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AN EPIDEMIOLOGICAL STUDY TO FIND PREVALENCE OF MALARIA IN JHARKHAND

Microbiology

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ABSTRACT

INTRODUCTION: Malaria is an infectious disease caused by the protozoa of the genus Plasmodium. It is the 5th deadliest infectious disease. India accounts for 58% of all the malaria infection among South East Asia & Jharkhand carries the burden of about 25 % of all malaria cases in India..
MATERIALS & METHODS : This is a retrospective study from Jan 2017 - july 2017 in which all 24 districts of Jharkhand accounting total of 1901978 cases . The diagnosis of malaria on basis of species were studied. The blood sample were collected at PHC, CHC & Sadar Hospital from above included cases, where the diagnosis were made by PERIPHERAL BLOOD SMEAR - THICK FILM & THIN FILM or SLIDE TEST METHOD.
RESULTS : In our study from Jan - July 2017; we screened total 1901978 blood samples in which 51109 patients diagnosed with malaria. Among them, 24175 patients were of Plasmodium falciparum & 26934 of Plasmodium vivax. Of all the diagnosed cases, 25017 were males and 25092 were females. Maximum prevelance was found in WEST SINGHBHUM district (9780) and JAMTARA district was found to have least cases(10).Maximum cases of P.f found in WEST SINGHBHUM (7457) & GARHWA accounted for maximum P.v cases(3971).
DISCUSSION and CONCLUSION: Heavy burden of malaria infection in Jharkhand can be efficiently reduced by early diagnosis & treatment alongwith taking strict preventive measures like promoting use of mosquito nets, keeping surrounding clean and enforcing adequate chemoprophylaxis. Due to efficient implementation of several state malaria programmes ,mortality due to malaria has been drastically reduced, same reflected in our study as there was 0 mortality reported between Jan - July 2017.

KEYWORDS

INTRODUCTION :-

Malaria is an acute parasitic illness notoriously known to claim uncountable number of human loss from past several centuries, not sparing any nook and corner of earth. Its menace has been described with the birth of mankind ,in the first millennium BCE in Greece and China.The name malaria has been given far back in 1753.Interestingly ,its unique about this disease that its treatment was established in 7th century , much before anything about its etiology was known. The magnitude of impact can be understood by the fact that malaria researchers have won multiple Noble Prizes , pioneered by Sir Ronald Ross who won Noble Prize in 1902 for studying stages of malarial parasite (oocysts) on the stomach wall of an anopheles mosquito which had previously fed on a malaria patient[1] .This proved milestone in disease transmission and prompted all efficient measures to come forth in its control and cure .Different species of plasmodium are well known like P.falciparum (mostfatal), P. vivax, P. ovale, P. malarie, P. knowlesi etc transmitted by multiple vectors in different ecosystem like Anopheles fluviatilis & A.minimus (foothills),A.stephensi & A.sundaicus (costal areas) , A.culicifaciens & A.phillipinensis (plains) adds to the complexity and graveness of disease[2].

Malaria continues to be a public health problem globally , being the 5th deadliest infectious disease.As per WHO ,in year 2017,there was 219 million cases world wide with mammoth mortality figure of 4,35,000 , highest death toll encounterd in Sub Saharan African countries specially children under 5 years being the most vulnerable population. WHO African regions accounted for 92% of global malaria cases followed by WHO South East Asian Regions ,5% & WHO Eastern Mediterranian region ,2%. 5 countries with massive burden of malaria are Nigeria (25%),Democratic Republic of Congo (11%),Mozambique (5%), India (4%) and Uganda (4%) accounts for 50% of global malaria load[3] .

