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A Cross-Sectional Survey of Knowledge Attitude and Prevention Practice towards Malaria among Basic Schools Pupils Prior to Health Education Campaign

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Abstract

Background: Malaria has historically been a major public health concern in Yemen, noted to be the country with the highest prevalence in the Eastern Mediterranean Region. As more and more children attend school, governments are increasingly recognizing the importance of child health for educational achievement. **Aim:** The aim is to assess the baseline knowledge, attitude and practice of pupil towards malaria before the health education activities. **Methods:** We conducted a cross-sectional study, in four randomly selected districts (rural and urban) of Taiz governorate. The study population was 1598 pupils in primary schools. Data was collected using questioner. **Results:** The pupils who recognized mosquito bite as a route of malaria transmission was 769 (48.1%), while the pupils who recognized fever as the main symptom were 786 (49.2%), 281 (17.58%) of pupils recognized convulsion as a complication of malaria. Regarding protective method 881 (55.31%) were mentioned the cover of the tanks as a protective method, about the BN 293 (18.3%) of pupils known about the BN and 280 (17.5%) mentioned children & pregnancy were the vulnerable groups to malaria. **Conclusions and Recommendation:** the percentage of knowledge of malaria knowledge and methods of prevention was low (24.5%). Also, the positive attitude and practice toward malaria was 45%. The rate of having bed-nets was very low (10.1%). There were misconceptions of malaria cause and transmission (48.1%). We recommend conducting health education activities that will focus on increasing the knowledge, attitude and practice levels of malaria among school pupils.

Keywords

School Children, Fever, Bed Net, Symptoms of Malaria, Complication of Malaria, Positive Attitude, Practice

1. Introduction

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable. In 2020, there were an estimated 241 million cases of malaria worldwide. The estimated number of malaria deaths stood at 627,000 in 2020. [1].

Malaria has been a scourge of humanity since antiquity and remains so today. Despite being preventable and treatable, malaria continues to have a devastating impact on people's health and livelihoods around the world in 2019, about 4 billion people were at risk of the disease in 87 countries [2] [3].

Over the past twenty years, the scale-up of malaria control efforts has led to marked reductions in morbidity and mortality. However, global progress has slowed in recent years, particularly in the WHO African Region, which accounted for 94% of the world's 229 million cases in 2019 [4] [5]. The world is now committed to an ambitious goal for malaria elimination by 2040-2050 using cost-effective participatory public health interventions [6] [7] [8] [9]. Malaria remains the major cause of disease and death in the world, especially among children and pregnant women [10] [11] [12] [13] [14]. Some population groups are at considerably higher risk of contracting malaria, and developing severe disease, than others. These include infants, children under 5 years of age, pregnant women and patients with HIV/AIDS, as well as non-immune migrants, mobile populations and travelers [1]. In Yemen, where is 60% of the total population living in malarious areas, the disease remains a significant health problem [14] [15] [16]. Malaria has historically been a major public health concern in Yemen, noted to be the country of highest prevalence in the Eastern Mediterranean Region [15]. Three *Plasmodium* species (*P. falciparum*, *P. vivax* and *P. malaria*) are reported in Yemen with *P. falciparum* being the predominant species [14] [17] [18]. As more and more children attend school, governments are increasingly recognizing the importance of child health for educational achievement [19] [20]. School-age children represent (25%) of Yemen's population and an increased proportion of these children are going to school, who could benefit from a systematic approach to school-based malaria control [21]. The study aimed to assess baseline knowledge, attitude and practice of pupil towards malaria before the health education activities.

2. Methods

We conducted a cross-sectional study, in four randomly selected districts (rural

and urban) of Taiz governorate, Yemen. The study was conducted in Feb. 2013. The study population was 2130 pupils of primary schools. The sample size was calculated using Epi Info. version 3.5.1 (August2008). According to the following criteria:

1) The population size of Taiz basic school children = 593,246 pupils [22].

2) The expected prevalence = 50% (since we don't have previous study that showed behavior change, so select 50% to give us maximum sample size.

