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Early Detection of Infectious Diseases among the Refugees of UNHCR in South Tangerang, Banten; the Problems and Strategies to Prevent the Disease's Transmission

Silvia Fitrina Nasution [1*], Hoirun Nisa[2]

[1]Faculty of Medicine, UIN Syarif Hidayatullah Jakarta
[2]Faculty of Health Sciences, UIN Syarif Hidayatullah Jakarta

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*) Corresponding author:
E-mail: silvia.nasution@gmail.com

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Abstract

The previous study at Puskesmas Pisangan, Ciputat had reported that 23.8% of patients of the UNHCR was infected by malaria *Plasmodium vivax*, and one patient with bacterial urinary infection. However, the result cannot represent the actual case of the disease, because of the lack number of participant to visit the Puskesmas since the Covid-19 pandemic which had been contributing to decrease number of the patients**.** The study purposed to improve data and information about parasitic infection, and to design strategy in early detection and prevention to the disease. Design of the study was approached in cross-sectional with a total sampling method of the UNHCR out patients visiting the Puskesmas Pisangan and Cirendeu. We collected specimen of feces, urine, and blood, and performed blood diff-count, rapid diagnostic, microscopic, dipstick, and bacterial culture. The study revealed some parasitic and bacterial infections as defined: five cases (17.24%) of malaria, which is suspected as imported cases; *Enterobacteriacea* family as non-specific bacteria of negative gram in urine; also *Entamoeba coli* in stool. This finding was also confirmed 17.24% of leucocytosis in differential blood count and 24.14% in urinalysis. By nationality, Sudanese was detected the most prevalent 10.34% of parasitic infections, followed by Somalian (6.9%), Yemeni (3.45%), and Afghan (3.45%) respectively. Mosquitoes and poor living conditions also contributed as the major potential risk of transmission to the diseases. In conclusion, early detection, health screening, vaccination, access to primary, and upgraded levels of healthcare are important for diseases control and management to prevent the transmission.

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INTRODUCTION

The United Nations High Commissioner for Refugees (UNHCR) in Indonesia has reported about 13,416 persons registered with UNHCR in Indonesia, 73% adult and 27% children. By April – June 2021, UNHCR reported that most of the refugees coming to Indonesia were from Afganistan (55%), Somalia (10%), Myanmar (5%), Sudan (3.8%), Iraq (0.05%), and other countries (19.5%).[1] In June 2021, the study at Puskesmas Pisangan on Ciputat, South Tangerang District reported some cases of parasitic infection in the refugees detained at the study area. Malaria and bacterial urinary infection were evidently detected as the major cases within the refugees.[2]

Several studies have reported that the origin of country of the refugees seemed to correlate with parasite infection burden within the refugees. For example, pathogenic intestinal parasites were found in 40.6% of the 956 African asylum seekers coming from areas south and east of the Sahara, and helminthiasis infections Strongyloidosis and Schistosomiasis were identified in 15% of patients from Africa.[3] Malaria and other intestinal parasites are widely prevalent in developing countries such as Indonesia, due to poor sanitation, inadequate personal hygiene, etc. This disparate case distribution is probably due to a complex combination of factors related to exposure infection, such as environmental and host behavior, and factors related the host's ability to resist infection, such as the genetic constitution and immune responsiveness (cited in Martin and Mak, 2006).[4]

The study purposed to give a broad overview and raise concern about the infectious diseases in the refugee and asylum seeker populations in the present time. Many areas in Indonesia, including South Tangerang District as the area of study, have for many years been resettled for the UNHCR refugees. However, the availability of evidence of demographic data and health status of the refugee and their life condition in this area is little reported.

On the other hand, several reports are published on health problems and access to healthcare for the UNHCR refugees around the world. Many aspects were identified to hamper the problems such as legality status of the refugee, barrier of language and communication, physical disability, poverty, etc. Yet, the available evidence on health problems among asylum seekers and refugees is limited in general with the best documentation on infectious diseases, mental illness, maternity health and almost non-existing for chronic diseases and childhood illnesses.[5]

Poor data and information about health status in the refugee in Indonesia may also be an obstacle as well as needing to initiate a better understanding about the possibility of disease transmission among the refugees and their local community. The risk of transmission to the autochthonous population is very low, though outbreaks in the refugee population should be considered due to poor living conditions and suboptimal vaccination, not least among children. Even though we see high transmission in the refugee populations, there is very little risk of spread to the autochthonous population.[6]

This study explores the potential transmission factors of parasitic diseases among the refugees and their local community. Screening may serve to avoid potential infectious disease risks in the receiving countries as well as to identify health needs of asylum seekers. It may create a two way moral obligation, upon asylum seekers to actively participate in the program, and upon authorities to reciprocate

the asylum seekers' participation and the benefits for the control of public health.[7]

Through this study, we follow up the previous data and extend the area of study in order to find more cases of infectious diseases within the refugees. It is also expected to get more information about some aspects as causative agents and routes of transmission of the diseases. The finding result should be a clear benefit to provide data and information for the local health takers to plan the strategy of health program in early detection, prevention, and treatment to eliminate disease transmission.

