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Malaria awareness and prevention behavior among Al-Madinah population

1- Dr. Hussain Abbas AL-Nakhli

Taibah university, college of medicine Internship.

Email: Hussalnakhli96@gmail.com

2- Dr. Hassan Ghazi Bakheet

Veterinary medicine

Email: Hassan_Bakheet.1996@outlook.sa

Abstract:

Malaria is a parasitic infectious disease transmitted through mosquito and caused by a protozoa called Plasmodium P. falciparum, P. vivax, P. ovale, and P. malariae, it's considered one of the major health problems in many countries around the world. The Saudi Health announced in 2019 that it would eliminate malaria in most of Saudi Arabia regions. Still, many people should be aware that the disease is endemic in some countries around the world and it could be transmitted when traveling outside Saudi Arabia or during Al-hajj or Umrah seasons. Therefore, this study will help us to spread knowledge to areas that lack it in Saudi Arabia and abroad. The study type was cross-sectional, in this research we collected data from 568 participants after taking consent, using an electronic closed questions questionnaire, to gather general data, check awareness, and prevention knowledge regarding malaria disease. Most of the participants showed to be aware about how to protect themselves from malaria, almost half of the participants in this study showed no interest in learning about endemic diseases while going as tourist in some areas, which could cause them to get a disease, or make them carry infection unintentional while coming back to Saudi Arabia. Further studies are needed in order to enlighten societies' knowledge regarding malaria prevention methods and how it's transmitted, which will help in the process of eliminating it.

Keywords: Malaria, Saudi Arabia, prevention, Public health.

ملخص البحث:

الملاريا هي مرض طفيلي معدي ينتقل عن طريق البعوض وينتج عن طفيليات تسمى المتصورة المنجلية والمتصورة النشيطة والمتصورة البيضية والمتصورة الملاريا ، وتعتبر واحدة من المشاكل الصحية الرئيسية في العديد من البلدان حول العالم. أعلنت الصحة السعودية في 2019 أنها ستقضي على الملاريا في معظم مناطق المملكة العربية السعودية. ومع ذلك ، يجب أن يدرك الكثير من الناس أن المرض مستوطن في بعض البلدان حول العالم ويمكن أن ينتقل عند السفر خارج المملكة العربية السعودية أو أثناء مواسم الحج أو العمرة. لذلك ستساعدنا هذه الدراسة على نشر المعرفة في المناطق التي تفتقر إليها في المملكة العربية السعودية وخارجها. كان نوع الدراسة مقطعيًا ، في هذا البحث ، قمنا بجمع بيانات من 568 مشاركًا بعد أخذ الموافقة ، باستخدام استبيان إلكتروني للأسئلة المغلقة ، لجمع البيانات العامة ، والتحقق من الوعي ، والمعرفة الوقائية فيما يتعلق بمرض الملاريا. أظهر معظم المشاركين أنهم على دراية بكيفية حماية أنفسهم من الملاريا ، أظهر ما يقرب من نصف المشاركين في هذه الدراسة عدم اهتمام بالتعرف على الأمراض المستوطنة أثناء السفر كسائح في بعض المناطق ، مما قد يتسبب في إصابتهم بمرض ، أو جعلهم يحملون العدوى عن غير قصد أثناء عودتهم إلى المملكة العربية السعودية. هناك حاجة إلى مزيد من الدراسات لتنوير معرفة المجتمعات بشأن طرق الوقاية من الملاريا وكيفية انتقالها ، مما سيساعد في عملية القضاء عليها.

الكلمات المفتاحية: الملاريا ، السعودية ، الوقاية ، الصحة العامة.

Introduction :

Background:

Malaria is a mosquito-borne that involves multiple parasite species such as Plasmodium. falciparum, P. vivax, P. ovale, and P. malariae, [1], it's also worth mentioning that there is a possibility to transmit Malaria through the placenta from mother to fetus, as well as the transfer through the use of a needle from an infected person to a healthy person, also possible transmission of the disease while transfusing blood from an infected person to a healthy person [4]. Malaria is a serious life threatening disease that affect some communities health even in this day. There are an estimated over 200 million cases of malaria worldwide each year [6], and it kills more than 1 million people each year [3-2]. This disease threatens almost half of the world's population, especially sub-Saharan Africa, where it has the highest incidence of the disease recorded in 2015 [8]. The Saudi Health announced in 2019 that it would eliminate malaria in most of Saudi Arabia regions[5]. The transfer of the Plasmodium parasite to a human is mainly through a female Anopheles mosquito. The parasite takes 7-20 days to develop into a Sporozoite [3-2]. The mosquito must survive for more than 7 days, in order to transmit the protozoa [3]. The parasite then moves to the salivary gland of the mosquito which makes it able to be transmitted to the human, then start to multiply within the liver cells, finally the parasite is transmitted from the liver to the RBCs [3]. Still, the period of incubation of the disease varies from person to person and may continue from the mosquito bite up to 7-30 days until the symptoms appear. These symptoms can be summarized in rise of body temperature, nausea, diarrhea, and headache. It is also possible to have some complications beyond the usual symptoms of Malaria such as kidney failure, anemia, and brain swelling. There are several ways to prevent Malaria, Including the use of insecticides to kill and remove mosquitoes, and using it around swamps, which is a suitable breeding ground for mosquitoes [3-2-7].

Methods:

In this study we aimed to check people knowledge regarding Malaria disease and the prevention methods against it. The consent of the participants in this study was obtained. This study is based on a closed questions questionnaire, which will be spread through media. The study type used in this research is cross-sectional. This research is intended to serve Al-Madinah community in Saudi Arabia. The number of sample will be 568. Survey data collection will take time from May 2020 to March 2020. Inclusion criteria: Ages between 18yr and more, all sexes, Saudis and other

nationalities who frequently visit Al-Medinah, Exclusion criteria: Individuals under the age of 18.

Statistical analysis:

The statistical analysis will be used. Data will be coded, entered, and analyzed using the Statistical Package for Social Science (SPSS) version 25.0 (SPSS, Chicago, IL, USA). Descriptive analysis followed by inferential statistics will be done. Percentages, means, and standard deviations will be calculated for qualitative and quantitative data respectively. Multivariate, analysis (GLM), and ANOVA will be used to compare means for quantitative data. A P-value of 0.05 and 0.01 will be considered as a cut off point for the level of significance.

Ethical consideration:

Approval for this study was obtained from all the participants before starting of questionnaire, the goal of this study was described to all the participants and the people involved in making the questionnaire were mentioned. Participation in this study was voluntary, there was no compulsion or payment of material compensation for the participants. Rather, they had absolute freedom to participate in this study and allow their contributions to be used by those in charge of the study.

Data analysis and results:

The total number of participants in this study was 568 persons, 285 (50.2%) of them were males, compared to 283 (49.8%) females. 544 (95.8%) are Saudis, 24 (4.1%) are non-Saudis, 446 (78.5%) are continuously residing in the Al-Madinah region, 122 (21.5%) are visitors to the Al-Madinah region but reside in another region, 21 (3.7%) were under 18 years old were directly excluded from the study, 265 (46.7%) were aged between 18 to 24 years, 90 (15.8%) persons were between 25 to 30 years old, 111 (19.5%) persons between 31 to 40 years, 49 (8.6%) person between 41 to 50 years, and 32 (5.6%) people whose ages range from 51 years and over. When asked about the level of education, 6 (1.1%) of them were at the primary school, 17 (3%) at the intermediate school, 214 (37.7%) in the secondary (high) school and 102 (18%) possessed a diploma that extends beyond the secondary (high) between two to two and a half years, 229 (40.3%) possessed a bachelor's degree or higher. 79 (13.9%) persons had a monthly income of less than 3,000 Saudi riyals (SR), 88 (15.5%) had an income between 3,000 to less than 5,000 SR, 87 (15.3%) had an income between 5,000 to less than 8,000 SR, 100 (17.6%) their income ranged between 8,000 to less than 11,000 SR, 101 (17.8%)

their income ranged between 11,000 to less than 15,000 SR, their income was from 15,000 Saudi riyals and higher, representing 113 (19.9%) persons. (Table 1)

The influencing factor		Frequency	Percent
Sex	Male	285	50.2
	Female	283	49.8
Nationality	Saudi	544	98.8
	Non Saudi	24	4.1
Region	Live in Al-Madinah	446	78.5
	Visitors	112	21.5
Age	Under 18	21	3.7
	18 to 24	265	46.7
	25 to 30	90	15.8
	31 to 40	111	19.5
	41 to 50	49	8.6
	51 and over	32	5.6
Education	Primary school	6	1.1
	Intermediate school	17	3
	High school	214	37.7
	Diploma	102	18
	Bachelor's or higher	229	40.3
Monthly income	Less than 3,000 RS	79	13.9
	3,000 to less than 5,000 SR	88	15.5
	5,000 to less than 8,000 SR	87	15.3
	8,000 to less than 11,000 SR	100	17.6
	11,000 to less than 15,000 SR	101	17.8
	15,000 SR and higher	113	19.9

Table 1: shows the factors affecting people's answers, the frequency and percentage of the answers.

