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Seroprevalence Of Scrub Typhus,A Hospital Based Study In District Bardhaman, West Bengal.

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Abstract

Background*: Scrub Typhus is a mite borne reemerging zoonotic bacterial disease, transmitted by bite of chiggers of trombiculid mite.Clinical diagnosis of scrub typhus is very difficult from other acute febrile illness due to nonspecific symptoms. The aim of our study is to know the prevalence of scrub typhus in our area and its relationship with age, gender and seasonal variation.*

Methods: *The study was conducted in Burdwan Medical College and Hospital, West Bengal with 325 samples from April 2024 to September 2024.A Volume of 2 to 3 ml of blood was collected from each patient with symptoms of fever, headache, myalgia with or without rash in a clot vial under aseptic conditions and centrifuged at 5000 rpm for 5 minutes for separating serum. Scrub IgM was detected during testing through ELISA.*

Results*: Out of 325 samples tested, 19 (5.84%) samples were positive for scrub IgM by enzyme linked immunosorbent assay (ELISA) testing. The positivity rate was higher in male (57.89%) than female (42.10%). Most affected age group 20-45 years (52.63%) followed by below 20 years (31.58%). Higher prevalence is seen in the month of September (31.57%) followed by July and August(26.31%).*

Conclusions: *Our study highlight, seroprevalence of Scrub Typhus in relation to age, gender, seasonal and monthly variations in district Bardhaman.*

Keywords: *Scrub Typhus; Orientia tsutsugamushi; Bardhaman,; Zoonotic; IgM ELISA.*

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I. Introduction

Scrub typhus is a vector borne endemic zoonotic disease where “Typhus“ is derived from the Greek word ”tuphos” meaning fever, “stupor” which means altered state of mind(1).It was first described by Hashimoto from Japan in 1899(2).Scrub Typhus is transmitted by infected chigger mite. They are caused by Orientia tsutsugamushi where “tsutsugamushi” means dangerous bug, after a jungle mite or chigger acts as a reservoir and transmits the disease to humans by biting through pores or hair follicles on exposed skin. There is newly discovered “Orientia chuto”, also known to cause scrub typhus fever. The term “tsutsuga” means something small and potentially dangerous while “mushi” means insects or mites(1).It was previously under Rickettsia family. Scrub Typhus is known to be the important cause of acute undifferentiated febrile illness in India. It is prevalent in South Asia, Southeast Asia, East Asia, the Pacific Islands and Northern Australia (the “ tsutsugamushi triangle”)(3,4).This disease reemerge in recent years due to climatic changes(global warming) and human encroachment because of rampant urbanization, deforestation, road building, water logging, rice cultivation, etc(5).Higher incidence is seen among rural agriculture worker than non-agriculture worker(6).Among the bacterial genome sequenced so far, it has the most repeated DNA sequences. The lesion starts from vesicle and then progresses to ulcer having black necrotic centre with erythematous border developing regional lymphadenopathy. Infection starts by the bite of chigger mites during their feeding. Incubation period is about 6 to 21 days (mean 10-12 days) after initial bite(7). Clinical features include fever,

rash, eschar at the site of bite followed by headache, myalgia, nausea, vomiting, abdominal pain and lymphadenopathy. Common sites of eschar were perineum, axilla and buttocks(8,9).Severe multi-organ manifestations include pneumonitis, acute respiratory distress syndrome(ARDS),hepatitis, acute renal failure, etc. IGM ELISA is quite satisfactory in comparison to gold standard. The Real Time PCR is used to target the gene encoding the major 56 kDa and/or 47 kDa surface antigens(10).Cheapest and readily available test for scrub is Weil-Felix test, but it's result is unreliable due to low sensitivity. Cell culture or molecular detection is possible but not routinely used for diagnosis(11) .The study area we are targeting has temperature ranging around 30-40°C during the time of March to October with moderate humidity accompanied with seasonal monsoon rain and thunderstorms in the months of April and May.

II. Materials And Methods

Study area and it's geo-climatic environment

The study area is mostly confined to the districts around East Bardhaman, which mainly include West Bardhaman, Purulia, Birbhum, Hooghly and West Midnapore.The climate is generally tropical in nature with environmental temperatures ranging between 35-40◦C in summers and in the winters it ranges between 5-25 ◦C.

