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RESEARCH ARTICLE

THE EPIDEMIOLOGY AND HEALTH BURDEN OF MALARIA IN TERTIARY HOSPITAL OF NEPAL

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Abstract:

Malaria is the most common protozoan infection and is one of the major public health problems in developing nations like Nepal. This study was conducted to find out total number of malaria cases in BPKIHS from 2006 to 2015 AD and to know the duration for which cases were admitted and improvement seen in them. This is a hospital based retrospective study conducted from 27th November to 10th December to see the number of malaria cases in B P Koirala Institute of Health Sciences, Dharan of Nepal, a tertiary level referral hospital in the Eastern Nepal. It was study in which secondary data, consistent with the diagnosis of malaria was collected from the Medical Record Section of BPKIHS and reviewed. Five hundred fifty four cases of malaria were enrolled. The patients were predominantly males (nearly 61.2%) and it was more commonly seen in 1-20 years age group (40.8%). Most of the cases were from Jhapa (22%), Sunsari (19.5%) and Morang (17.3%) District respectively. Most of the patients (69.9%) were admitted in Medicine wards. Almost 83.9% of admitted malaria cases were improved in BPKIHS. There seems to be decreasing number of cases since 2010 but still there is burden of malaria cases. We conclude that the problem of malaria is common and has become a key public health concern for all.

Key Words: Epidemiology, Health Burden, Malaria, Nepal.

Introduction:-

Malaria is one of the most important public health problem in term of morbidity and mortality, causing more than 200 million cases and 655,000 deaths every year.¹ The number of malaria cases globally fell from an estimated 262 million in 2000 (range: 205-316 million), to 214 million in 2015 (range: 149-303 million), a decline of 18%.² In 2010, 2.4 million confirmed malaria cases were reported in WHO *South-East Asia Region*. In 2010, malaria deaths were 2,426 as reported from eight countries of the region, most of all reported in India and Nepal. Democratic People's Republic of Korea and Sri Lanka are actually in pre-elimination phase. Bangladesh, Bhutan, the Democratic Republic of Timor-Leste, India, Indonesia, Myanmar, Nepal and Thailand are in the control phase.¹

Malaria cases are being reported from 65 of the 75 districts of Nepal. A population of approximately 22.8 million (83% of Nepal's population) lives in these malaria-endemic districts. Out of 65 malaria prone districts, 13 have been classified as being at high risk. These high-risk districts are Ilam, Jhapa, Morang (located in the eastern development region), Dhanusha, Mahottari, Kavre and Sindhuli (located in the central development region), Nawalparashi (located in the western development region), Banke and Bardiya (located in the mid-western development regions), Kailali, Kanchanpur and Dadeldhura (located in the far western development region).³ Therefore, the present study was designed to find out total number of malaria cases in BPKIHS from 2006 to 2015 AD and to know the duration for which cases were admitted and improvement seen in them.

Material and methods:-

This was a hospital based retrospective study conducted from 27th November to 10th December 2016 to see the number of Malaria cases in B. P. Koirala Institute of Health Sciences, Dharan of Nepal. A total of five hundred fifty four cases between the ages of 1 to 80 years from 01/08/2006 to 12/09/2015 AD who were admitted to BPKIHS at different ward because of various clinical presentations. It was study in which secondary data was collected from the

Medical Record Section of BPKIHS. Patients without complete medical records were excluded from this study. All the patients were recorded in as format age wise and sex wise.

The variables were used in the study was age, gender, address, patients admitted in different wards with year, duration of stay in wards and their outcome etc. The written consent was taken from the Hospital Director of BPKIHS.

The collected data was coded and entered in MS Excel 2007. The analysis was done by using statistical software SPSS (Statistical Package for Social Science) version 17. Percentage and proportion was calculated where ever applicable.

