SCIENTIFIC COLLECTION INTERCONF

№ 123
September, 2022

THE ISSUE CONTAINS:

Proceedings of the 1st International Scientific and Practical Conference

SCIENCE IN THE ENVIRONMENT OF RAPID CHANGES

BRUSSELS, BELGIUM

6-8.09.2022

Tkachenko Elena Viktorovna
Candidate of medical sciences, Physiology chair assistant
Poltava State Medical university, Ukraine

Jha Sahil Kumar
Student, International faculty, General Medicine
Poltava State Medical University, Ukraine

Rauth Upasona
Student, International faculty, General Medicine
Poltava State Medical University, Ukraine

Kumari Chhaya
Student, International faculty, General Medicine
Poltava State Medical University, Ukraine

MALARIA PECULIARITIES IN THE STUDENTS OF PSMU AND INDIAN EDUCATIONAL ESTABLISHMENTS AS WELL AS IN THE INDIAN INHABITANTS FROM SLUM AND NON-SLUM AREAS DEPENDENTLY ON TYPOLOGIAL BELONGING AND SOME OTHER CONTRIBUTIVE FACTORS

Abstract. *Malaria is widely-spread infectious disease in the world. India is not an exception. We were interested in analyzing the disease' perception peculiarities in our educational establishment' and other students in India as well as non-students living in India. Our survey established in part the varieties in morbidity in India different parts, in rural and urban areas, in slum and non-slum districts while emphasizing on water sources important contribution in the disease transmission as well as age varieties in the morbidity. The majority of people insist on mechanical (anti-Anopheles nets) and chemical protection as well as essentiality to follow proper hygiene. We prove necessity to take ethno-age typological aspect into consideration while malaria multi-facetated study (students belong to separate age category and there were age varieties in the sick' amounts with maximal age in 18 years).*

Keywords: *malaria, India, Indian students, typological aspects.*

There are nine countries in the world creating successful malaria-eliminating programmes and receiving the status of malaria-free countries due to this over the past decade namely China, El Salvador, Algeria, Argentina, Uzbekistan, Paraguay, Sri Lanka, Maldives and Armenia. India represents geographically diverse country and is targeting malaria elimination by 2030 [1]. There is a significant problem hardened malaria elimination in a big extent – unlicensed medical practitioners in tribal dominated rural areas of central India that increases essentiality of significant knowledge of the population about this disease that can be reached by multi-facetated researches in India and other countries in part. There is an attention to assessing the malaria socio-economic determinants in tribal dominated districts for example the Mandla one with enrollment into the disease elimination demonstration project, in Madhya Pradesh in this research work [2]. Doubtly such projects are of crucial importance. Another big problem – asymptomatic malaria prevalence in separate regions in part in Odisha [3]. Separately malaria epidemiology was assessed in an area of stable transmission in tribal population of Jharkhand [4]. Surveys are proposed as method for studying the epidemiological and behavioral aspects of the disease in separate districts in part Sundargarh district, Odisha [5]. And we used survey in our research set as well.

Forest malaria can be differentiated as a separate type by ethiology and pathogenesis of this disease in India [6]. Epidemiology was and is established even for separate Plasmodiums types in India [7].

Modern scientific data considered Plasmodium vivax as proven ethiotropic agent of malaria and there is an investigation about genetic diversity in two leading vaccine candidates AMA1 and $MSP1_{19}$ at three sites in India while emphasizing therefore about Plasmodium vivax typologies [8].

There were distinguished the malaria vectors in India and they are considered to be very important state strategy for this disease elimination [9]. There is a description of endectocide ivermectin acting to the vectors and thus helping to the disease elimination; it is a new ethiotropic method of therapy [10].

Mosquito repellents are used widely as preventive method at this disease and its usage is described here in three sites in India with ethnic typological aspect

emphasizing [11]. Another method, the modern one, of shift in potential malaria transmission is based in fuzzy-based climate suitability thus governed climate changing with creating the special model [12]. Anopheles mosquitos are present near water – there are researches about the disease prevalence in separate cities with coastal regions, for example in Mangaluru city are in the southwestern coastal region of India [13].