Study design and duration

This cross-sectional study was conducted in Virus Research and Diagnostic Laboratory (VRDL) at Microbiology Department of Burdwan Medical College with 325 samples from April 2024 to September 2024 ie.for a period of 6 months. (Table 1)

Study participants

All the individuals who visited the Burdwan Medical College and Hospital with fever, chills, myalgia, headache with or without rash and were prescribed by the doctors for the respective tests were included in this study. Total 325 samples were tested for Scrub typhus IGM (April 2024 to September 2024), among them 19 were tested positive. (Table 1)(FIG 1)

Inclusion criteria:

1.Patients with fever, headache, myalgia.
2.Patients with IgM Positive for scrub typhus.

***Exclusion criteria*:**

1.Patients with other causes of fever, headache, myalgia.
2.Medically compromised patients.
3.Patient who refuses to participate in this study.

ETHICAL CONSIDERATIONS: Institutional Ethical Permission was taken for this study.

Laboratory Investigation

Approximately 2 to 3 ml of blood was collected in clot vials from each individual patient with fever, chills, headache, myalgia like symptoms strictly following aseptic conditions. Centrifugation of each sample was done at 5000 rpm for 5 minutes for separating the serum and tests were performed immediately. In case of delay, sera were stored at 4°C. Scrub IgM were detected using Scrub Typhus IGM Microlisa Kit (J.Mitra and Co. Pvt. Ltd) following the test procedure according to the manufacturer's protocol. Patient details were maintained on a datasheet for further analysis.

III. Results

Prevalence in terms of gender distribution

During the period of April 2024 to September, 2024, a total of 325 samples were tested for Scrub typhus among which 166(51.07%) were male and 159(48.92%) were female. Total 19 samples were IgM positive. Positivity rate was 5.84%. Males were predominantly positive (57.89%) than females (42.10%) (Table 2)(FIG 2).

Prevalence in terms of age structure

For the convenience of the study, the age structure was distributed into individuals having age less than 20 years, individuals with age between 20 to 45 years and above 45 years. It is being observed, prevalence of positivity is highest within the age group of 20-45 years (52.63%) followed by individuals having age within 20 years (31.58%)(Table 3)(FIG 3).

Seasonal Pattern of Prevalence

There was a significant seasonal pattern in appearance of the disease as there was a gradual increase in positive cases in the month of June(10.52%)which peaked during the month of September(31.57%)followed by July and August(26.31%)(Table 5) (FIG 5).

IV. Discussions

The prevalence of scrub typhus varies from 8 to 60% in different countries(12).Though Scrub Typhus is a common rickettsial disease in India but is one of the neglected zoonosis of public health importance, affecting large part of North and East India(Kashmir, Himachal Pradesh, Assam and Sikkim) and some parts of South India(Eastern and Western Ghats)(11). In India, Scrub typhus was first reported from the states of Assam and West Bengal during World War II(9).Scrub typhus is transmitted through trombiculid mite. The risk of Scrub typhus infection increased to 3.5 fold in presence of water body within 100 meter of house. People who are engaged in cleaning waste materials, forest, river banks and agricultural fields are at risk due to optimal environment of larval mite. Scrub typhus is an important cause of acute febrile illness among children in South Asia including India(13). Orientia tsutsugamushi is the causative agent of scrub typhus which is an obligate intracellular, gram negative bacterium. It can invade host cells evading the host immune reaction. The clinical features may include fever, rash, myalgia, lymphadenopathy, etc. In untreated conditions, it may lead to serious complications like pneumonia, meningitis and myocarditis(7).Scrub Typhus mainly affects the vascular endothelium and mononuclear macrophages causing vasculitis. The organs including the lungs, liver, kidneys, and central nervous system, can be affected(14).Doxycycline and tetracycline are the treatment options for scrub typhus. Azithromycin, rifampicin and ciprofloxacin are the alternatives. Azithromycin is a preferred for pregnant women and for children less than 8 years of age(15).Single dose of tetracycline,doxycycline or chloramphenicol every 5 days for a period of 35 days for prophylaxis of Orientia infection(16).To prevent high risk complications and to reduce morbidity and mortality rate, high index suspicion, timely diagnosis and proper treatment with antibiotics are necessary(17,18).In India, seroprevalence is between 9.3% and 27.9% and around 30% mortality rate among untreated induviduals, as noted in passive national surveillance systems(19,20).Many genetic and antigenic variations resulting from variations in tsa gene, which codes for 56-kDa type specific antigen. Around 30 serological types like Kato, Karp, Kuroki, Gilliam and Kawasaki were detected by immunoperoxidase reaction(21). Litchfield strain is a novel strain detected in Australia(22).Our study highlights the prevalence of scrub typhus in Bardhaman district with respect to age, gender and seasonal variation. Higher prevalence is seen among age 20-45 years (52.63%).Gender prevalence is highest in males(57.89%) than females(42.10%).Highest peak is seen in the month of September(31.57%),followed by July and August(26.31%)