MATERIAL AND METHOD

Materials

We utilized some materials to conduct assays and tools for collecting samples. To proceed microbiological procedures, we used media produced by MERCK such as : MacConkey Agar by MERCK KGaA Germany #1.05465.0500 for cultivating Enterobacteriacea colonies; SS Agar by MERCK KgaA Germany #1.07667.0500 for Salmonella-Shigella culture; and Nutrient agar by MERCK KgaA Germany #1.05450.0500. In running the urine test, we used dipstick urinalysis reagent strips by ACON Biotech, Hangzhou, P.R.China. For malaria, we utilized combo rapid test by Zhejiang Orient Gene Biotech Co. LTD, China, which has four indicators of control, Pan malaria, *Plasmodium vivax*, and *Plasmodium falciparum*, then we proceeded malarial stain by giemsa product by MERCK KgaA Germany #1.09261.1000.

Design of the Study

Design of the study was cross-sectional, with total sampling of all UNHCR patients visiting the Puskesmas Pisangan and Cirendeu at Ciputat area. They were priorly examined by clinician for their current and previous historical medical status. All the subjects were required to give agreement to participate in the study by signing the informed consent. They were also required to fulfill a questionnaire in Bahasa, English, and Arabic, which was provided by the researcher. We also collected stool, blood, and urine specimens from the subjects.

Subjects of the study were selected by the inclusion and exclusion criteria of the specimen. The inclusion criteria accommodated the attendance of all the UNHCR/IOM refugees visiting the puskesmas during the study. They were also required to collect specimens of urine, blood, and feces, and complete the questionnaire to attach with the specimen. Those with Covid-19 and/or other suspected infectious diseases who isolated at home-based care, were also considered in this criteria. Meanwhile, those with incomplete questionnaire and specimen were excluded.

Sample Collection

For each patient, we collected blood and urine during their visit to the Puskesmas while the feces were collected at home and returned to the laboratory on the next day. Each specimen was aliquoted to perform different tests and to double check the result. For the urinalysis and routine differential blood count these were documented at the Puskesmas laboratory. while parasitology tests in blood, feces, and urine were performed and analyzed at the laboratory of Parasitology in UIN Syarif Hidayatullah.

Several tests were approached to determine the pathogen in the specimens, such for the intestinal parasite through a stool microscopic; for the blood parasite by utilizing microscopic and rapid test; and for urine samples, we conducted rapid analysis by dipstick reagent strips, and

cultivation procedures to detect bacterial urinary infections in media cultures.

Methods

Malaria Procedure

Laboratory procedure for malaria detection was performed by thick and thin smear. It should be considered before performing smear that blood collected with the use of EDTA anticoagulant is acceptable; however, if the blood remains in the tube for any length of time, true stippling may not be visible within the infected RBCs (*Plasmodium vivax*, as an example). Also, when using anticoagulants, it is important to remember that the proper ratio between blood and anticoagulant is necessary for good organism morphology. Heparin can also be used, but EDTA is preferred. Finger stick blood is recommended, particularly when the volume of blood required is minimal (i.e., when no other hematologic procedures have been ordered). The blood should be free flowing when taken for smear preparation and should not be contaminated with alcohol used to clean the finger prior to the stick.[8]

Thick smears consist of a thick layer of dehemoglobinized (lysed) red blood cells (RBCs). The blood elements (including parasites, if any) are more concentrated (app. 30×) than in an equal area of a thin smear. Thick smears should not be fixed with methanol or heat. If there is a delay in staining smears, the thick smear should be briefly dipped in water to hemolyse the RBCs. Thus, thick smears allow a more efficient detection of parasites (increased sensitivity). However, they do not permit an optimal review of parasite morphology. For example, they are often not adequate for species identification of malaria parasites: if the thick smear is positive for malaria parasites, the thin smear should be used for species identification (Figure 1).[9]

Thin smears consist of blood spread in a layer such that the thickness decreases progressively toward the feathered edge. The smears are fixed by dipping them in absolute methanol and drying in open air. The smears allows an adequate identification of malaria species (higher specificity).[9]

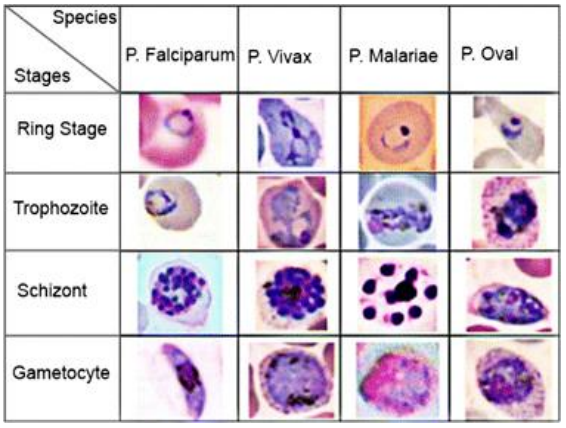

Figure 1. Morphology stages of Plasmodium species.[8,9]