There are researches about malaria elimination peculiarities in India various districts for example in the Kheda one in India Western part (ethnic typological aspect) [14]. There exist comprehensive case management programmes in India separate districts and even cities, for example Odisha (ethnic typological aspect as well) [15]. Also information technologies were and are established in the country separate districts and cities, in part in Mangaluru (ethnic typological aspect) [16]. A model for malaria elimination was established on the base of Mandla district experience (ethnic typological aspect) [17].

Polymerase chain reaction represents one powerful diagnostic method for malaria proper diagnosis in India at mono and mixed infections caused by Plasmodium falciparum and Plasmodium vivax in India [18]. Of course, search and applying the most suitable diagnostic methods is of crucial importance for proper diagnostics and differential diagnostics. And, moreover, as Hippocrat said: “Bene diagnostir – bene curatur” (“Good diagnostics – proper treatment”). Humoral immunity (antibody) responses were studied concerning to the vaccines against two leading Plasmodium vivax antigens (vaccine candidate antigens if to be more exact) in three geographically diverse malaria-endemic regions of India [19]. These authors emphasized that there are endemic regions on this disease in India. Targets of naturally acquired immunity in India and Ghana represent peripheral merozoite surface proteins [20].

Ethno-gender-age typological aspect on this question was concerning to malaria treatment and prevention in pregnancy on the base of the data received in the Eastern India [21]; malaria prevalence and risk factors associated with anemia was established in semiurban community of Hazaribag, Jharkhand that added the data about ethno-gender-age typological aspect concerning to malaria study (we say

about ethno-gender-age but not ethno-gender aspect because pregnancy represents significant age period in 9 months) [22].

This review demonstrates typological aspects involvement in the discussed question. We would like to emphasize and to show the excessive time that the diseases have their course, diagnostics' (valuable methods), treatment (helping methods) and prevention (helpful means) in every country, in our research set – in India. Also it is important that there can be additional typological dividing taking the urbanization into consideration – in the places with conveniences and without them (in slums) and this aspect was used in our work. For example, there was created an elimination project in the rural area of 1233 villages in district Mandla, Madhya Pradesh [23]. They write about spatial and temporal village-level prevalence of Plasmodium infection and associated risk factors in part in two districts of Meghalaya [24]. There is a consideration and even evidence from a cross-sectional study in an urban slum setting in Chennai that socio-demographic and household attributes may not necessarily influence malaria [25] that increases the essentiality to perform the comparative analyses between urban and rural areas, slum and non-slum districts to establish main contributive aspects in malaria appearance and development if not all. We have a hope that our modest research work will contribute in this at least a bit. Moreover, socio-economic and household determinants must be assessed with ethno-age typologic aspect taking into consideration – there is a research about them in the Indian adults aged 45 and above with the longitudinal ageing survey analysis [26]. Long-lasting insecticidal nets were applied in Central India to decrease the subclinical malaria distribution among the children in the presence of pyrethroid resistance in Anopheles culicifacies (ethno-age typological aspect of the work) [27]. We used the ethno-age typological aspect in our research set in the students because students represent separate age category.

Our own researches results. They were received by survey method.

The patient's views:

"Doctors charge a lot just for consultation, we cannot afford to pay so much every time we get sick, so we choose to wait and try home remedies. We only go for medical help when things are out of our own care. To prevent mosquito bite, we

mostly use nets around our bed and spray kerosene oil on open water puddles, we fully cover ourselves during monsoons and evenings."

The doctors' view:

"The monsoon is a season where most awareness hoarding is put up on streets to make people more aware of the dangerous disease. It is so, because in this season the immunity can be a bit compromised and person can become more susceptible to infections. Patient come from various backgrounds, in cities malarial infection is seen more often in people from low to medium socio-economic status, mainly children. It is so may be because they are more easily available in parks where they can get mosquito bites easily. There are the days when there are many rolls on mosquito repellents for kids to apply on their clothes. In general the patients come when the symptoms become severe .... nausea, body pain, sometimes fever .We suggest if there's irritation post-bite, to wash the area with mild soap ...more often the patients use toothpaste like things to ease the discomfort or itchiness."

A total of 100 people were surveyed randomly to our examinations, 29% of them previously have incurred the malarial infection, 24 % were from below poverty line families; although no significant association could be made between the income / financial states and probability of incurring the infection at large. 41% were having source of stagnant water around the place of their residence; we found it could be contributive to getting the infection, by serving as breeding grounds of plasmodium vector (Anopheles mosquito).