V. Conclusions

Scrub Typhus is a vector borne endemic zoonotic disease caused by Orientia tsutsugamushi . It is endemic in tropical and subtropical regions of the Asian continent. It is an important cause of acute febrile illness in India.Early diagnosis and treatment is very important for scrub typhus to reduce morbidity and mortality. People who are engaged in agricultural work are more prone to this disease than non-agricultural worker. Proper cleaning of hands and feet after work is very important.

VI. References

[1] Lakshmi RM, Dharma TV, Sudhaharan S, Surya SM, Emmadi R, Yadati SR, Modugu NR, Jyotsna A. Prevalence Of Scrub Typhus In A Tertiary Care Centre In Telangana, South India. Iranian Journal Of Microbiology. 2020 Jun;12(3):204.
[2] Mahajan SK. Scrub Typhus. JAPI. 2005 Nov;53(955):269.
[3] Kweon SS, Choi JS, Lim HS, Kim JR, Kim KY, Ryu SY, Yoo HS, Park O. Rapid Increase Of Scrub Typhus, South Korea, 2001–2006. Emerging Infectious Diseases. 2009 Jul;15(7):1127.
[4] Jeung YS, Kim CM, Yun NR, Kim SW, Han MA, Kim DM. Effect Of Latitude And Seasonal Variation On Scrub Typhus, South Korea, 2001–2013. The American Journal Of Tropical Medicine And Hygiene. 2016 Jan 1;94(1):22.
[5] Park SW, Ha NY, Ryu B, Bang JH, Song H, Kim Y, Kim G, Oh MD, Cho NH, Lee JK. Urbanization Of Scrub Typhus Disease In South Korea. Plos Neglected Tropical Diseases. 2015 May 22;9(5):E0003814.
[6] Zhang WY, Wang LY, Ding F, Hu WB, Soares Magalhaes RJ, Sun HL, Liu YX, Liu QY, Huang LY, Clements AC, Li SL. Scrub Typhus In Mainland China, 2006–2012: The Need For Targeted Public Health Interventions. Plos Neglected Tropical Diseases. 2013 Dec 26;7(12):E2493.
[7] Islam A, Saha R, Roy A. Scrub Typhus—A Threatening Scenario In North Bengal. J Evid Based Med Healthc. 2021 Sep 27;8(39):3417-22.