Dipstick Principle, Procedure and Interpretation

The principle of dipstick urinalysis is to detect substances or cellular material in the urine associated with metabolic disorders, renal dysfunction or urinary tract infections (UTI). A totally negative dipstick test is associated with negative microscopy in 90-95% of cases (false negative rate 5-10%). Several indicators of urinary function are measured by color changes on the dipstick chart. The color changes determine the titer of components in urine such nitrate, leucocyte, protein, glucose, bilirubin, hemoglobin, ketone, and pH.[10,11]

The procedure requires diluting the dipstick for three seconds and ensuring that the urine spreads all over it. The color changes on the dipstick urinalysis chart at different time indicators are then interpreted, as shown on the chart (Figure 2).

Bacterial Cultures, Principle, Procedure and Interpretation

We continued to cultivate the urine samples by utilizing three media of cultures by MacConkey Agar (MCA), Nutrient agar

(NA), and *Salmonella-Shigella* agar (SSA). If one of the cultures showed negative result, then we continued to run the other two cultures to isolate *Enterobacteriaceae* colonies.

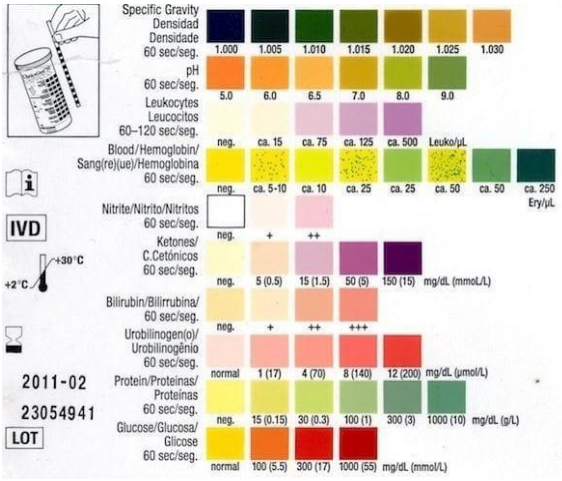

Figure 2. Dipstick urinalysis chart[11]

The principle of MCA is used for the isolation of Gram-negative enteric bacteria and the differentiation of lactose fermenting from lactose non-fermenting gram-negative bacteria. MCA is particularly recommended for the cultivation of pathogens which may be present in a variety of specimens such as urine, feces and wound swabs.[12]

We conducted the procedure of MCA as follows: Preparation of MacConkey Agar: 1. Measure 10.3 grams of MCA (MacConkey agar oxoid 51.5 gr/1 L); 2. Mix with distilled water to make 200 ml; 3. Heat the mixture on a hot plate stirrer until cooked; 4. Transfer the mixture to an Erlenmeyer flask and seal it tightly; 5. Pour about 20 ml into a petri dish near a Bunsen flame in a laminar airflow; 6. Store the prepared media in a cool, dry place, such as a refrigerator.

Cultivate bacteria on MCA Media for Urine Culture: 1. Prepare MacConkey agar media in a petri dish; 2. Dip the flared dose into urine then stroke it into MacConkey Agar media; 3. Incubate the media in an incubator at 37ºC for 24 hours, and observe for any microbial growth.

Result interpretation on MCA is indicated positive by red or pink and may be surrounded by a zone of acid precipitated bile for lactose fermenting strains growth such as *Escherichia coli* (Figure 3).[12]

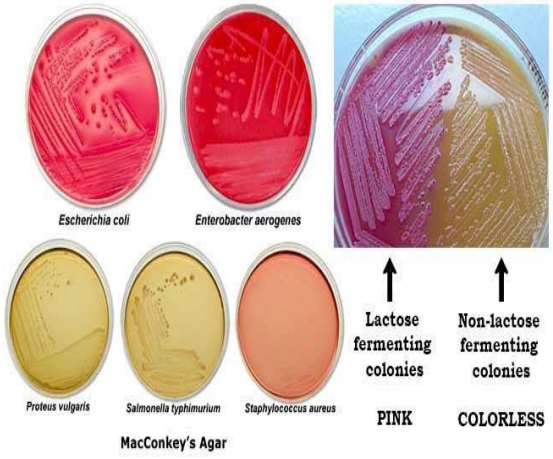

Figure 3. Bacterial colonies on MacConkey agar.[12,13]

We continued to select the bacterial colonies to cultivate in the Nutrient agar (NA). Preparation of NA: 1.Weigh 4 grams of Merck NA media designed for 1 liter of solution; 2. Suspend the weighed media in distilled water, and make the final volume up to 200 ml; 3. Heat this suspension on a hot plate stirrer until it is fully cooked; 4. Transfer the cooked solution into an Erlenmeyer flask and tighten the lid; 5. Pour approximately 20 ml of solution onto a petri dish near a Bunsen flame in laminar airflow; 6. Store in a cool and dry place (in the refrigerator).