3) The worst acceptable results = 3% (percent that we can accept the deviation of the study result (sample statistics) from population parameters.

4) Corresponds to the level of significance 95%.

Based on that, calculated sample size was found to be 1065 pupils.

A larger sample size is needed, because of the design effect. Since we will use (Urban-Rural), the design effect (DEFF) was estimated as 2. The including criteria are: 1) Pupils of 6, 7 and 8 grades, 2) Participant voluntary agreed to participate in the study. The excluding criteria are: 1) Pupils from other grades of the same schools, 2) Students from other than selected schools.

(*N.B*: *This is the first research* (*base line study*). *In the second research the sample sized was divided in to two group intervention group* (1065) *and non-intervention group* (1065). *The control group* (*non-intervention group*), *half of them* (533) *which had pre-intervention questioner*) *and the other half* (532) *we distributed to them a questionnaire post intervention only to avoid the effect of the questionnaire questions* (*reactive effect of instrument*) *we only took their demographic characteristic. So, the sample sized in this research was* 1065 + 533 = 1598). Specially designed Arabic questionnaire was prepared by principle investigator, the questions related to bed net was taken from previous study, that conducted in Yemen about BN [23]. The questionnaire includes demographic, knowledge, attitudes and practice data. The variables are: Demographic (age, sex). Knowledge about mode of malaria transmission, cause of disease, symptoms, complication of disease, prevention, information about bed net and sources of information. Attitude and practice (what are group you think are at high risk in malaria, is bed net prevent from malaria, do you think health education about malaria is important, sleeping under bed net, and washing of bed net). The questionnaire was validated by experts from Sana'a University and from the Ministry of Public Health & Population. The questionnaire includes demographic, knowledge, attitudes and practice data, the same questionnaire was used. One pilot study was conducted before implementation of the study in two schools urban and rural. Data collectors were trained to ensure the standardization of data collection. At the end of each day of data collection, the completed questionnaires were checked for errors, and completeness, the data was coded to be suited for computer feeding.

We used mean and standard deviation for continuous quantitative variables such as age, others categories of variables were presented in form of tables.

Interpretation:

Very good knowledge = correct answer for (75%) and above of questions.

Good knowledge = correct answer for questions (50% to 74%).

Poor knowledge = correct answer for questions (less than 50%).

We used 5 points Likert scales to measure the attitude (strongly agree, agree, uncertain, disagree and strongly disagree).

Informed consent was obtained from parents/caretakers along with the children's assets. Institutional approval was obtained from the Ministry of Education Office in Taiz Governorate, district education offices, and headmasters of targeted schools before the start of data collection.

3. Result

3.1. Characteristics of the Study Sample

Half of them are from urban and others are half from rural. Females were 1065 (50%), and males were 1065 (50%). Mean age of the included pupils was 12.9 ± 1.4 years. The mean income of pupils' families was 29000 ± 1300 Y. R. The illiteracy among fathers of pupils was 420 (19.7%), the majorities were basic level 885 (41.5%), and the illiteracy among mothers of pupils was 1288 (60.5%).

3.2. Mode of Transmission

It is obvious that proper knowledge of the route of malaria transmission can play an important role in its prevention. The pupils who recognized mosquito bite as a route of malaria transmission was 769 out of 1598 respondents (48.1%). Details are illustrated in Table 1.

Table 1. Route of malaria transmission as stated by pupils.

Mode of transmission	Total (n = 1598*)	
	Frequency	Percent
	No.	(%)
Mosquito bite	769	48.1
Eating dirty food	167	10.5
Drinking dirty water	144	9
Fly	174	10.8
Other	8	0.5
I don't know	336	21

*N.B: In the second stage of the research the sample sized was divided in to two group intervention group (1065) and non-intervention group (1065) and the control group (non-intervention group), half of the total control group (533) which had pre-intervention questioner. The other half (532) we distributed to them a questionnaire post intervention only to avoid the effect of the questionnaire questions (reactive effect of instrument) we only took their demographic characteristic. So, the sample sized in this research was 1065 + 533 = 1598.