[8] Kamarasu K, Malathi M, Rajagopal V, Subramani K, Jagadeeshramasamy D, Mathai E. Serological Evidence For Wide Distribution Of Spotted Fevers & Typhus Fever In Tamil Nadu. Indian Journal Of Medical Research. 2007 Aug 1;126(2):128-30.9
[9] Rathi N, Rathi A. Rickettsial Infections: Indian Perspective. Indian Pediatrics. 2010 Feb;47:157-64.
[10] Narendra Rathi Akanksha Rathi Infections In Indian Context, Sciverse Science Directpediatr Infect Disease20135648
[11] Mallick SK, Hazra S, Nandi T, Sarkar A. Scrub Typhus: A Hospital-Based Study In The Northern Districts Of West Bengal, India. Int J Res Med Sci. 2019 Jun;2:2403-7.
[12] Koh GC, Maude RJ, Paris DH, Newton PN, Blacksell SD. Diagnosis Of Scrub Typhus. The American Journal Of Tropical Medicine And Hygiene. 2010 Mar;82(3):368.
[13] Mukhopadhyay S, Gupta R, Shukla S, Bhattacharjee P, Bhatnagar R, Yadav S, Kamal SF, Virk A, Imran S, Liyakath A. Once Forgotten Now Re-Emerging: Scrub Typhus Infection In Pediatric Patients From North West India. Cureus. 2023 Aug;15(8).
[14] Lee YM, Kim DM, Lee SH, Jang MS, Neupane GP. Phylogenetic Analysis Of The 56 Kda Protein Genes Of Orientia Tsutsugamushi In Southwest Area Of Korea. The American Journal Of Tropical Medicine And Hygiene. 2011 Feb 2;84(2):250.
[15] Varghese GM, Dayanand D, Gunasekaran K, Kundu D, Wyawahare M, Sharma N, Chaudhry D, Mahajan SK, Saravu K, Aruldhas BW, Mathew BS. Intravenous Doxycycline, Azithromycin, Or Both For Severe Scrub Typhus. New England Journal Of Medicine. 2023 Mar 2;388(9):792-803.
[16] Xu G, Walker DH, Jupiter D, Melby PC, Arcari CM. A Review Of The Global Epidemiology Of Scrub Typhus. Plos Neglected Tropical Diseases. 2017 Nov 3;11(11):E0006062.
[17] Agrawal A, Parida P, Rup AR, Patnaik S, Biswal S. Scrub Typhus In Paediatric Age Group At A Tertiary Care Centre Of Eastern India: Clinical, Biochemical Profile And Complications. Journal Of Family Medicine And Primary Care. 2022 Jun 1;11(6):2503-6.
[18] Jana JK, Mandal AK, Gayen S, Mahata D, Mallick MS. Scrub Typhus In Children: A Prospective Observational Study In A Tertiary Care Hospital In Eastern India. Cureus. 2023 Jul;15(7).
[19] Saraswati K, Day NP, Mukaka M, Blacksell SD. Scrub Typhus Point-Of-Care Testing: A Systematic Review And Meta-Analysis. Plos Neglected Tropical Diseases. 2018 Mar 26;12(3):E0006330.
[20] Bonell A, Lubell Y, Newton PN, Crump JA, Paris DH. Estimating The Burden Of Scrub Typhus: A Systematic Review. Plos Neglected Tropical Diseases. 2017 Sep 25;11(9):E0005838.
[21] Enatsu T, Urakami H, Tamura A. Phylogenetic Analysis Of Orientia Tsutsugamushi Strains Based On The Sequence Homologies Of 56-Kda Type-Specific Antigen Genes. FEMS Microbiology Letters. 1999 Nov 1;180(2):163-9.
[22] Odorico DM, Graves SR, Currie B, Catmull J, Nack Z, Ellis S, Wang L, Miller DJ. New Orientia Tsutsugamushi Strain From Scrub Typhus In Australia. Emerging Infectious Diseases. 1998 Oct;4(4):641.

TABLE 1: PREVALENCE OF SCRUB TYPHUS		
IGM ELISA RESULT	**FREQUENCY(N=325)**	**PERCENTAGE**
Scrub typhus positive	19	5.84%
Scrub typhus negative	306	94.15%
Total samples tested	325	100%

TABLE 2: GENDER WISE PREVALENCE OF SCRUB (AMONG POSITIVE CASES)		
GENDER	**FREQUENCY(N=19)**	**PERCENTAGE**
Male	11	57.89%
Female	8	42.10%

TABLE 3: AGE WISE PREVALENCE OF SCRUB(AMONG POSITIVE CASES)		
AGE	**FREQUENCY(N=19)**	**PERCENTAGE**
<20 years	6	31.57%
20-45 years	10	52.63%
>45 years	3	15.79%

TABLE 4: SYMPTOMATIC PREVALENCE OF SCRUB(AMONG POSITIVE CASES)		
SYMPTOMS	**FREQUENCY(N=19)**	**PERCENTAGE**
Headache	18	94.73%
Fever	19	100%
Myalgia	5	26.31%

TABLE 5: MONTHWISE PREVALENCE OF SCRUB(AMONG POSITIVE CASES)		
MONTH	**FREQUENCY(N=19)**	**PERCENTAGE**
April	0	0%
May	1	5.26%
June	2	10.52%
July	5	26.31%
August	5	26.31%
September	6	31.57%