Cultivation of Microorganisms from Urine in NA: 1. Prepare a petri dish of Nutrient agar media; 2.Dip an incandescent loop into the urine sample and then streak it onto the NA at 37°C for 24 hours; 4.Observe the media for any signs of microorganism growth.

To confirm selected growth colony on NA, we continued the procedure on *Salmonella-Shigella* Agar (SSA) as follows. Preparation of SSA: 1. Weigh 12 gram of SSA media (SSA Merck 60 gr/ 1 L); 2. Add distilled water

to the media and make the final volume 200 ml; 3. Heat the mixture on a hot plate stirrer until it becomes cooked; 4. Transfer the mixture to an Erlenmeyer flask and close it tightly; 5. Pour about 20 ml of the mixture into a petri dish near a Bunsen flame in laminar airflow; 6. Store the petri dishes in a cool and dry place (in the refrigerator).

Cultivation of Microorganisms from Urine in SSA: 1. Prepare the SSA media by pouring it into a petri dish; 2. Dip a flared tube into the urine sample and then gently stroke it onto the surface of the agar media; 3. Place the petri dish in an incubator and incubate it at 37°C for 24 hours; 4. After 24 hours, observe the petri dish to check for the growth of microorganisms. The results are shown in Figure 4.

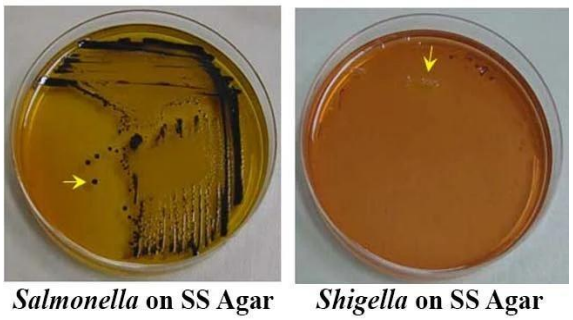

Figure 4. Different color of colonies *growth* on SSA[12,13]

These three types of media should be proceeded to the next confirmative test by Triple sugar iron agar (TSIA) as a selective and differential medium to differentiate bacteria, especially of the *Enterobacteriaceae* family. The TSIA test is a biochemical test used to differentiate bacteria based on their ability to ferment these three sugars and release acid and hydrogen sulfide gas.[13]

We did not conduct the TSIA test since the samples no longer existed and no media was available when we had the colonies on SSA and NA media.

Data Management and Analysis

Data management and analysis were considered to quantitive description for subject's characteristic, parasitic infection, health record, and transmission-related factors. Comparative studies were analyzed by means to find infectious samples of parasite by microscopic, rapid test result, dipstick, and bacterial culture.

RESULTS AND DISCUSSION

We interviewed and collected samples from 50 participants of the UNHCR patients visiting the Puskesmas Pisangan and Cirendeu in Ciputat sub-district. The finding described in the following tables.

Characteristic of the subjects

Several aspects were included to describe the characteristics of subject in the study. We also combined data from the previous and recent study as follows Table 1.

By Table 1, we found that most prevalent of our subjects were men aged between 18-55 years old, and by the nationality was 26% from Somalia. It was also reported by medical records that the most frequent diseases were diarrhea, helminthiasis, and hepatitis. We cannot define and trace the medical history of the diseases as there is no evidence base of infectious diseases in refugees to trace from medical records. This may also be an obstacle to a better understanding about the possibility of disease transmission among the refugees and their local community. We also found that the environmental and personal behavioral of hygiene apparently contributed as disease transmission among the community. The risk factor to diseases transmission was identified by mosquito (80%), rats, pets, and other insect disturbance.

Table 1. Characteristics of Subject

No	POINT OF SUBJECT	QUANTITY
A	Gender	
	1) Female	22/50 (44%)
	2) Male	28/50 (46%)
B	Age	
	1) Children (1 – 17 yo)	17/50 (34%)
	2) Adult (18 – 55 yo)	33/50 (66%)
	3) Elderly (> 55 yo)	0
C	Nationality	
	1) Somalian	13/50 (26%)
	2) Yemeni	7/50 (14 %)
	3) Sudanese	5/50 (10%)
	4) Afghan	7/50 (14%)
	5) Ethiopian	3/50 (6%)
	6) Pakistani	2/29 (6,89%)
	7) Iraqi	1/50 (2%)
	8) Others	12/50 (24%)
D	Medical Record :	
	1) Diarrhea during the last 3 months	5%
	2) Diarrhea with fever	5%
	3) Drug treatment of anthelmintic	5%
	4) Hepatitis	5%
E	Vaccination :	
	1) Hepatitis A/B	5%
	2) Malaria	5%
	3) Covid-19	60%
	4) Tuberculosis (TB)	5%
F	Environmental and Personal Behavioral of Hygiene	
	1). Availability of clean water resource	70%
	2). Availability of proper toilet	80%
	3). In house mosquito nuisance	80%
	4). In house rat disturbance	5%
	5). In house pet (dog/cat)	5%
	6). In and outside fogging	15%