Participant history of having Malaria:

568 subjects responded, of whom 8 (1.4%) had previously had malaria, compared to 497 (87.5%) who had not, and 63 (11.1%) responded that they did not know whether or not they were infected. When asked if they knew someone who had malaria before, 58 (10.2%) of people knew and 510 (89.8%) did not. Mean and median (2.10, 2.00), standard error (Std. Error of Mean) (0.14), standard deviation (Std. Deviation) (0.340) and the effect of gender on the incidence of malaria at a significant level of the probability value (0.05) was a positive effect (P <0.05). Which means that it may be There is an association between sex and malaria infection in the Al-Madinah region. (Table-2, Graph-1)

Malaria and sex:

When asked whether it is possible for Malaria to be transmitted through sex, 568 persons answered, of whom 84 (14.8%) answered yes, 131 (23.1%) answered no, and the largest number was 353 (62.1%) of the people who answered not knowing. Mean and median (2.47, 3.00), Std. Error of Mean (0.31), Std. Deviation (0.739). There was no effect of the variables for the studied factors, neither at P-value 0.01 or 0.05 significant level.(Table-2, Graph-1)

Al-Madinah population information about the Malaria vaccine:

When we asked the participants about any information they had about malaria vaccine, their answers varied, 568 persons answered, of whom 114 (20.1%) said that the vaccine is available, 169 (29.8%) answered no, 39 (6.9%) said there was no vaccine, and 246 (43.3%) said they did not know. Mean and median (2.73, 3.00), Std. Error of Mean (0.51), Std. Deviation (1.211) and the effect of gender on having adequate information about a Malaria vaccine at a large level of the probability value 0.05) had a positive effect (P <0.05). This means that there may be a relationship between gender and the availability of information on the vaccine for Malaria in the Al-Madinah region. (Table 2, Diagram 1)

Personal protection from Malaria:

568 persons responded, of whom 354 (62.3%) said by avoiding mosquito bites, 11 (1.9%) said to stay warm in the winter, 71 (12.5%) said to avoid direct contact with the infected, and 132 (32.2%) said they did not know. Mean and median (1.97,

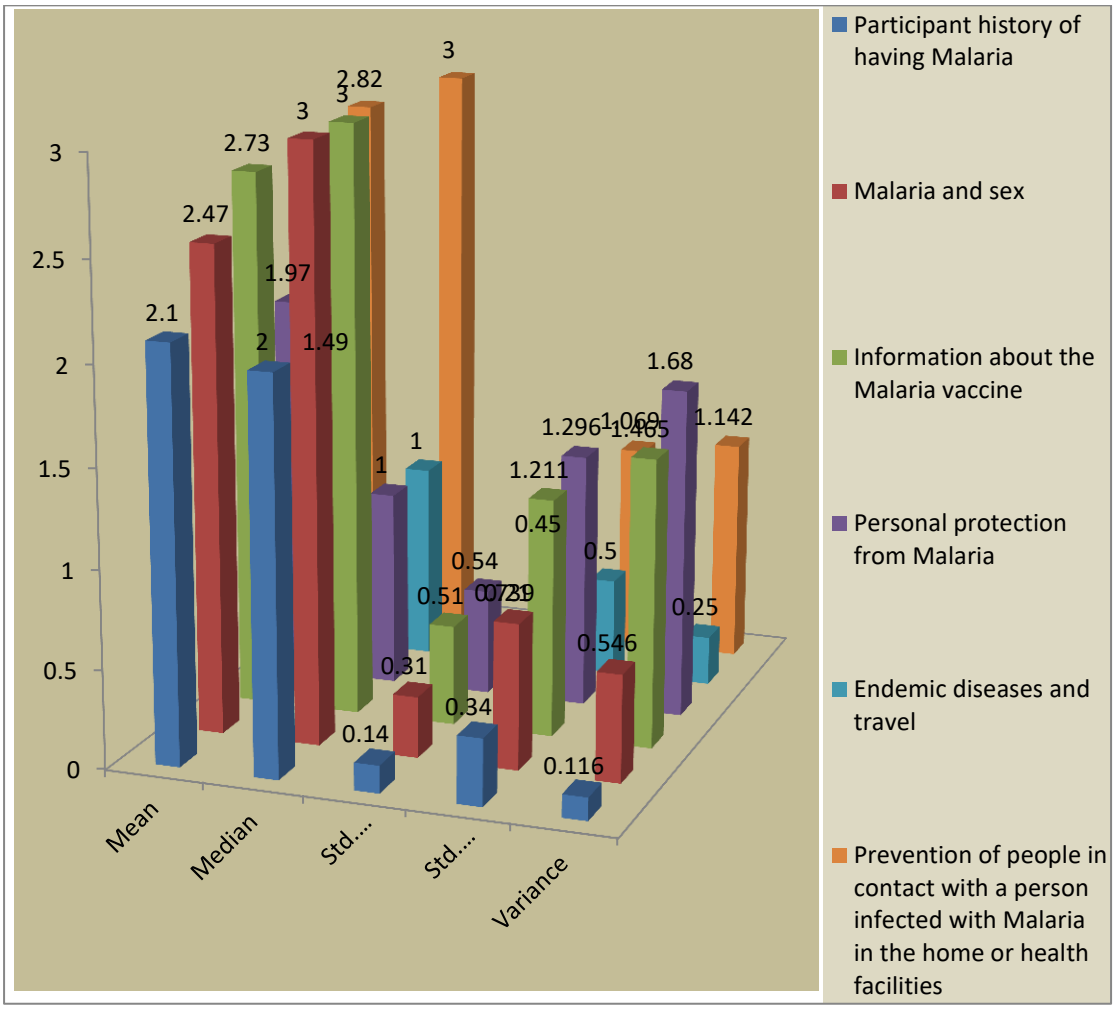
1.00), Std. Error of Mean (0.54), Std. Deviation (1.296). The effect of age and education level on people's knowledge of personal prevention of malaria infection at a significant level of the probability value (0.05) was a positive effect (P <0.05), which indicates the existence of a link between age and educational level of persons and their knowledge of personal prevention of Malaria infection in Al-Madinah. (Table-2, Graph-1)

Endemic diseases and travel:

When people were asked whether they were interested in learning about infectious diseases endemic in some countries and regions when they wanted to travel to them, a total of 568 persons, of whom 289 (50.9%), said they are interested in learning about endemic diseases, and in return 279 (49.1%) are not interested in that. . Mean and median (1.49, 1.00), Std. Error of Mean (0.21), Std. Deviation (0.500). The effect of gender on people's interest in learning about endemic diseases about their desire to travel to another country or region at a significant level of the likelihood value (0.05) was a positive effect (P <0.05), indicating a link between sex and the extent of people's interest in endemic diseases. The settlement before they travel to another place. (Table-2, Graph-1)

Prevention of people in contact with a person infected with Malaria in the home or health facilities:

When people were asked whether a person with malaria was present in the home or health facilities, what should they do to protect themselves from transmitting the infection to them, a total of 568 persons, of whom 407 (71.7%), said that a high dose of antibiotics should be given to the malaria infected person. ,16 (2.8%) said that the infected person should be isolated from disease vectors and 45 (7.9%) chose to isolate the infected person from the uninfected people and a total of 100 (17.6%) answered not knowing. Mean and median (2.82, 3.00), Std. Error of Mean (0.45), Std. Deviation (1.069). There was no effect of the variables for the studied factors, neither at P-value 0.01 or 0.05 significant level. (Table-2, Graph-1)



Graph-1: shows the statistical results of data analysis (arithmetic mean, arithmetic mean, standard deviation, standard error) and the sum of data for each question separately, and compares the results with the data for each of them.

1- Participant history of having Malaria				
Answers		frequency	Percent	P-value
Contracted		8	1.4	**positive effect (P <0.05) a relationship between sex and the incidence of Malaria**
non-Contracted		497	87.5	
did not know		63	11.1	
they knew someone who had Malaria		58	10.2	
2- Malaria and sex				
yes		84	14.8	**was no effect**
no		131	23.1	
didn't know		353	62.1	
3- Information about the Malaria vaccine				
vaccine is available		114	20.1	**had a positive effect (P <0.05) a relationship between gender and the availability of information on the vaccine for Malaria**
no		169	29.8	
there was no vaccine		39	6.9	
didn't know		246	43.3	
4- Personal protection from Malaria				
avoiding mosquito bites		354	62.3	**positive effect (P <0.05) a relationship between age and educational**
stay warm in the winter		11	1.9	
avoid		71	12.5	

direct contact with the infected				**level of persons and their knowledge of personal prevention**
did not know		132	32.2	
5- Endemic diseases and travel				
they are interested		289	50.9	**positive effect (P <0.05) a relationship between sex and the extent of people's interest in endemic diseases**
are not interested		279	49.1	
6- Prevention of people in contact with a person infected with Malaria in the home or health facilities				
high dose of antibiotics should be given to the Malaria infected person		407	71.7	**was no effect**
infected person should be isolated from disease vectors		16	2.8	
isolate the infected person from the uninfected people		45	7.9	
did not know		100	17.6	