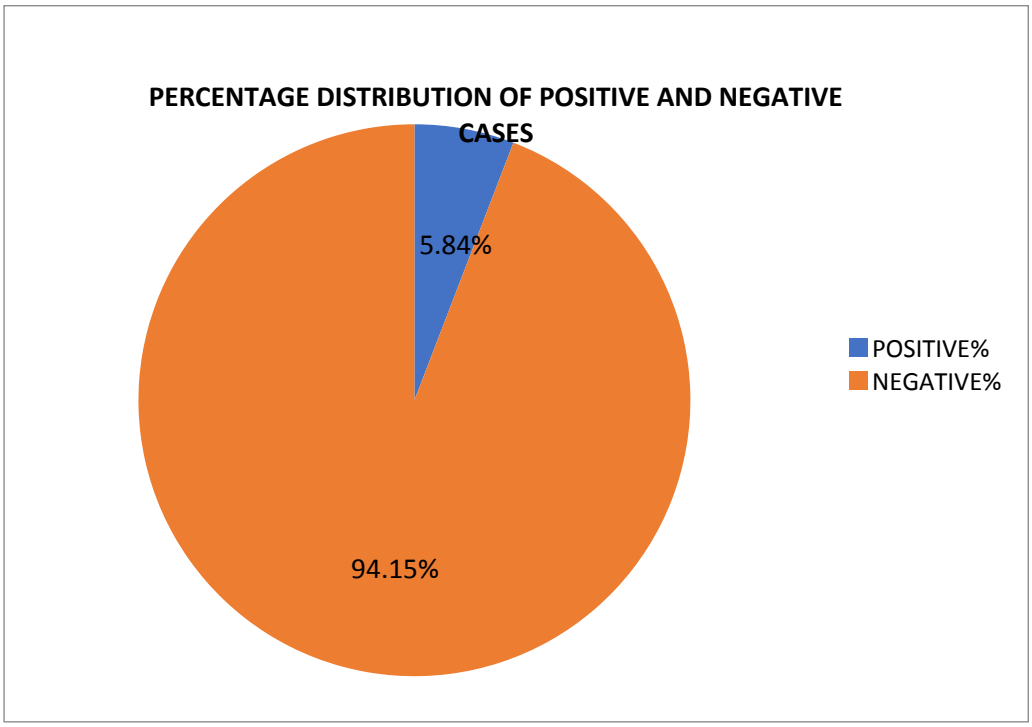

FIGURE 1

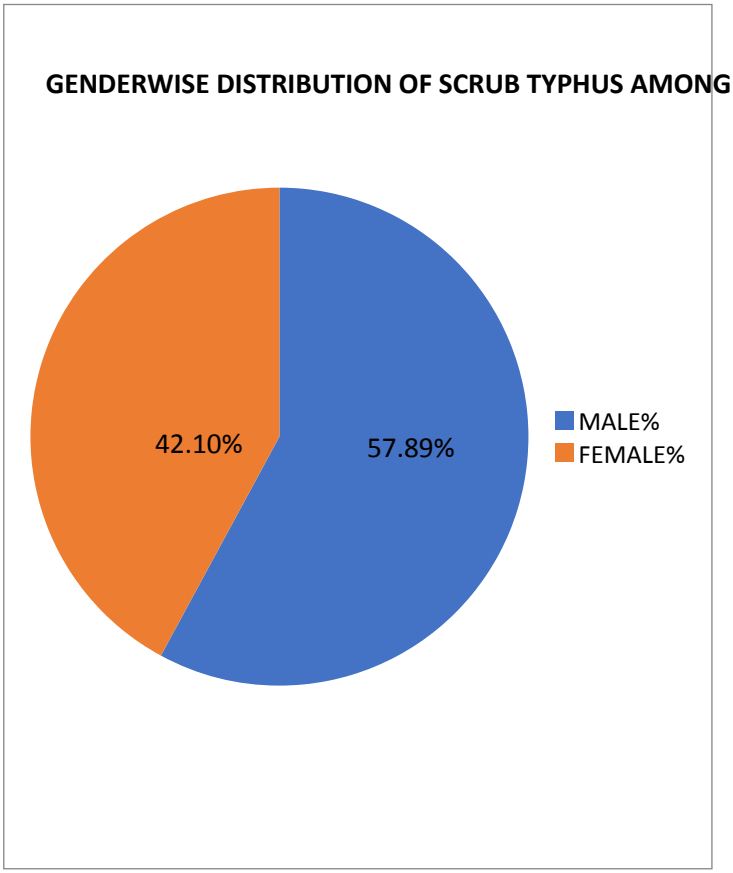

FIGURE 2

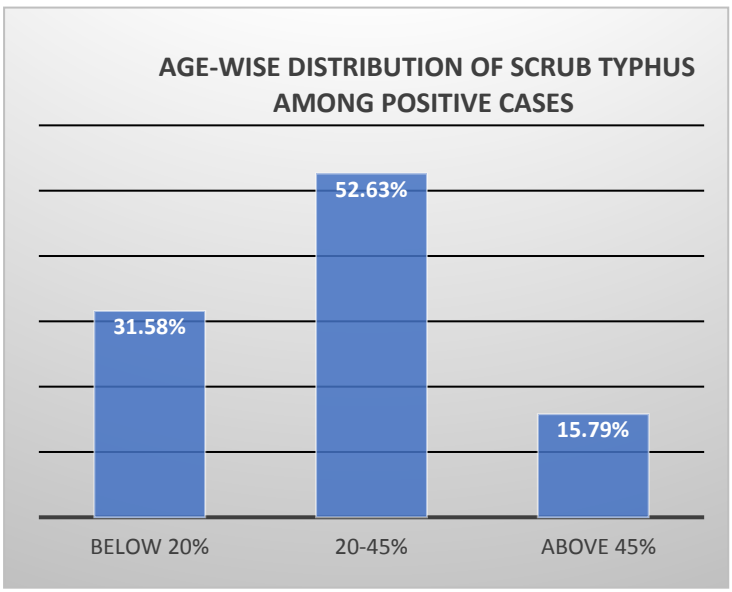