India's diverse topography with tough terrains and lush green forests areas including remote rural ,tribal and forested inhabitance put add on effect on prevailing socioeconomic disparity to multiply the prevalence of disease to peak[4]. India accounts for 58% of malaria prevalence among South East Asian countries and Jharkhand carries burden of about 25% of all cases in India. Jharkhand being endemic for malaria , there is immense scope of prevalence study, district wise covering remote tribal hamlets ,lush green difficult to access forests ,tough hilly terrains and different topographic locus .This study will prove fruitful, displaying the barren land to be explored for quenching maximum output by enforcing National Goal of Eliminating Malaria to 0 in best possible way . Odisha accounted for 40% of malaria prevalence in country establishing malaria capital.By locating difficult to assess areas , remote and tough terrains tribal halmet , Odisha government enforced DAMaN[5] (Durgama Anchalare Malaria Nirakaran - elimination of malaria in inaccessible regions), started in 2016.Due to its impact, Odisha reported 80% decline in prevalance and death in 2017 .Reported malaria cases declined from 3,47,860 in 2017 to 55,365 in 2018 (Jan-Sep) and death dropped from 24 to 4 during same period as per World Malaria Report 2018.

Jharkhand being neighouring state of Odisha and shares topography and cultural similarity , prevalence study to explore difficult to access areas with remote and tribal populations could prove instrumental for achieving maximum result similar to Odisha.

MATERIALS AND METHODOLOGY :-

It is a record based study in which informations has been obtained from State Malaria Office, Namkum ,Ranchi .This study involves all 24 districts of Jharkhand from Jan 2017 to July 2017 , accounting total of 1,901,978 subjects who were screened for malaria according to symptoms and clinical features.

The identification was done by peripheral blood smear examination , thick film for identification of parasite and thin film for species identification along rapid kit test, detecting antibodies against species specific antigen like HRP2 for P.falciparum and LDH for different species (P.falciparum or P.vivax).The identification procedures propagate from the most basic level ,village/subcentre level who send their reports to PHC/Blocks , which is further sent to districts .District Malaria Office in turn submit the PHC wise data to State Malaria Office, Namkum ,Ranchi where malaria prevalence is compiled district wise and finally sent to Directorate of NVBDCP[6] . Data entry has been done in M.S EXCEL and analyzed by M.S EXCEL. Determinants like species identification , sex proportionated

prevalence , district wise prevalence of different species of malarial parasite among male and female population has been catered.

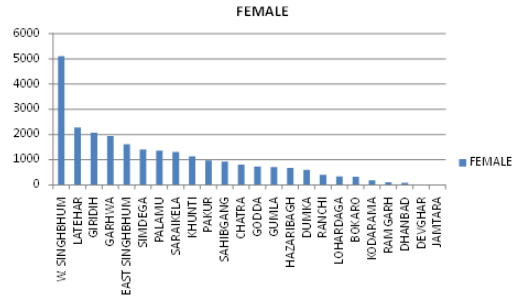
RESULT :-

In this study from Jan-July 2017 ,total 19,01,978 blood samples were screened for Malaria in which 51,109 patients identified with Malaria (2.68%).Among them 24,175 patients were identified with infection of P.falciparum (47.30) and 26,934 patients infected with P.vivax (52.69). Infection due to P.falciparum in African countries is 99.7%,South East Asian Region ,68.8% ;Eastern Mediterranean ,69% and Western Pacific ,71.9% (World Malaria Report 2018) .Infection due to Plasmodium vivax in Jharkhand, India, is 52.69% and WHO region of America is 71.9%.

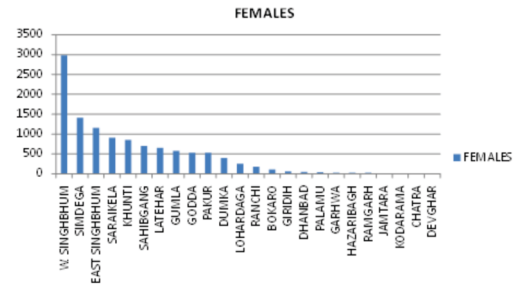
According to Disease Control Program run under National Health Mission ,Chapter 5 ; National ratio of P.falciparum :P vivax in 2014 was 65.55 : 34.45 , in 2015 was 66.61 : 33.39 & in 2016 was 65.87 : 34.13 .This shows high prevalence of P.falciparum at national level which is different from Jharkhand , where P.vivax infection is slightly more than P.falciparum.This explains accountability for 0 mortality which emerged out in my study as a result of less complication and graveness due to lower proportion of P.falciparum.

Of all identified Malarial cases , 25,017 were males and 25,092 were females .This infers that screening programme has been enacted in uniform fashion covering all sections of society.District wise study of prevalence of malaria revealed , West Singhbhum district having maximum burden of malaria (9,780) and Jamtara district was found to be lowest number of cases (10). Maximum cases of P.falciparum was found in West Singhbhum (7,457) and Garhwa district accounted for maximum P.vivax (3,971).

PREVELANCE OF CASES OF MALARIA IN FEMALES FROM JAN –JULY 2017 DISTRICT WISE



PREVELANCE OF CASES OF PLASMODIUM FALCIPARUM MALARIA IN FEMALES FROM JAN –JULY 2017 DISTRICT WISE



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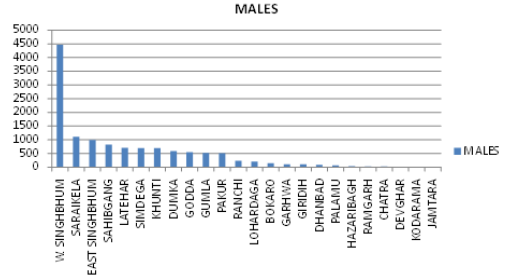

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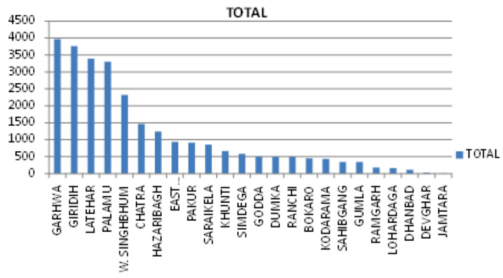

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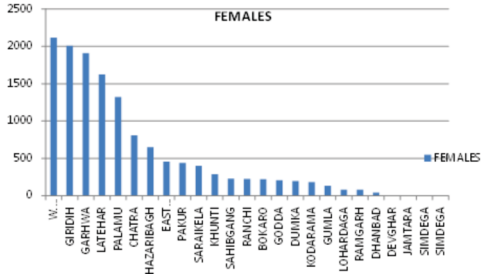

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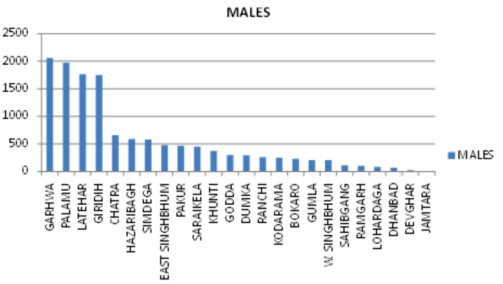
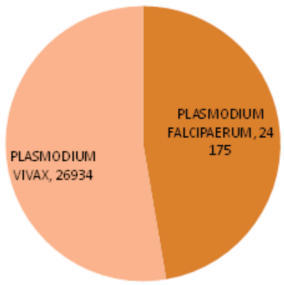


TOTAL POPULATION SUFFERING FROM MALARIA



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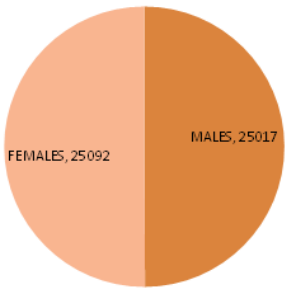

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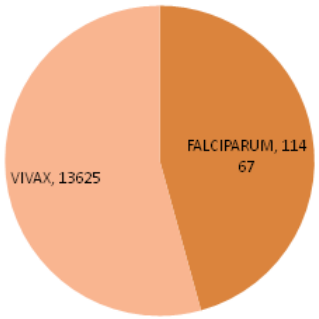
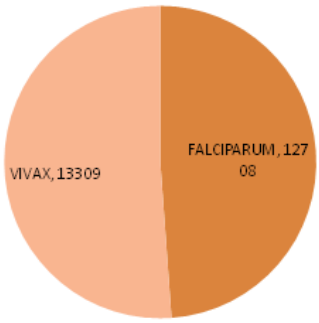
TOTAL FEMALES SUFFERING FROM MALARIA



TOTAL MALES SUFFERING FROM MALARIA



EPEDEMIOLOGICAL DETERMINANTS[7] :-

1. FALCIPARUM %=TOTAL +VE CASES OF P.FALCIPARUM / TOTAL +VE CASES OF MALARIA X 100 = 24,175/51,109 X 100 = 47.30%
2. VIVAX % = TOTAL +VE CASES OF P.VIVAX / TOTAL +VE CASAS OF MALARIA X 100 = 26,934/51,109 X 100 = 52.69%
3. SLIDE POSITIVE RATE (SPR) = TOTAL +VE CASES OF MALARIA IDENTIFIED BY SLIDE METHOD / TOTAL SLIDE EXAMINED X100= 51,109/19,01,978 X 100 = 2.68%
4. SLIDE FALCIPARUM RATE = TOTAL P. FALCIPARUM IDENTIFIED BY SLIDE METHOD / TOTAL SLIDE EXAMINED X 100 = 24,175 / 19,01,978 X 100 = 1.27%
5. SLIDE VIVAX RATE = TOTAL P.VIVAX IDENTIFIED BY SLIDE METHOD / TOTAL SLIDE EXAMINED X 100 = 26,934 / 19,01,978 X 100 = 1.41 %

DISCUSSION :-

0 Mortality in a study span of 7 months from Jan-July 2017 covering all 24 districts of Jharkhand is very satisfying .This seems to be outcome of aggressive National Policy targeting Malaria Elimination to 0.There has been 52% reduction in National Malaria Prevalence and 76% massive reduction in National Malaria Mortality in year 2016 compared to year 2000.This is well explained by appreciable and continuous downfall of Annual Parasitic Incidence (API).The number of districts with API > 2 have decreased whereas districts with API<1 has increased from 492 in year 2012 to 524 in 2015[8].

25.33% reduction has been achieved in malaria cases against the target of reducing malaria morbidity by 25% by the year 2015 . Similarly ,reduction in deaths due to malaria has been 78.10% in 2015 against set target of 50% reduction in malaria mortality.This produce a sense of satisfation that we are up to achieve our ultimate target but rather being complacent ,our endeavour should be accelerated as yet much is to be achieved.

In this study, West Singhbhum emerged to be the district with maximum burden of malaria and even the cases of P. falciparum is also maximum. This can be explained on basis of its geographical topography decorated by dense lush green forest and chains of mountains. Even the tribal hamlet is in great number,the access seems to be a tough task.

Ground reports displayed an astonishing fact that the death reported from peripheral and remote areas are often over reported as death registerd on name of malaria may have multi factirial etiology like TB , Diabetes, Snake bite , RTA .Due to lack of resources , communication problem and accessibility difficulty , the scrutiny of typical malaria death in tough topography proves a difficult task.

Garhwa accounted for maximum P.vivax cases. Since , mortality in this study is 0 , comparative analysis between P.falciparum & P.vivax in context of lethality leading to death is not possible.

Prevalence of malaria in both male and female was almost same .It reveals working culture of Jharkhand where females are equally active and spend outdoor period at par to their male counterparts regarding work and earning livelyhood.

Hence, we conclude that prevalence of malaria in Jharkhand depends directly on " Prevalence of Infective Vectors" and "Human Vector Contact", which is further influenced by various factors such as climate, sleeping habits of human , density & viability of mosquitoes[9].

CONCLUSION :-

The study regarding prevalence of malaria in all 24 districts very well explains topography , forest areas, types of terrains (mountains or plains),river coastal settlements and foremost working culture among males and females.

We are very well following the National Guidelines and we are on the way to achieve our goal .Artemisinin Combined Therapy (ACT) along distribution of Long Lasting Insecticidal Nets (LLINs) in every nook and corner are proving pivotal .The challenge is not yet over as more endeavour will be needed to further depreciate the menace of malaria by infiltrating more and more deeper in every pocket of Jharkhand by further strengthening human resources ,training programmes and disease surviellance system.

With Global reference ,we outclassed in curbing malaria prevalence. Where 10 highest burden countries in Africa reported increase in cases of malaria in 2017 compared to 2016.Of these, Nigeria ,Madagascar and the Democratic Republic of Congo has the highest estimated increase , all greater than 1/2 million cases per year. In contrast India tops the list of countries known for reduction of malaria cases .India registered 3 million reduction in malaria cases followed by Rwanda ,0.43 million cases further followed by Ethiopia & Pakistan who registered 0.24 million cases reduction in 2017 compared to 2016 .P.falciparum being most prevalent malaria in WHO African Region accounting for 99.7% of estimated malaria in 2017 , WHO S.E Asia, 68.8% ,the Eastern Meddeterarian ,69% and Western Pacific ,71.9 % . P.vivax being predominant parasite in WHO region of America ,74.1% of malaria cases .The largest decline of mortality due to malaria has been reported in WHO S.E Asia (54%).

Global statistical analysis hence , infers Jharkhand statistics toward commendable reduction in Malaria Prevalence, its morbidity and mortality.The National Strategic Plan for Malaria Elimination in India (2017-2022) developed by NVBDCP with support of WHO will be inevitably achieved[10].

LIMITATIONS :-

Though, Jharkhand has shown commitment toward achieving National Goal but yet certain limitations are encountered in this study .The study was totally dependent on Record Input.It totally depends upon the expertise and endeavour of human resources used in surveillance and data production -assimilation regarding Malaria Prevalence.

Difficult to assess areas like West Singhbhum district having Saranda Forest known for a chain of 100 mountains owns tough terrains ,lush green forests and good number of tribal populations residing there. There is obvious chances of under reporting of Malaria cases as due to lack of connectivity and facility ,it becomes difficult for patients to assess nearest PHC or Sub Centre which is much far to be traveled by foot. Even human resources used for collecting data regarding malaria prevalence ,those enrolled to educate them, distribute medicines (ACT) and LLINS face difficulties to reach there. Surveillance along with influx of inadequate fund seems to be biggest concern. Strong willpower and dedication toward goal will overcome all limitations, what is being expected and that we are up to.

RECOMENDATIONS :-

Indoor residual spraying (IRS) and distribution of Long Lasting Insecticidal Nets (LLINs) in every nook and corner should be prioritized and assured. Anti- larvicidal measures including bio-larvicides use should be universalized.

Early case detection with active, passive and sentinel surveillance along judicious distribution of Artimesnin Combined Therapy (ACT) in conjunction with Behaviour Change Communication (BCC) will enhance the pace of malaria control manifold times.

Modern researches enlightens much hope in fight against malaria .The genomic study of A.gambiae may yield an efficient weapon against mosquito control . A new malaria vaccine in pipeline , RTS,S/AS01 has completed its phase 3 trial in childrens age group 5-17 months & 6 -14 weeks and can be administerd in a 4 dose schedule[11].

Last but not the least ,it is monitory funding around which all determinants of any policy hovers around and same proves key here too.

CONFLICT OF INTEREST :-

No conflict of interest from any other researchers or any other institutional body .No funding recieved from any other sources.

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