3.3. Knowing Symptoms

Regarding malaria symptoms, out of 1598, 786 (49.2%) pupils recognized fever as the main symptom. Detailed description of pupils' knowledge about malaria symptoms are shown in Table 2.

Percent cannot be accumulated due to the possibility of mentioning more than one symptom from the same person.

3.4. Knowing Complication

Regarding malaria complication 811 (50.8%) out of 1598, recognized high fever as malaria complications. Details are illustrated in Table 3.

Percent cannot be accumulated due to the possibility of mentioning more than one complication from the same person.

Table 2. Knowledge of pupils about malaria symptoms.

Symptoms	Total (n = 1598)	
	No.	%
Fever	786	49.18%
Vomiting	300	18.77%
Sweating	233	13.95%
Shivering	264	16.52%
Headache	415	26%
Loss of appetite	406	25.40%
Bone pain	156	9.67%
Anemia	63	3.94%
Don't know	404	25.28%

Table 3. Knowledge of pupils about malaria complication.

Complication	Total (n = 1598)	
	No.	%
High fever	811	50.75%
Convulsion	281	17.58%
Coma	216	13.51%
Renal failure	67	4.19%
Cerebral malaria	415	25.96%
Low weight	192	12.01%
Abortion	181	11.23%
Don't know	499	31.22%

3.5. Knowing Method of Protection

Regarding the knowledge of pupils about malaria protective methods slightly more than half 884 (55.3%) mentioned cover of the water tanks, while only (6.2%) mentioned IRS, details are illustrated in Table 4.

Percent cannot be accumulated due to the possibility of mentioning more than one method from the same person.

Regarding the knowledge of pupils about the BN 293/1598 (18.3%) of pupils known about the BN, the main sources of information about BN were television & radio 106 (36.8%).

3.6. Knowing of Anti-Malarial Drugs

We asked pupils if they know anti-malarial drugs, only 4 out of 1598 were known about malaria drugs.

3.7. Attitude and Practice

Perception of vulnerable groups to malaria infection.

Regarding perception of pupils about vulnerable groups to malaria infection, 280/1598 (17.5%) mentioned children & pregnancy.

Perception towards an exposed to malaria this year.

Regarding perception of pupils towards exposure to malaria this year, almost 952 (60%) of the study population mentioned they don't know, while 106 out of 1598 (6.6%) mentioned, that they strongly agreed that they are at risk of getting malaria.

Perception towards the most important symptoms:

Regarding the perception toward fever as the most important symptoms of malaria 593 (37.1%) out of 1598 pupils strongly agreed.

Perception towards the importance of health education about malaria:

Table 4. Knowledge of pupils about malaria protection methods.

Protection	Total (n = 1598)	
	No.	%
Cover water tank	881	55.31%
Fill up pond	435	27.22%
Dealing water	387	24.21%
Using bed nets	622	38.92%
Using nets on window	584	36.54%
Indoor residual spray	105	6.57%
Repellent	263	16.45%
Don't know	302	18.89%

Regarding the perception towards the importance of health education about malaria 776 (48.6%) of pupils strongly agreed.

Perception towards usefulness of BN in malaria prevention.

Regarding the perception of pupils toward the importance of BN using in malaria prevention almost one third of the study population mentioned that they don't know, 396 (24.8%) of pupils were strongly agreed.

Perception toward usefulness of IRS in prevention of malaria.

Regarding the perception towards usefulness of IRS in prevention of malaria almost one third of the study population mentioned that, they don't know,416 (26.3%) of the pupils were strongly agreed.

Perception towards necessity of use of correct treatment.

Regarding of respondent to perception toward the usefulness of appropriate use treatment in prevention of malaria, around one fourth mentioned don't know, while 628 (39.2%) of pupils were strongly agreed.

Perception towards health seeking behavior.