In our own survey we find that the age group of persons who previously had malaria is 17-28 years. The most affected comprised 18 year-old (5 persons), 17 year-old (4 persons), 24 year-old (4 persons), 19 year-old (1 person), 22year-old (3 persons), 23 year-old (2 persons), 25 year-old (1 person), 26 year-old (2 persons), 28 year-old (1 person) while no sick people were among the 27-year-old. It is also observed that most cases were from rural / slum areas of Bihar (east region of India) with partial lack of hygiene control facilities and lack of easy access to medical facilities. Out of the 9 cases, 4 were from places where stagnant water was present near the place of residence. The north region of India, Uttar Pradesh and New Delhi had total of 10 cases (5 from each state), from these 2 cases come from people

residing near sources of stagnant waters. There was 1 patient from South India (Tamil Nadu), while 1 – from West-coast of India (Mumbai), and 1 from Central India Madhya Pradesh.

Although 99% of the people know about malaria and its prevention, the results indicate that people from rural areas are still at higher chances of getting malaria than their urban counterparts.

Key contributive factors affecting the diagnosis, prevention and treatment of the disease are:

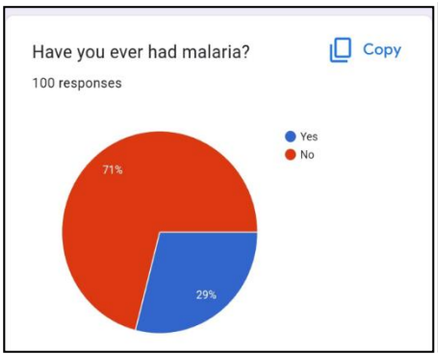
– More green areas, ponds which provide optimal conditions for multiplication of the mosquitoes in rural / slum areas (lack of hygienic conditions).

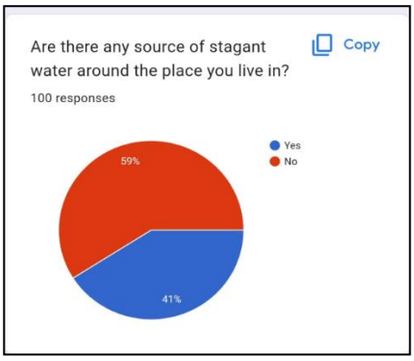
– Lack of easy access to medical facilities and diagnostic laboratories.

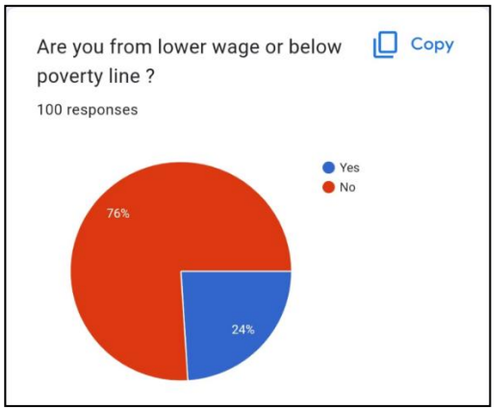
– Less number of entomologists for developing proper malaria elimination plan suitable to respective regions.

– The many unlicensed doctors in the rural / tribal areas are the "go-to" options for people.

The methods of treatment applied by them may cause counteraction (resistance to drugs).







Some of our experimental results are represented in the diagrams 1-3.

Thus, we analyzed the ethiological, pathogenetic, treaty and preventive measures of the examined population's of people from various parts of India, slum and non-slum areas, while ethno-age typological aspect taking into account.

References:

1. Sharma S, Verma R, Yadav B, Kumar A, Rahi M, Sharma A. What India can learn from globally successful malaria elimination programmes. BMJ Glob Health.2022; 7(6): e008431. Doi: 10.1136/bmjgh-2022-008431.
2. Sharma RK, Rajvanshi H, Bharti PK, Nisar S, Jayswar H, Mishra AK, Saha KB, Shukla MM, Das A, Kaur H, Wattal SL, Lai AA. Socio-economic determinants of malaria in tribal dominated Mandla district enrolled in malaria elimination demonstration project in Madhya Pradesh. Malar J.2021; 20:7. Doi: 10.1186/s12936-020-03540-x.
3. Kumari P, Sinha S, Gahtori R, Yadav CP, Pradhan MM, Rahi M, Pande V, Anvikar AR. Prevalence of asymptomatic malaria parasitemia in Odisha, India: A challenge to malaria elimination. Am J Trop Med Hyg.2020;103(4):1520-1516.
4. Das MK, Prajapati BK, Tiendrebeogo RW, Ranjan K, Adu B, Srivastava A, Khera HK, Chauhan N, Tevatiya S, Kana IH, Sharma SK, Singh S, Theisen M. Malaria epidemiology in an area of stable transmission in tribal population of Jharkhand, India. Malar J.2017; 16: 181. Doi: 10.1186/s12936-017-1833-9.
5. van Eijk AM, Choubey S, Baria P, Haque MA, Nandini P, Acharya S, Sullivan SA, Mohanty S, Satpathi S, Cariton JM. Acta Trop. 2020; 211: 105647. Doi: 10.1016/j.actatropica.2020.105647.
6. Ranjha R, Sharma A. Forest malaria: the prevailing obstacle for malaria control and elimination in India. BMJ Glob Health. 2021; 6(5): e005391. Doi: 10.1136/bmjgh-2021-005391.
7. Anvikar AR, Shah N, Dhariwal AC, Sonal GS, Pradhan MM, Ghosh SK, Valecha N.Am J Trop Med Hyg.2016;95 (6 Suppl): 108-120.
8. Kale S, Pande V, Singh OP, Cariton JM, Mallick PK. Genetic diversity in two leading Plasmodium vivax malaria vaccine candidates AMA1 and $MSP1_{19}$ at three sites in India. PLoS Negl Trop Dis.2021;15(8):e009652. Doi: 10.137/journal.pntd.0009652.
9. Subbarao SK, Nanda N, Rahi M, Raghavendra K. Bioplogy and bionomics of malaria vectors in India: existing information and what more needs to be known for strategizing elimination of malaria.Malar J.2019; 18:396.doi:10.1186/s12936-019-3011-8.
10. Shafat Ahmad S, Rahi Manju, Saroha P, Sharma A. Ivermectin as an endectocide may boost

control of malaria vectors in India and contribute to elimination. Parasit Vectors. 2022; 15: 20. Doi: 10.1186/s1307-021-05124-3.

11. van Eijk AM, Ramanathapuram L, Sutton PL, Peddy N, Choubey S, Mohanty S, Asokan A, Ravishankaran S, Sri Lakshmi Priya G, Johnson JA, Velayutham S, Kanagaraj D, Patel A, Desai N, Tandel N, Sullivan SA, Wassmer SC, Singh R, Pradhan K, Cariton JM, Srivastava HC, Eapen A, Sharma SK. The use of mosquito repellents at three sites in India with declining malaria transmission: surveys in the community and clinic.Parasit Vectors.2016;9:418. Doi: 10.1186/s1307-016-1709-9.
12. Sarkar S, Gangare V, Singh P, Dhiman RC. Shift in potential malaria transmission areas in India. Using the fuzzy-based climate suitability malaria transmission (FCSMT) model under changing climatic conditions. Int J Environ Res Public Health.2019; 16(18): 3474. Doi: 10.3390/ijerph16183474.
13. Dayanand KK, Punnath K, Chandrashekar V, Achur RN, Kakkilaya SB, Ghosh SK, Kumari S, Gowda DC. Malaria prevalence in Mangaluru city area in the southwestern coastal region of India. Malar J.2017;16:492. Doi: 10.1186/s12936-017-2141-0.
14. Baharia RK, Yadav CP, Sharma A. Four decades of epidemiological data reveal trajectories towards malaria elimination in Kheda district (Gujarat), western part of India. BMJ Glob Health.2021; 6(12):e005815. Doi: 10.1136/bmjgh-2021-005815.
15. Pradhan MM, Pradhan S, Dutta A, Shah NK, Valecha N, Joshi PL, Pradhan K, Daumerie PG, Banerji J, Duparc S, Mendis K, Sharma SK, Murugasampillay S, Anvikar AR. Impact of the malaria comprehensive case management programme in Odisha, India. PLoS One. 2022; 17(3): e0265352. Doi: 10.1371/journal.pone.0265352.
16. Baliga BS, Baliga S, Jain A, Kulai N, Koduvattat N, Prakash Kumar BG, Arun K, Ghosh SK. Digitized smart surveillance and micromanagement using information technology for malaria elimination in Mangaluru, India, an analysis of five-year post-digitization study.Malar J.2021; 20: 139.Doi: 10.1186/s12936-021-03656-8.
17. Rajvanshi H, Bharti PK, Nisar S, Jayswar H, mishra AK, Sharma RK, Saha KB, Shukla MM, Wattai SL, Das A, Kaur H, Anvikar AR, Khan A, Kshirsgar N, Dash AP, Lai AA. Malar J. 2021;20: 98. Doi: 10.1186/s12936-021-03607-3.
18. Siwal N, Shyasunder Singh U, Dash M, Kar S, Rani S, Rawal C, Singh R, Anvikar AR, Pande V, Das A. Malaria diagnosis by PCR revealed different distribution of mono and mixed species infections by Plasmodium falciparum and P. vivax in India. PLoS One.2018; 13(3):e0193046. Doi: 10.137/journal.pone.0193046.
19. Kale S, Yadav CP, Rao PN, Shalini S, Eapen A, Srivastava HC, Sharma SK, Pande V, Cariton JM, Singh OP, Mallick PK. Antibody, responses within two leading Plasmodium vivax vaccine candidate antigens in three geographically diverse malaria-endemic regions of India.