FIGURE 3

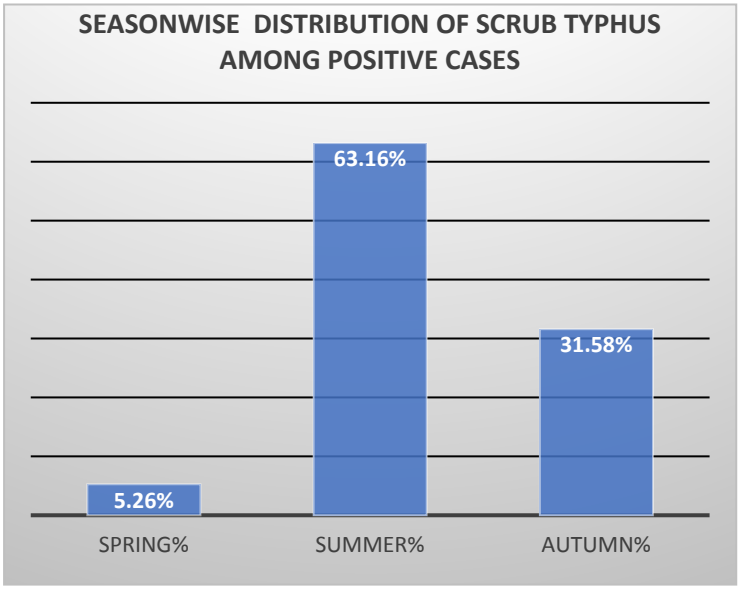

FIGURE 4

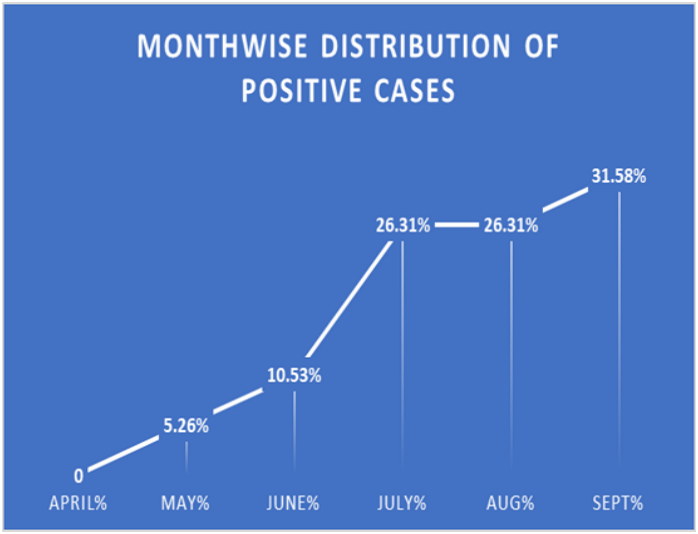

FIGURE 5