Regarding the health seeking behavior, the vast majority of pupils 1315 out of 1598 mentioned that in case of having malaria they take medication from health workers/physician, this represent (82.3%).

Summary of the positive attitude of pupils towards malaria are illustrated in Table 5.

Table 5. The attitudes of pupils towards malaria.

Strongly believe that	Total (n = 1598)	
	No.	%
Exposed to malaria	106	6.63
Fever as a most important symptom	593	37.1
Important of health education	776	48. 6
Important of BN	396	24.8
Importance of IRS	416	26.3
Correct treatment of malaria	628	39.2
Source of taking medicine	1315	82.3

Although the number of the pupils that was known the importance of the BN in the prevention of malaria was 622(38.9 %), less than (10%) of pupils mentioned that they have bed net 194/1598(9.1%). Out of 194, only 5 pupils (2.6%) use BN every day, while others no, this means that the majority of pupils are at risk of getting malaria. We asked pupils if they know anti-malarial drugs, only 4 out of 1598 that they know, this represents only (0.4%).

4. Discussion

The knowledge of correct mode of transmission was (48.2%), we observed that

(51.9%) of pupils believed that drinking dirty water and eating dirty food cause malaria. This misconceptions among our study population was more than the misconceptions observed in previous studies conducted in India [24], Zimbabwe [25] and in Nigeria [26] where the misconceptions were (32.8%), (19.2%) and (42.7%) respectively. The percent of pupils who know that the fever is the most important symptom of malaria was (49.2%), and (18%) for headache, while in Nigeria the most obvious symptoms of malaria to the students when they fell ill due to malaria was fever (22.3%), while headache was (49.6%) [26]. The percent of knowledge in our study findings is less than the findings of a study conducted in Loags in Nigeria [27], Our results in this regard are much less than other study conducted in Uganda where the knowing of fever was (91.3%) [28]. More than one third of pupils in our study (37.4%) don't know any of malaria complications, while (17.6%) mentioned convulsion and (3.9%) mentioned anemia. The main source of BN information in our study was radio and TV (36%) of those who had heard about BN, while the schools represent only (0.7%) as a source of information. A study conducted in Nigeria obtained that (33.8%) had heard about BN over the radio, (22.5%) through the television, (11%) had heard about malaria from their teachers [29]. While in Tanzania the sources of information about malaria and its control were mainly from their teachers (47.4%) [30]. Our findings regarding the school as a source of bed net information is noticeably less than finding of studies conducted in Nigeria (47%) [29], India (26.7%) [24] and in Tanzania (47.3%) [30]. in our study revealed that (48.6%) agreed that health education was useful in malaria prevention, this was less than a study conducted in India that obtained (76.5%) of the respondents affirmed that health education is the best way to promote the prevention of malaria [31]. Factors such as vulnerability, economic constraints, inadequacy or unavailability of appropriate health services, and other related factors play an important role in explaining health seeking behavior of the people [26]. Personal protection is widely used and accepted to prevent mosquito bites [29]. We observed that, (55.3%), (4.9%), (29.2%) and (12.3%) of pupils mentioned the cover of the water tank, IRS, BN and used repellent were a protective method respectively. This result was similar to a result in the MIS (Malaria Indicator Survey in 2009) in Yemen, where one third of respondents (34.2%) identified sleeping under the bed net as a malaria preventive method and (9.5%) for used repellent. Our result was also similar to the study conducted in Tanzania [30], which obtained the knowledge of malaria preventive methods was varied among districts ranging from (19.4%) to (93%) to residual house spraying, and low (0.2%) to (22.7%), (8.1%) to (24.5%) to mosquito nets and repellents, respectively. Regarding usage of BN as personal protection, in our study only (12.3%) identified sleeping under the bed net as a malaria preventive method, this was less than studies conducted in Nigeria that showed (70.5%) of the respondents were aware that insecticide-treated nets kills mosquitoes [29]. Study conducted in Tanzania revealed that availability of mosquito nets was relatively high (70%), but only (38%) of the pupils were using insecticide treated nets [30]. And study conducted in Ghana,