Malar J.2019;18: 425.Doi: 10.186/s12936-019-3066-6.

20. Garcia-Senosianin A, Kana IH, Singh SK, Chourasia BK, Das MK, Dodoo D, Singh S, Adu B, Theisen M. Peripheral merozoite surface proteins are targets of naturally acquired immunity against malaria in both India and Ghana.Infect Immun.2020; 88(4): e00778-19. Doi: 1128/IAI.00778-19.
21. Sabin L, Hecht EMS, Brooks MI, Singh MP, Yeboa-Antwi K, Rizal A, Wylle BJ, Bondzie PA, Banos M, Tuchman J, Singh N, Hamer DH. Malar J 2018; 17: 207. Doi: 10.118/s12936-018-2339-9.
22. Sohail M, Shakeel S, Kumari S, Bharti A, Zahid F,, Anwar S, Singh KP, Islam M, Sharma AK, Lata S, Ali V, Adak T, Das P, Raziuddin M. Prevalence of malaria infection and risk factors associated with anaemia among pregnant women in semiurban community of Hazaribag, Jharkhand, India. Biomed Res Int. 2015; 2015: 740512. Doi: 10.1155/2015/740512.
23. Rajvanshi H, Bharti PK, Nisar S, Jain Y, Jayswar H, Mishra AK, Sharma RK, Saha KB, Shukla MM, Das A, Kaur H, Wattal SL, Singh N, Lai AA. Study design and operational framework for a community-based malaria elimination demonstration project (MEDP) in 1233 villages of district Mandla, Madhya Pradesh.Malar J. 2020; 19: 410. Doi: 10.1186/s12936-020-03458-4.
24. Kessler A, Shylla B, Shyamsunder Singh U, Lyngdon R, Mawkhileng B, van Eijk AM, Sullivan SA, Das A, Walton C, Wilson ML, Cariton JM, Albert S. Spatial and temporal village-level prevalence of Plasmodium infection and associated risk factors in two districts of Meghalaya, India.Malar J.2021; 20:70. Doi: 10.1186/s12936-021-03600-w.
25. Thomas S, Ravishankaran S, Asokan A, Johnson Amala Justin NA, Kalsingh TMJ, Mathai MT, Valecha N, Eapen A. Socio-demographic and household attributes may not necessarily influence malaria: evidence from a cross sectional study of households in an urban slum setting of Chennai, India. Malar J. 2018;17:4.
26. Mohan I, Kodali NK, Chellapan S, Karuppusamy B, Behera SK, Natarajan G, Balabaskaran Nina P. Socio-economic and household determinants of malaria in adults aged 45 and above: analysis of longitudinal ageing survey in India 2017-2018. Malar J. 2021; 20: 306. Doi: 10.1186/s12936-021-03840-w.
27. Chourasia MK, Kamaraju R, Kleinschmidt I, Bhatt RM, Swain DK, Knox. Impact of long-lasting insecticidal nets on prevalence of subclinical malaria among children in the presence of pyrethroid resistance in Anopheles cuicifacies in Central India. Int J Infect Dis.2017; 57:123-129.