Even though, they reported that the puskesmas were frequently fogging the area to respond to the dengue program and vector control, nevertheless, this program was not supported by the community hygiene behavior, as we observed as to their living area such as one small room was occupied by more than 3-5 family members, hanging clothes around the house, messy trash, in house pets, etc.

The risk indicators associated with these animals are assumed communicable infectious diseases, particularly those caused by zoonotic and neglected parasites (including protista, helminths, and arthropod), and represent a major and long-term burden in disadvantaged communities; many of these pathogens are carried by animals, such as dogs and cats, and include fleas (and the pathogens they transmit) and soil-transmitted helminthes.[14] The risk of transmission from these pathogens is a real threat in this area of study.

The refugees in this area have been living in a low standard of healthcare and daily primary needs. They are no longer financially supported nor entitled for health insurance by the district health takers in accordance to have free access of health service.[2] This situation has been worsening during the current Covid-19 pandemic. It is critical for the UNHCR Indonesia to receive sustained funding to be able to deliver protection and complementary solutions to the persons of concern as the pandemic continues to pose challenges to the already limited resettlement opportunities. The resettlement conditions are just some of the important factors that may influence the health of migrants.[1]

Another issue that may threaten refugee' health condition is the declined immunization rates in countries of origin of migrants and refugees. Our data described that only 5% of refugees have been administered hepatitis A/B, malaria, and tuberculosis vaccinations from their country. During the Covid-19 pandemic, 60% of them had been vaccinated for

Covid-19 by the local health center in their recent living at Ciputat.

Several studies highlighted that migrants and refugees have lower immunization rates compared to European-born individuals. Firstly, this is due to low vaccination coverage in the country of origin. Then, several problems may limit migrants' access to vaccination such as: information on the immunization status of migrants is often lacking; migrants often refuse registration with medical authorities for fear of legal consequences; and the lack of coordination among public health authorities of neighboring countries may determine either duplications or lack of vaccine administration. Possible strategies to overcome these problems include tailoring immunization services on the specific needs of the target population, developing vaccination registers, and promoting collaboration among public health authorities.[15]

Vaccination programs for children of the refugees is also one of the main concerns in this study. Children who are either refugees themselves or have parents who are refugees often lack routine vaccinations, either because of their parents' unawareness of the vaccination programs or because of unwillingness to participate.[16]

All refugees were informed that they could opt-out of sharing their vaccination history or having their children vaccinated. Some information records are included: a list of all the children 0–14 years of age hosted at each camp and their demographic characteristics (age, sex, and nationality), any vaccines that a child had already received, and if a child had never been vaccinated or whose vaccination status was unknown.[17,18]

Result of Sample Procedures

We conducted assays for three types of samples to identify parasitic infection in our subjects. We ran the test for urine sample by dipstick urinalysis, bacterial culture; rapid test and microscopic examination for blood and stool stain while differential blood count was performed at the laboratory of Puskesmas Pisangan and Cirendeu, Ciputat, South Tangerang district. The results are described in Table 2.

Table 2. Result of Specimen Assays

No	Type of Parasite Infection	Quantity
A	Gastro intestinal infection	
	1. Helminthiasis	0
	2. Amebiasis : *Entamoeba coli*	1/50 (2%)
B	Urinary Tract Infection (Bacterial Culture):	
	1. Unspecified bacterial of negative gram (*Enterobacteriaceae*)	2/50 (4%)
C	Malaria	
	1.Plasmodium ovale	2/50 (4%)
	2.Plasmodium vivax	3/50 (6%)
	3.Plasmodium malariae	1/50 (2%)
D	Blood diffcount	
	1. Limphocytosis	2/50 (4%)
	2. Thrombocytopenia	2/50 (4%)
	3. Leucocytosis	6/50 (12%)
	4. Anemia	1/50 (2%)
E	Urinalysis	
	1. Leucocytosis	7/50 (14%)
	2. Protein ++ with excretion of 100 mg/dl (1.0)	1/50 (2%)

Result of Stool Samples

In stool samples, we found cyst of *Entamoeba coli* in one patient of child age, a 6-year-old from Afghanistan. The characteristic of sample showed normal consistency, yellowish color, and no watery or mucus in the stool. Hence, the *Entamoeba coli* was known as a normal habitant in gastrointestinal, and people who get infected

by this parasite are usually asymptomatic. The results of urinalysis and blood test of this patient were also negative for other parasites.