where were the most children under five years of age have yet to be protected by ITNs [20], revealed that (96.3%) believe that the BN are effective, another studies conducted in Ghana [32], and Nigeria [33], showed that (32.7%), (54.7%) of the respondents that owned ITN respectively did not use them. The schoolchildren who answered correctly more than 12 of the 23 knowledge questions were (4.9%) while it was (10.7%) in China [34]. Regarding to the perception of pupils toward importance of BN in prevention of malaria, (24.8%) of pupils were strongly agreed, while in Ghana (96.3%) believed that BN are effective [20]. In our study the positive attitude toward the seeking medical care was (40.2%). This is less percentage than the study in China conducted that obtained (78 %) of the respondents were had the positive attitude toward seeking medical care [34]. Our study revealed that availability of mosquito nets was relatively low less than 10%, It was less than the findings of MIS Yemen 2009, which showed that the percentage of households who own at least one BN was (15%). May be this is due to limited study area of our study (Taize).

5. Limitation of Study

School pupils must have time for health activities due to activities that are not based on the curricula increased teachers work load.

6. Conclusion and Recommendation

The percentage of malaria knowledge and methods of prevention was low (24.5%). Also, the positive attitude and practice of malaria prevention was 45%. The rate of having bed-nets was very low (10.1%). There are still misconceptions of malaria cause and transmission (48.1%). There is a need for the conduct of health education activities that will focus on increasing the knowledge, attitude and practice levels of malaria among school pupils. Shifting the perceptions and attitude of schoolchildren in a positive mode will improve the best methods towards malaria prevention between school pupils and reflects that to the community on the whole.

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Informed consent was obtained from each pupil enrolled in the study.

Approval was obtained from the health office authority and education office in each district in Taiz governorate.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

A questionnaire on the impact of health education of malaria disease on the knowledge and behavior of school students in Taiz governorate

Dear student, put a mark (√) or (x) on the phrase you deem appropriate.

Date:

Serial number:

District:

Al-Qahera ☐ Sala ☐ Ataazya ☐ Ashamayatean ☐

First: the demographic characteristics

1) Age in years:

2) Sex:

Male ☐ Female ☐

3) The educational level of the student) class): ☐ 6 ☐ 7 ☐ 8

4) The educational level of father:

Illiterate ☐ Basic ☐ High school ☐ University ☐

5) The educational level of mother:

Illiterate ☐ Basic ☐ High school ☐ University ☐

6) Average household income per month:

10,000 - 19,000 ☐ 20,000 - 29,000 ☐

30,000 - 39,000 ☐ 40,000 and more ☐

The profession of the head of the family:

Farmer ☐ Employee ☐ Retired ☐ Other: mention ☐

Second: Knowledge:

1) Malaria is transmitted to humans by: -

Flies ☐ Eating contaminated food ☐ Mosquitoes bite ☐

Other: mention ☐ Don't know ☐

2) What are the symptoms of malaria? (More than one answer can be chosen)?

Fever ☐ Vomiting ☐ sweating ☐ headache ☐ anemia ☐

Joint pain ☐ Loss of appetite ☐ Shivering ☐

Other: mention ☐ Don't know ☐

3) Malaria complications are (more than one answer can be chosen

High fever ☐ Spasm ☐ Coma ☐ Cerebral malaria ☐ abortion ☐

Kidney failure ☐ The birth of low-weight baby ☐ Other: mention ☐

All of above ☐ Don't know ☐

4) How can we protect ourselves from malaria (more than one answer can be chosen)?

Covering tanks ☐ Backfilling ponds ☐ Draining stagnant water ☐

Making nets on windows ☐ Using impregnated nets with insecticide ☐

Spraying with residual pesticide ☐ using repellent ☐

Don't know ☐ Other (mention) ☐

5) Do you have information about the impregnated bed nets?

Yes ☐ No ☐

If no, go to Question 7

6) If the answer is yes to the previous question, then what is the source of this information (more than one answer can be chosen)?