Table-2: shows people's answers and states whether there was a positive effect at the level of significance (P-value 0.05 or 0.01) in short for the aforementioned

DISCCUSSION:

In this study, our questionnaire was focused on the knowledge regarding malaria disease prevention, and transmission. It was made to have a look about Al-Madinah's general public knowledge. Most of the participants were aware about how to protect themselves from malaria. Regarding transmission of malaria, most of precipitants knew the vector which transmit the infection from a person to another. However, the preventive behavior such as fighting mosquitoes need to be followed in order to avoid many diseases such as the malaria. One of the biases that may have affected the results of this study that some of the participants may not recall past event. Selection bias may occur due to the questionnaire being published through social media only. Therefore, there was no complete control over the participants or spreading of the questionnaire widely, which may led to a lack of variability in the answers.

Most of the participants didn't know whether malaria is transmitted through sex or not, the parasite Plasmodium that causes malaria was not yet been proven to be sexually transmitted. On the other hand, we would advise to avoid pregnancy for women who are infected with malaria due to the risk of transmission of the disease From mother to fetus.

Fifth of the participants thought there is a vaccine for malaria, however most of them didn't know if there was a vaccine or there isn't, and only a small part were sure that it is not available. Hence, diseases which can be endemic in some areas around the world should be relevant to the public so is the prevention method whether it was a medicine, vaccine, or other methods.

Approximately half of the participants in this study were not interested in learning about endemic diseases while going as tourist in some areas. Even though, some of these endemic disease may not be found in Saudi Arabia which make it hard to be diagnosed and spreadable when coming back. Thus, considering some reading or inquires about areas from a healthcare professional or healthcare ministry should be mandatory before traveling. A person may become infected during his visit to endemic countries if he does not take preventive measures. For example, mosquito resistance in his temporary residence during traveling. This is a very important point since in 2019 alone it was reported from more than 80 countries where malaria is transmitted continuously. For example, African region, where it recorded

213 million (93%) cases of malaria in 2018 only, and South-East Asia Region 7 million and 752 thousand (3.4%) of the total cases in 2018. [7]

The majority of participant, believed taking a high dose of antibiotics can protect them from malaria if they were around an infected person, very few people did not neglect the idea of isolating the infected person from the disease vector (mosquitoes). Therefore, we want to highlight the importance of guidance the general public about how to deal with in infectious disease in the right way, in case of malaria not to leave windows open without a very small spaces wire. Also, to resist mosquitoes on a daily basis inside closed places and avoid swamps area.

We must not overlook that malaria is one of the most important diseases, since it's considered a global problem health. Many people overlook this problem. Therefore, we recommend that the media focus on it during Al-hajj or Umrah seasons in addition to focusing on the Covid-19 pandemic. Travelers, especially those going to places endemic by malaria, should learn about methods to protect themselves from it, and travelers to these affected areas are allocated a budget in which medicines that work to protect them from infection are dispensed and they are prohibited from traveling before taking these medicines, and intensive attention must be paid to health education for the public about malaria.

Conclusion:

Gender, age, and academic degree had an impact on people's orientation in the answers, the effect of gender on history of malaria infection, the availability of information about a malaria vaccine and its presence or not among the participants. As well as an impact on the participants ’interest in researching about endemic infectious diseases in areas to be visited. When addressing the methods used for personal protection, the effect of both the age and educational level of the participants on their orientation in choosing the answers. The main results in the extent of public knowledge of the Al-Madinah public through the transmission and prevention of malaria most had a good background about the malaria disease. However, the importance of knowing about endemic infectious diseases of countries before traveling to it was not understood from majority of participant. Distributing information regarding transmission and prevention on a regular and continuous basis, and conducting more researches that focuses on the knowledge weaknesses of societies can help in eliminating this worldwide problem.

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Email. zray@qu.edu.sa.

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