Several epidemiological data were reported on the prevalence of intestinal parasitic infections among refugees from Palestine, Syria, Iraq, Turkey, and other African refugees. In the Asylum Seekers Centre of Castelnuovo di Porto (one of the largest centers in Italy), 300 migrant newcomers from sub-Saharan Africa, were screened upon their arrival for protozoa and helminth eggs from March to May 2017. The results of stool analysis showed a prevalence of intestinal parasitic infections of 20.12% in migrants from West Africa and 23.40% in those from East Africa, with no statistically significant differences.[19] Nevertheless, in our study we had no evidence of any helminth infection in the stool samples of our subjects based on these origin countries. This result might be correlated by the elimination program of helminthiasis by the puskesmas in these areas which is periodically conducted every six months.

Result of Urine Samples

Dipstick urinalysis has resulted that 14% or seven subjects showed an increased titer of leucocyte (Leucocytosis) and one subject with proteinura. This result was correlated to urinary infection by bacterial. We continued the urine assay by culture media.

We detected growth colonies on MCA as well as on NA and SSA media. The subject was a 5-year-old boy from Sudan. The physical examination and urinalysis of the sample, showed normal result as well.

Another subject was detected unspecified Gram-negative of bacteria on the NA and SSA. This subject was a female aged 22 and originally from Somalia. The differential blood count had increased value of leucocyte 10.000/µL, and dipstick urinalysis showed 125 mg/dl (++) of leucocyte, protein 15(0.15)±, and urine pH 6. These two results of blood and urine were related and confirmed by the bacterial culture of *Enterobacteriaceae*.

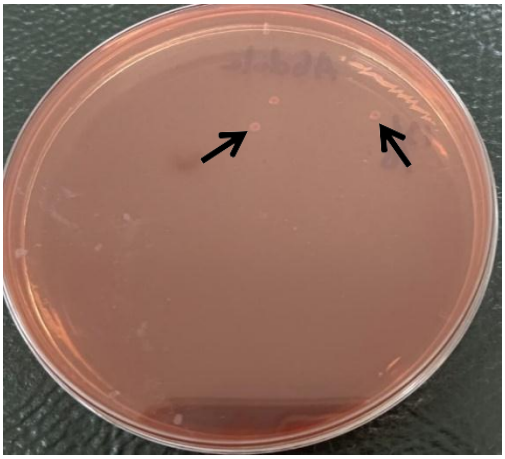

Figure 5. Bacteria growth colonies of *Enterobacteriaceae* on MacConkey Agar

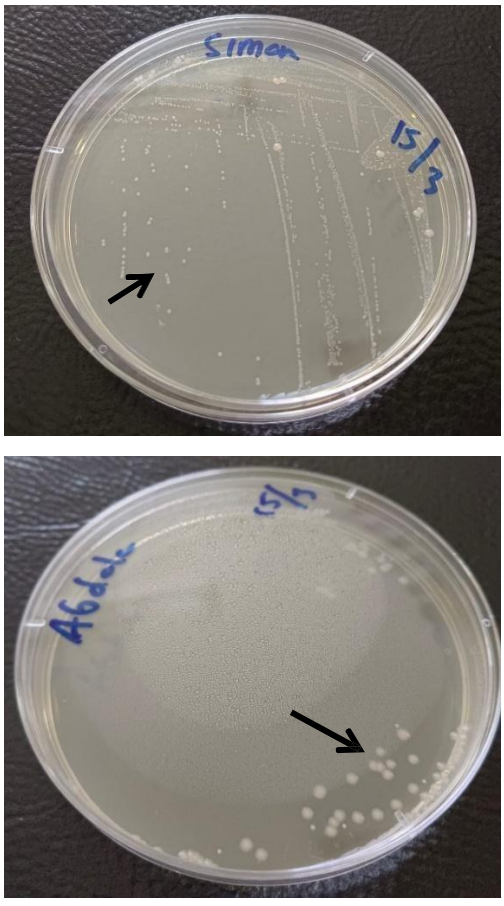

Figure 6. Bacteria growth colonies of *Enterobacteriaceae* on Nutrient Agar

These results should be confirmed by TSIA or SIM selective microbiology tests to identify species of the bacteria. But we didn't continue the test due to limited time and materials.