Mosquito nets distribution team ☐ Television ☐

Imam of the mosques ☐ Radio ☐ The health office/health facilities ☐

Schools ☐ newspapers ☐ poster and leaflet ☐

7) Do you know anything about the treatment of malaria?

Yes ☐ No ☐

8) If yes, mention some of the treatments used

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Third: Attitudes, beliefs and behavior:

1) Who are the most vulnerable groups to severe malaria (more than one answer can be chosen)?

Adult ☐ children ☐ elderly ☐ pregnant women ☐

Other: mention ☐ Don't know ☐

2) Do you think you are at risk of malaria this year?

Agree ☐ Strongly agree ☐ Disagree ☐ Strongly disagree ☐

Don't know ☐

3) Do you think the most important symptom of malaria is fever?

Agree ☐ Strongly agree ☐ Disagree ☐ Strongly disagree ☐

Don't know ☐

4) From your point of view, is awareness of malaria useful?

Agree ☐ Strongly agree ☐ Disagree ☐ Strongly disagree ☐

Don't know ☐

5) Do you belief that the insecticide-impregnated bed nets protect from malaria?

Agree ☐ Strongly agree ☐ Disagree ☐ Strongly disagree ☐

Don't know ☐

6) Do you belief that the spraying with residual pesticide protects from malaria infection?

Agree ☐ Strongly agree ☐ Disagree ☐ Strongly disagree ☐

Don't know ☐

7) Do you belief that taking malaria treatment immediately after diagnosis and in a correct way can protects from malaria complications?

Agree ☐ Strongly agree ☐ Disagree ☐ Strongly disagree ☐

Don't know ☐

8) If you get infected with malaria, where do you take the treatment of malaria?

From the pharmacy ☐ From doctor or near health center ☐

From home without a prescription ☐ Traditional healer ☐ others ☐

9) Do you have a mosquito net at home (in the absence of a net, do not complete the questionnaire)

Yes ☐ No ☐

10) Does anyone sleep under the net?

Yes ☐ No ☐

11) How many people usually sleep under a net?

2 ☐ 3 ☐ 4 ☐ 5 ☐

12) What is the time to use the mosquito nets?

After sunset ☐ After Isha'a prayer ☐ After 10 O'clock ☐

Other: mention ☐

13) Who usually sleeps under a mosquito net?

Head of family ☐ Mothers ☐ Pregnant women ☐

Children less than 5 years ☐ Any one ☐

14) Did the pregnant woman sleep under the bed net last night?

Yes ☐ NO ☐ Not applicable (no pregnant woman) ☐

15) Did children under five years of age sleep under the bed net last night?

Yes ☐ NO ☐ Not applicable (no children under 5 years) ☐

16) Is it a habit in this home for people to sleep under an impregnated net?

Yes ☐ NO ☐

17) If the answer is "yes" to Question 16, why?

Protect from mosquitoes ☐

Protect from the harm of flies and other insects ☐

Other: mention ☐ Don't know ☐

18) If the answer is "NO" to Question 16, why?

NO mosquitoes and other insects ☐ Need fixation ☐

Chemicals cause allergies and diseases for pregnant women and children ☐

Other: mention ☐ Don't know ☐

19) What is the season for using mosquito nets in a year?

Summer ☐ Winter ☐ Other: mention ☐

20) Where the nets are placed after use? (Can choose more than one answer)?

The cupboard ☐ Hangs over the crib ☐

Other: mention ☐ Don't know ☐

21) How to protect impregnated net from damage (more than one answer can be chosen).

Keep away from children ☐ Keep away from fire ☐

Keep out of the sun ☐ Other: mention ☐

22) What do you do if the mosquito nets are torn?

Leave it as it ☐ Sew it ☐ Don't know ☐

23) How many times have you washed the impregnated nets?

Never ☐ One to two times ☐ Three to five times ☐

When becoming dirty ☐ Don't know ☐

Other notes:

Data Collector:

Supervisor: