performance in subjects with knee dysfunction.

Upon analysis of the data the results indicated that there was a statistically significant difference in the pre and post values of pain on numeric pain rating scale, Peak isokinetic torque of Quadriceps femoris & values of functional performance.

Dor A, Kalichman L. in their study titled, "A myofascial component of pain in knee osteoarthritis." offered initial evidence that myofascial pain and the presence of MTrPs may have a role in pain and disability of knee OA.[4]

Trigger points are associated with accelerated muscle fatiguability, due to accumulation of waste metabolites like lactate, calcitonin related gene peptide (CGRP) and substance P. They are also associated with abnormal/altered muscle activation/recruitment patterns due to uneven load on specific motor units present in the region of myofascial trigger points. Trigger points are also linked with altered/restricted blood flow in skeletal muscles due to formation of nodules and taut bands and contribute to generation of pain and motor dysfunction due to all these factors.[8]

Hence, studying the immediate effect of MTrP release helped us to verify the changes in pain status, muscle strength and functional performance.

Grindstaff TL, Hertel J, Beazell JR, Magrum EM, Kerrigan DC, Fan X, Ingersoll CD. in their study titled "Lumbopelvic joint manipulation and quadriceps activation of people with patellofemoral pain syndrome." conducted a randomized controlled trial and found that when knee pain was reduced with lumbo-pelvic manipulation, there was a significant gain in Quadriceps peak isokinetic torque.[11]

Tang, C. in his study titled "A Prospective Study Evaluating the Effects of Manual Therapy on the Treatment of Patellofemoral Pain" observed that knee pain decreased and there was a significant increase in the % voluntary activation of the quadriceps for the TPT group at 2 weeks post-baseline (9% increase) and 6 weeks post-baseline (10% increase).[12]

Ashok, N, Karthi, M. C. in their study titled "Immediate Effect of Myofascial Trigger Point Release on Chronic Neck Pain among Visual Display Terminal Operators." reported that there was an immediate effect of myofascial trigger point release on chronic neck pain patients which was evident with lower VAS scores.[13]

The term ischemia denotes, reduction of blood supply, which is found to be associated with tissue destruction and obstruction. The primary aim of applying ischemic compression is to deprive the tissue of oxygen (transient), producing artificial hypoxia which will in-turn help in the improvement of the blood flow to the affected part i.e., the myofascial trigger point. With the application of local pressure on the trigger point, it may cause a reduction in metabolic energy consumption. With ischemic compression, a spinal reflex mechanism or a counter irritant effect occurs which causes relaxation of the affected muscle which must have contributed to reduction of pain in the study participants.[14,15]

We infer that an increase in quadriceps femoris isokinetic strength (peak torque) immediately post intervention can be associated with the physiological changes occurring in the affected muscle i.e., increased blood supply to the treatment site which results in an increased washout of waste products, increased supply of oxygen which may help in healing of the involved tissue.[15]

After releasing the pressure off the trigger point, there is a flushing out of inflammatory exudates from the muscle, pain metabolites, muscle tone reduction, desensitization of the free nerve endings and equalization of the length of sarcomeres which were in a state of persistent contraction due to continuous release of acetylcholine at the neuromuscular junction.[15]

We infer that increase in functional performance immediately post intervention must have occurred as result of reduced knee pain and increased voluntary activation of the Quadriceps muscle as a result of the physiological changes discussed previously. The findings for increased functional performance are in line with the results of the study conducted by F Devereux *et al*[16] which reported improved jump performance immediately post myofascial trigger point release.

Hence, it can be concluded that protocol for Quadriceps femoris MTrP release is helpful in significantly improving pain, isokinetic strength and functional performance in subjects with knee dysfunction.

It is recommended that myofascial trigger point evaluation should be a part of routine physical examination in patients due its strong association with knee pain and referral pattern& pain should be addressed prior to commencing a strengthening rehabilitation program so as to improve muscle activation and help the muscle reach its optimal strength and maximize the outcomes of a strengthening program.

Limitation of the study was blinding was not done and there was no control group. Follow-up studies can be done to determine the lasting effects following trigger point release.