Result of Blood Samples

The number of people with suspected malaria confirmed by either microscopy or RDT should include both outpatient and inpatient cases. The number should include cases detected passively (attending health facilities or seen by community health workers) or actively (sought in the community); it is often useful to provide a breakdown of cases detected passively and actively. Regardless of transmission setting, any person with a positive result in a parasite-based test (microscopy or RDT), irrespective of clinical symptoms, should be considered to have a (confirmed) case of malaria.[20]

The finding of this study by microscopic blood stain showed five people with nationality from Sudan, Somalia, and Yemen, respectively, were infected by malaria; three people were infected by *Plasmodium vivax*, one with *P. malariae*, and the two others with *P. ovale*. These three species of Plasmodium were not endemic diseases nor vector transmitter inhabitants in the area of study. We suspect the infection was imported cases from their country or other previous journey from endemic areas, but no statement was declared in the medical record or questionnaire. We reported and sent the specimen to double check to the district laboratory, and recommended for the subjects to have antimalarial treatment. The treatment will prevent the subject from chronic and recurrent symptoms.

The risk for vector-borne diseases, such as malaria is very limited to non-existing in the Middle East and North African countries, but should be considered for persons originating from sub-Saharan African countries or Asia (India, Pakistan). In a range of studies, recent immigrants accounted for between 5% and 35% of reported malaria cases. Malaria in recent immigrants is often asymptomatic; the parasites may persist for up to 28 months after arrival. Vulnerable groups include pregnant women and children. In children, malaria can be easily confused with common childhood illnesses, particularly vomiting and fever, which may delay the correct diagnosis.[21]

Meanwhile, the differential blood count resulted that 12% of the samples were leucocytosis, as well as 14% of urinalysis results. This result related to the occurrence of bacterial, Plasmodium, and intestinal protozoa in the samples. Additionally, one subject was detected with a higher value of protein ++ in the urine that was suspected to associate with a certain chronic disease. We recommend the patients to be followed up to confirm the result at the higher level of the health center.

Several factors have been reported as causative agents and routes of transmission of the disease, e.g.: environmental and host behavior and factors related to the host's ability to resist infection, such as the genetic constitution and immune responsiveness. Intestinal parasites are widely prevalent in developing countries due to poor sanitation, and inadequate personal hygiene.[6]

The risk of transmission to the autochthonous population is very low, though outbreaks in the refugee population should be considered due to poor living conditions and suboptimal vaccination, not least among children. Even though we see high transmission in the refugee populations, there is very little risk of spread to the autochthonous population.[7]

Problems and Strategies

We have identified some problems for the refugees in term of accessing to the upper level of healthcare for their acute and chronic health problems. Difficulties in accessing general practice and an increased reliance on accident and emergency services for non-emergency treatment were identified, even though almost all the surveyed refugees were registered with a general practitioner.[6]

Due to the current Covid-19 pandemic, it is critical for UNHCR Indonesia to receive sustained funding to be able to deliver protection and complementary solutions to the persons of concern as the pandemic continues to pose challenges to the already limited resettlement opportunities. The Covid-19 pandemic has taken its effect in some of the income streams of the UNHCR Indonesia Private Sector Partnership. The situation has been contributing to decrease the number of refugees visiting primary health centers. Furthermore, for refugees who do not or cannot declare themselves to the statutory authority, fear of detection may discourage access to health services.[1]

The strategy on the elimination program of communal diseases, particularly from the immigrant/refugees community are required as follows: 1. Health screening upon arrival to the resettled area, 2. Vaccination to some recommended diseases. Particularly for children under 5 and elderly, 3. Provide access to primary health center and upgrading level of healthcare for specialist and psychologist/psychiatry, 4. Conducting integrative service and home-based care for elderly, malnutrition babies, mental disorder, and people suffering for a chronic disease, 5. Early diagnosis for communicable infectious diseases periodically, 6. Prompt treatment and rehabilitation program, particularly for disability limitation, 7. Monitoring to involve participation of "kader kesehatan desa" and "kesling". 8. Program evaluation included all the local health-takers, authorized people, and the communities.

Evidence-based public health measures to mitigate the health implications of migration could save a significant number of lives and reduce suffering and ill health. They are also likely to be instrumental in effectively addressing growing healthcare costs and in preventing or mitigating the negative effects of migration on health systems and societies. Nevertheless, insufficient knowledge in many areas has hampered efforts toward more effective planning and implementation of effective strategies to address migration and health. A robust multidisciplinary scientific knowledge base is therefore an essential foundation for enhancing public health practices and policy development.[5]

We address some policy considerations to improve information and to support the design of national standards and management strategies in the health and social care of refugees and asylum seekers. Policy options based on the evidence reviewed here are: improved access to services by removal of legal restrictions; provision of full health coverage for all pregnant women and for children regardless of immigration status; adoption of approaches to improve communications, such as provision of interpreters, good documentation for patients; and eventually adjustment of healthcare provision to improve service utilization, for example longer appointment times and transport provision.[6]

Through this study, we strongly suggest to improve communication and more progressive coordination between the puskesmas as the first stakeholder for the local community, and the International

NGO (such as the UNHCR, IOM, refugees, etc.) as the first takers of worldwide institutions, to conduct a strategy for screening on infectious and non-infectious diseases, provide financial resources from the local district CSR to support healthcare for the refugee and the community, and to prevent disease transmission by the vector and other intermediate host.