Results:-

Table 1: Distribution of study population by different sociodemographic variables

| Characteristics | Frequency | Percentage |
|--|------------|--------------|
| Age in years | | |
| 1-20 years | 226 | 40.8 |
| 21-39 Years | 191 | 34.5 |
| 40-59 ears | 107 | 19.3 |
| >60 | 30 | 5.4 |
| Sex | | |
| Male | 331 | 61.2 |
| Female | 215 | 38.8 |
| Address | | |
| Sunsari | 109 | 19.5 |
| Jhapa | 122 | 22.0 |
| Illam | 34 | 6.1 |
| Morang | 96 | 17.3 |
| Siraha | 32 | 5.8 |
| Saptari | 28 | 5.1 |
| Others(Dhanusha,Mahottari,Sarlahi,Dhankuta, Terathum,Panchther,India,Dang,Sankhuwasava) | 134 | 24.2 |
| Total | 554 | 100.0 |

A study subject consists of 554 patients which were admitted in wards of BPKIHS from 2006 to 2015 AD. The study subjects consist of 61.2% of male and 38.8% of female. Majority of Malaria patients belongs from Jhapa, Sinsari and Morang District of Nepal. (Table 1 & 2)

Table 2: Distribution of study population by different variables

| Characteristics | Frequency | Percentage |
|-----------------------------------|-----------|------------|
| Patient admitted in a ward a year | | |
| 2006 | 108 | 19.5 |
| 2007 | 91 | 16.4 |
| 2008 | 56 | 10.1 |
| 2009 | 77 | 13.9 |
| 2010 | 42 | 7.6 |
| 2011 | 43 | 7.8 |
| 2012 | 40 | 7.2 |
| 2013 | 34 | 6.1 |
| 2014 | 34 | 6.1 |
| 2015 | 29 | 5.2 |
| Admitted in different wards | | |
| Medicine | 387 | 69.9 |
| Pediatrics | 136 | 24.5 |
| Tropical medicine | 9 | 1.6 |
| Surgery | 6 | 1.1 |

| | | |
|------------------------------------|------------|------------|
| PICU | 11 | 2.0 |
| ICU | 2 | 0.4 |
| CCU | 3 | 0.5 |
| Duration of stay in wards in days | | |
| <6 | 286 | 51.6 |
| 6-10 | 213 | 38.4 |
| 11-15 | 38 | 6.9 |
| ≥16 | 17 | 3.1 |
| Outcome | | |
| Improved, cured | 465 | 83.9 |
| Expired | 35 | 6.3 |
| Others (Unchanged,LAMA, Recovered) | 54 | 9.7 |
| Total | 554 | 100 |

Table 2 shows most of the patients (19.5%) admitted in 2006 AD. Most of the patients were admitted in Medicine wards. Almost 83.9% of admitted Malaria cases were improved in BPKIHS.

Discussion:-

In the past, the South Asia/Southeast Asia region annually was estimated to contribute about 30% to the estimated 300-500 million global cases of malaria and about 8% of the global 1 million deaths due to malaria.⁴

Currently, the number of cases of malaria registered in Brazil has been falling yearly and the figures reported in the most recent years are as follows: 267,047 cases in 2011, 242,756 in 2012 (9.1% reduction) and 178,613 in 2013 (26.4% reduction).⁵ In Brazil, Morbidity and lethality also decreased from 21,288 hospitalizations and 243 deaths in 2000 to 3,328 hospitalizations and 60 deaths in 2012 and 2,365 hospitalizations and 41 deaths in 2013.⁶ The annual mortality rate per 100,000 people from malaria in Nepal has decreased by 78.4% since 1990, an average of 3.4% a year.⁷ Nepal has surpassed the Millennium Development Goal #6 by reducing malaria morbidity and mortality rates by more than 50% in 2010 as compared to 2000. Therefore, Government of Nepal has set a vision of Malaria free Nepal in 2025. Confirmed cases dropped from 2,634 in fiscal year 2068/69 to 1,674 in 2070/71. The proportion of *P. falciparum* infections has sharply declined and reached 13 percent in reporting year. Recorded malaria deaths are drastically declined from more than 200 during the 2006 (outbreak years) to less than 10 in 2010 and maintained zero deaths due to malaria from 2012 to till date.⁸ In our study in BPKIHS, we found burden of malarial cases has been decreasing since 2011, and out of 544 cases studied, nearly 60% cases were reported in 2006-2009 which shows some similarity to the Nepal government report about decreasing incidence.

This study showed the age ranging from 1 to 80 years and it was more commonly seen in 1-20 years age group (40.8%). Biologically highest risk of malaria are young children from six months to five years.⁹ In India, Children in the states of Assam,¹⁰⁻¹² Arunachal Pradesh,¹³ and Rajasthan¹⁴ had a higher incidence of malaria than adults, whereas in the indo-gangatic plains, the situation was reversed.^{15, 16} According to the study done in Malawian children the risk of malaria hospitalization decreased with increasing age.¹⁷ Age wise distribution of malaria cases indicates that among the total malaria cases, 70% of cases were seen in the age group of 15 and above, while only 1% of the case were seen in infants.¹⁸ Present study showed 40.8% of malaria cases were of age group 1-20 years and age group 21-39 years (34.5%). Which suggests young and adults are more affected by malaria and somewhat near to the result of Parajuli K et al where the most affected age group was 20-29 years with 31.3% positive cases followed by 30-39 years with 21.9% positives.¹⁹

A study in Myanmar on activities that enhance human-vector contact revealed that gender-specific patterns of both leisure and work activities during peak biting periods by men and women placed them at equal risk of contracting malaria through exposure to mosquitoes.²⁰ Available evidence suggests that given equal exposure, men and women are equally vulnerable to malaria infection, except for pregnant women who are at greater risk of severe malaria in most endemic areas.²¹ Sex wise distribution of malaria cases revealed that males are more affected than females.¹⁸ Though sex predilection has not been major concern for malaria except pregnant woman's and adolescent age girls but due to socioeconomic background of our society there has been coincidental finding of male reporting more cases of malaria than females in our current study where 61.2 % of total cases were male and 31.8 % were females.

In India, the burden is generally higher in men than women in all age groups.²²For men, the deadliness of malaria in Nepal peaks at above 80 years of age. It kills men at the lowest rate at age 10-14 years. At 12.2 deaths per 100,000 men in 2013, the peak mortality rate for men was higher than that of women, which was 12.1 per 100,000 women. Women are killed at the highest rate from malaria in Nepal at above 80 years of age. It was least deadly to women at age 20-24 years.⁷

A total of 26526 clinical suspected malaria cases were reported in FY 2070/71.; more than 50% in 5 districts: Dhanusha (N=4380), Mahottari (4245), Morang (2149), Surkhet (2159) and Saptari (1573).⁸The confirmed malaria incidence was reduced from 2.24 per 10,000 in 2007 to 0.31 per 10,000 population in 2011 in Morang district but increased from 3.38 to 8.29 per 10,000 population in Kailali district. The incidence of malaria was 82% lower in Morang than in Kailali district.²³In the study done by Parajuli K et al in two Eastern districts (Jhapa and Morang) of Nepal which showed the malaria cases was higher (56.3%) in Jhapa than Morang district (43.7%) which shows uniformity with our result where out of 554 cases, most of the malaria cases were reported from Jhapa (22%) of cases, Sunsari (19.5%) and Morang (17.3%) respectively which is more than 50% of total cases.¹⁹

Malaria is a major public health problem in most tropical countries causing morbidity. Out of 11 countries of the South-East Asia Region (SEAR), 10 countries are malaria endemic. Around 60% of the global population at risk resides in SEA Region and accounts for 25% of the global morbidity and around 12% of the global mortality due to malaria.¹⁹In our hospital based study we found most of patients were admitted to medicine ward followed by pediatrics. We found, out of total admitted cases 83.9% were cured and 6.3% were expired. Despite the limitation of information available, our study has driven us in some conclusion about the status of malaria cases admitted in BPKIHS as a tertiary health center located in center of malaria high risk district of eastern Nepal and its correlation with national and international epidemiological evidences.

Conclusion:-

The problem of malaria is common and has become a key public health concern for all. There seems to be decreasing number of malaria cases since 2010 but still there is burden of malaria cases. Most of the cases were from Jhapa, Sunsari and Morang District out of cases reported in BPKIHS from eastern Nepal. Malaria has affected mostly the younger age groups and with male predilection. Nearly 83.9% of patients were improved and most of them were discharged from medicine and pediatrics ward respectively.

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References:-

1. Autino B, Noris A, Russo R, Castelli F. Epidemiology of Malaria in Endemic Areas. [Mediterranean Journal of Hematology and Infectious Disease](#) 2012; 4(1): e2012060.doi: 10. 4084/MJHID.2012.060.
2. World Malaria Report. 2015. http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf. (Accessed on 28 December 2016)
3. Nepal Malaria Programme Review 7-16 June 2010. Available on http://apps.searo.who.int/PDS_DOCS/B4673.pdf. (Accessed on 28 December 2016)
4. Kumar A, Chery L, Biswas C, Dubhashi N, Dutta P, Dua VK et al. Malaria in South Asia: Prevalence and control. [Acta Tropica](#) 2012; 121(3): 246-255.
5. Andrade JCR, Anjos CFD, Wanderley DMV, Alves MJC, Campos PC. Foco de malária no estado de São Paulo (Brasil) [Rev Saude Publica](#) 1986; 20:323-326.
6. de Pina-Costa A, Brasil P, Di Santi SM, de Araujo MP, Suárez-Mutis MC, Santelli AC et al. Malaria in Brazil: what happens outside the Amazonian endemic region. [Memórias do Instituto Oswaldo Cruz](#) 2014; 109(5):618-33.
7. Malaria in Nepal. Available on http://global-disease-burden.healthgrove.com/1/9813/Malaria_in_Nepal. (Accessed on 28 December 2016)
8. Annual Report of Nepal 2070-2071. Available on http://dohs.gov.np/wp-content/uploads/2014/04/Annual_Report_2070_71.pdf. (Accessed on 28 December 2016)

9. Gender wise health malaria. Available on http://www.who.int/gender/documents/gender_health_malaria.pdf. (Accessed on 28 December 2016)
10. Das NG, Baruah I, Kamal S, Sarkar PK, Das SC, Santhanam K. An epidemiological and Entomological investigation on malaria outbreak at Tamalpur PHC, Assam. *Indian Journal of Malariology* 1997; 34:164-170.
11. Dev V, Sharma VP. Persistent transmission of malaria in Sonapur PHC, Kamrup district, Assam. *Journal of Parasitic Dis* 1995; 19:65–68.
12. **Prakash A, Mohapatra PK, Bhattacharyya DR, Doloi P, Ma-hanta J. Changing malaria endemicity-a village based study in Sonitpur, Assam. *Journal of Communicable Diseases* 1997; 29: 175-178.**
13. Dutta P, Khan AM, Mahanta J. Problem of malaria in relation to Socio-cultural diversity in some ethnic communities of Assam and Arunachal Pradesh. *Journal of Parasitic Diseases* 1999; 23:101–104.
14. Shukla RP, Pandey AC, Mathur A. Investigations of malaria outbreak in Rajasthan. *Indian Journal of Malariology* 1995; 32:119-128.
15. Dhiman RC, Pillai CR, Subbarao SK. Investigation of malaria outbreak in Bahraich district. *Indian Journal of Medical Research* 2001; 113:186-191.
16. Srivastava HC, Kant R, Bhatt RM, Sharma SK, Sharma VP. Epidemiological observations on malaria in villages of Buhari PHC, Surat, Gujarat. *Indian Journal Malariology* 1995; 32:140-152.
17. [Kazembe LN](#), [Kleinschmidt I](#), [Sharp BL](#). Patterns of malaria-related hospital admissions and mortality among Malawian children: an example of spatial modelling of hospital register data. *Malaria Journal* 2006; 5:93.
18. Nepal Malaria Strategic Plan 2011-1016. Available on <http://umeshg.com.np/wp-content/uploads/2015/04/Nepal-Malaria-Strategic-Plan-2011-1016.pdf>. (Accessed on 28 December 2016)
19. Parajuli K, Ghimire P. Epidemiology of malaria in two Eastern districts of Nepal. *Kathmandu University Medical Journal* 2010; 8(29), 45-50.
20. Tin-Oo P et al. Gender, mosquitoes and malaria: implications for community development programmes in Laputta, Myanmar. *Southeast Asian Journal of Tropical Medicine and Public Health* 2001; 32(3):588-594.
21. Reuben R. Women and Malaria - Special Risks and Appropriate Control Strategy. *Social Science and Medicine* 1993, 37(4):473-480.
22. Kumar A, Valecha N, Jain T, Dash AP. Burden of Malaria in India: Retrospective and Prospective View. *The American Journal Tropical Medicine and Hygiene* 2007; 77 (6): 69-78.
23. [Dhimal M](#), [Hara RBO](#), [Karki R](#), [Thakur GD](#), [Kuch U](#), [Ahrens B](#). Spatio-temporal distribution of malaria and its association with climatic factors and vector-control interventions in two high-risk districts of Nepal. *Malar J* 2014; 25; 13:457.