Acknowledgements

This is to acknowledge the help and support extended to me in carrying out this research study. I would like express my heartfelt thanks to my research guide Dr. Annamma Varghese (PT), principal Dr. Shweta Manwadkar (PT) and my parents for their constant help and support throughout the research study. I would also like to thank all my patients who participated in this research and helped in its successful completion.

References

1. Kim IJ, Kim HA, Seo YI, *et al*. Prevalence of knee pain and its influence on quality of life and physical function in the Korean elderly population: a community based cross-sectional study. J Korean Med Sci. 2011 Sep;26(9):1140-6.
2. Dor A, Kalichman L. A myofascial component of pain in knee osteoarthritis. J Bodyw Mov Ther. 2017 Jul;21(3):642-647.
3. Akamatsu FE, Yendo TM, Rhode C, *et al*. Anatomical Basis of the Myofascial Trigger Points of the Gluteus Maximus Muscle. Biomed Res Int. 2017 Nov.
4. Kim JR, Yoo JJ, Kim HA. Therapeutics in Osteoarthritis Based on an Understanding of Its Molecular Pathogenesis. Int J Mol Sci. 2018 Feb 27;19(3):674.
5. Ge HY, Arendt-Nielsen L, Madeleine P. Accelerated muscle fatigability of latent myofascial trigger points in humans. Pain Med. 2012 Jul;13(7):957-64.
6. Ge HY, Fernández-de-Las-Peñas C, Yue SW. Myofascial trigger points: spontaneous electrical activity and its consequences for pain induction and propagation. Chin Med. 2011 Mar 25;6(13).
7. Shah JP, Thaker N, Heimur J, *et al*. Myofascial Trigger Points Then and Now: A Historical and Scientific Perspective. PM R. 2015 Jul;7(7):746-761.
8. Baltzopoulos V, Brodie DA. Isokinetic dynamometry. Applications and limitations. Sports Med. 1989 Aug;8(2):101-16.
9. Gkrilias P, Tsepis E, Kokkalis Z, *et al*. The relationship between isokinetic strength and functional performance tests in patients with knee osteoarthritis. J Phys Ther Sci. 2018 Jun;30(6):888-891.
10. Alghadir AH, Anwer S, Iqbal A, *et al*. Test-retest reliability, validity, and minimum detectable change of visual analog, numerical rating, and verbal rating scales for measurement of osteoarthritic knee pain. J Pain Res. 2018 Apr 26; 11:851-856.
11. Grindstaff TL, Hertel J, Beazell JR,*et al*. Lumbopelvic joint manipulation and quadriceps activation of people with patellofemoral pain syndrome. J Athl Train. 2012 Jan-Feb;47(1):24-31.
12. Tang, C. A Prospective Study Evaluating the Effects of Manual Therapy on the Treatment of Patellofemoral Pain (Unpublished master's thesis). Calgary: University of Calgary;2014.
13. Ashok, N, Karthi, M. C. Immediate Effect of Myofascial Trigger Point Release on Chronic Neck Pain among Visual Display Terminal Operators. *International Journal of Research and Scientific Innovation* (IJRSI). 2018 Jan; V(I),95-97.
14. Nambi GS, Sharma R, Inbasekaran D, *et al*. Difference in effect between ischemic compression and muscle energy technique on upper trapezius myofascial trigger points: Comparative study. Int J Health Allied Sci 2013; 2:17-22.
15. Gohil D, Vaishy S, Baxi G, *et al*. Effectiveness of strain-counterstrain technique versus digital ischemic compression on myofascial trigger points. Arch Med Health Sci 2020; 8:191-5.
16. Devereux F, O'Rourke B, Byrne PJ, *et al*. Effects of Myofascial Trigger Point Release on Power and Force Production in the Lower Limb Kinetic Chain. J Strength Cond Res. 2019 Sep;33(9):2453-2463.

How to cite this article:

Nirmit Patel *et al*.2023, Study of Hematological And Coagulation Profile In Patients of Malaria. *Int J Recent Sci Res.* 14(02), pp. 2855-2860. DOI: http://dx.doi.org/10.24327/ijrsr.2023.1402.0587

****