Following Indonesia's recent accession to the Global Compact for Safe, Orderly and Regular Migration and its role as a Global Compact "Champion Country, "there has been increased cooperation between the International Organization for Migration (IOM) Indonesia and the Government of Indonesia. To build on the success of this cooperation, IOM formulated a Country Strategy 2022–2025 for Indonesia to define a clear strategic pathway to work within the country and enhance current and future collaborations with the Government to guide its operations and strategic engagement with wider stakeholders in the country and the region.[22]

IOM will support the Government of Indonesia's engagement with inter-governmental forum to ensure coordination around migrant health and harmonization of approaches to major diseases of international importance and emerging public health threats.[22] This activity area includes the development of various standard operating procedures (SOPs), guidelines, plans and tools for the management of communicable diseases, including for detection, notification, isolation, management and referral at borders.[23]

IOM has supported the implementation of early detection and referral of cases at point of entry (PoEs) through primary and secondary screenings. Health screening procedures are adapted to the specific characteristics of an individual disease or health threat, and linked with a competent referral system connected to the national response.[23]

In addressing health issues in refugee shelters, it is essential to establish minimum standards to guide planning, provide assistance, and evaluate the work of government agencies and non-governmental organizations (NGOs).[24]

Minimum standards for refugee health services include providing comprehensive healthcare, preventing and eradicating infectious diseases, and ensuring emergency nutritional surveillance. The health services cover public health, reproductive health, and mental health support, while preventive measures target potential disease outbreaks like measles, diarrhea, smallpox, malaria, chickenpox, acute respiratory infections, and tetanus.[24] In the event of identifying an infectious disease case, prompt reporting to the Community Health Center is crucial. All stakeholders, including NGOs, are obliged to notify the District Health Service for coordinated monitoring.

In order to effectively address refugee health challenges and prevent the spread of infections, it is crucial to prioritize the management of infectious diseases. Infectious disease management essentially consists in identifying the agent cause(s) of an infection (proper diagnosis), initiating if necessary therapy against pathogens, and controlling host reactions to infection.[25] Moreover, significant advances are also included for management of sanitation in terms of controlling life cycle of vector and reservoir, proper use of chemical and biological agents against the disease's transmitter, and appropriate treatment and medication for the management of the patient and the communities.

Infectious disease management requires collaboration across sectors to

achieve more rapid, mutually beneficial and effective responses. This collaboration requires a comprehensive and strategic way of thinking about the problem of infectious diseases in order to minimize the impact. Implementation of regulatory policies in infectious disease management should involve the community and related parties, including local health officials, related stakeholders, international non-governmental organizations (INGOs), and District Health Department.

The successful elimination of an infectious disease does not entirely depend on the availability of medical infrastructures but also on the ability to comprehend the transmission of a disease and the application of control strategies together with proper implementation of logistic policies.

The effective and efficient intervention strategies are needed to prevent uncontrollable outbreaks. Some models to identify and respond to infectious disease outbreaks utilizing One Health approach are described as follows : know the principles of infection control and personal protection for responders in infectious disease management; be knowledgeable about leadership principles for the detection and response toward infectious diseases; be knowledgeable about cultural and religious issues in communities as these play a great role in infectious diseases management/control and transmission.[26] These components are very important for an effective management and control of infectious diseases outbreak.

STRENGTH AND LIMITATION

The strength of this study was originality and integrated aspects of health status of the refugees and potential transmission to the local community; and to develop awareness for collaboration between local health institution and international non-government organization (INGO) for the refugees.

The limitation of this study was lack of participation from the refugees, and restricted barrier of communication and coordination with the INGOs, such as IOM and UNHCR, to open information and collaboration for the study research.

CONCLUSIONS

Our study conclusions are that parasitic and bacterial infectious diseases remain prevalent among the refugee subjects. Based on the disease burden and the nationality of the participants, we found that Sudanese individuals had the highest prevalence of infectious diseases. Our study also revealed that mosquitoes and poor living conditions were the major potential factors contributing to the transmission of the diseases. This finding has raised awareness for the management and control strategies on the elimination program of infectious diseases, particularly from the immigrant/refugees to the local community. The plan includes health screening, vaccination, access to primary and upgraded levels of healthcare for chronic diseases, home-based care monitoring, and evaluation involving all local health providers, authorized individuals, and communities.

ETHICAL CLEARANCE

The research protocol was approved by Ethical Committee of Faculty of Medicine UIN Syarif Hidayatullah Jakarta, number:B-018/F12/KEPK/TL.00/03/2023.

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CONFLICT OF INTEREST

No conflict of interest should be stated within the study report.

AUTHOR CONTRIBUTION

Silvia Fitrina Nasution as first author and principal investigator. Hoirun Nisa as second author and contributor.

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