OTJHS
Online Turkish Journal of Health Sciences

e-ISSN: 2459-1467

OTSBD
Online Türk Sağlık Bilimleri Dergisi

Online Turkish Journal of Health Sciences 2021;6(4):482-490 *Online Türk Sağlık Bilimleri Dergisi 2021;6(4):482-490*

Parazit Enfeksiyonları: Maran, Pekan ve Kuantan'daki Aborijinler Arasında Hijyen Yardım Setinin Bulunması ile Bilgi, Tutum ve Uygulama Düzeyleri

Parasitic Infections: The Level of Knowledge, Attitude and Practices Well as the Availability of Hygiene Aid Kit among Aborigine in Maran, Pekan and Kuantan

[1,2]Normalina ALIAS, [1,2]Mohamad Helmy JAAFAR, [1,2]Muhammad Lokman MD. ISA

[1]Department Basic Medical Sciences, International Islamic University Malaysia
[2]IIUM Human Molecular and Cellular Biology Research Cluster (iMoleC), International Islamic University Malaysia

Normalina Alias: https://orcid.org/0000-0001-8697-505X
Mohamad Helmy Jaafar: https://orcid.org/0000-0002-9368-5170
Muhammad Lokman Md. Isa: https://orcid.org/0000-0001-8063-3526

ÖZ

Amaç: Aborjin'in paraziter enfeksiyon anlayışı, tutum ve uygulamasında ve hijyen farkındalığında halen yetersizlikler bulunmaktadır. Bu çalışmanın amacı, (I) Kuantan, Maran ve Pekan'daki Aborjinlerin paraziter enfeksiyon konusundaki bilgi düzeylerini keşfetmek, (II) paraziter enfeksiyonlara karşı tutumlarını analiz etmek ve (III) Aborjin halkını paraziter enfeksiyonlardan önlemeye yönelik en iyi uygulamaları bildirmektir.

Materyal ve Metot: Uygun örneklemenin yapıldığı Kuantan, Maran ve Pekan'daki 88 Aborjin halkına doğrulanmış anketin dağıtılması yoluyla nicel bir kesitsel çalışma belirli kriterlere göre numune almak için kullanıldı. Veriler SPSS 20.0 sürümü kullanılarak analiz edilmiştir. Önemli testi gerçekleştirmek için tanımlayıcı istatistik kullanarak.

Bulgular: Bulgular, Aborjin halkının paraziter enfeksiyonlar konusunda yetersiz bilgi, olumlu tutum ve iyi uygulamalara sahip olduğunu ve sonuçlara göre bazılarının hijyen yardım materyalinin varlığından haberdar olmadığını göstermektedir.

Sonuç: Bu nedenle, sağlığı geliştirmede doğru yaklaşım, kişisel hijyen konusunda rehberlik ve Aborjin tarafından kullanımı pratik olan kullanışlı hijyen yardım kiti, parazit enfeksiyonunun kontrol edilmesine yardımcı olacaktır.

Anahtar Kelimeler: Aborjin, bilgi, paraziter enfeksiyonlar, tutumlar, uygulamalar

ABSTRACT

Objective: There are still inadequacies in Aborigine 's understanding, attitude and practice of parasitic infection and hygiene awareness. The purpose of this study are to (I) discover the level of knowledge among Aborigine on parasitic infection in Kuantan, Maran and Pekan, (II) to analyse out their attitude towards parasitic infections, and (III) to inform the best practices of preventing parasitic infections to the Aborigine people.

Materials and Methods: A quantitative cross-sectional study through distribution of validated questionnaire to 88 of Aborigine people in Kuantan, Maran and Pekan where the convenience sampling was used to get the sample based on the specific criteria. Data was analyzed using SPSS version 20.0 by employing descriptive statistic to carry out for significant test.

Results: Findings show that Aborigine people have poor knowledge, positive attitude and good practice regarding the parasitic infections and based on the results, some of them do not aware of the existence of hygiene aid material.

Conclusion: Therefore, proper approach of health promotion, guidance on personal hygiene and useful hygiene aid kit which is practical to use by the Aborigine will help to control parasitic infection.

Keywords: Aborigine, attitudes, knowledge, parasitic infections, practices

Sorumlu Yazar / Corresponding Author:
Muhammad Lokman Md Isa
Department Basic Medical Sciences, Kulliyyah of Nursing, IIUM Human Molecular and Cellular Biology Research Cluster (iMoleC), International Islamic University Malaysia.
Tel: +60 12-964 5581
E-mail: lokman@iium.edu.my

Yayın Bilgisi / Article Info:
Gönderi Tarihi/ Received: 03/06/2021
Kabul Tarihi/ Accepted: 02/10/2021
Online Yayın Tarihi/ Published: 01/12/2021

Atıf / Cited: Alias N and et al. Parasitic Infections: The Level of Knowledge, Attitude and Practices Well as the Availability of Hygiene Aid Kit among Aborigine in Maran, Pekan and Kuantan. *Online Türk Sağlık Bilimleri Dergisi* 2021;6(4):482-490. doi:10.26453/otjhs.947344

INTRODUCTION

Aborigine is a minority among Malaysians regardless of peninsular or non-peninsular Malaysia. [1] Although Malaysian government has taken proactive initiatives for socioeconomic development to improve the quality of life of the aborigine community, these groups remain to live under poverty line and isolated. The aborigine is found to be malnutrition, facing high incidence of infectious diseases such as tuberculosis, leprosy, malaria and experiencing intestinal parasitic infections.[2]

Intestinal parasitic infections are considered as troubling public health problems worldwide. Approximately about two billion people are infected with at least one soil-transmitted helminth (STH) species particularly those caused by *Ascaris lumbricoides, Trichuris trichiura* and hookworms especially in underprivileged rural communities while about four billion are at risk of infection.[3] According to Perignon M et al.[4] parasitic infection which is mainly by STH during childhood are significantly associated with protein-energy malnutrition, iron deficiency anemia, vitamin A deficiency, intellectual retardation and educational deficits that consequently lead to poor school attendance and poor educational achievement.

Latest study by Elyana et al.[5] has reported about 149 (90.3%) from 165 aborigine children in Terengganu were infected by at least one parasite species. As the high prevalence of parasitic infections and related diseases among the people of aborigine continues to have a major impact on public health in Malaysia and as a result of Pahang's high population of aborigine, there is an urgency to introduce effective preventive measures to control parasitic infections to improve the quality of life of aborigine communities in Pahang area. According to Lee et al.[6] a mixture of approaches, including mass treatment, and improving the nutritional status of the population, accompanied by good health education, is more likely to succeed.

In Malaysia, a well-planned health education program for indigenous communities is still lacking, resulting in a lack of knowledge and an indifferent attitude toward parasitic infection prevention.[7] Nevertheless, an isolated success story of reducing transmission of IPIs via a trial health education learning package has been reported by Al-Delaimy et al. [8] The success that has been achieved from this trial and other projects could serve as a benchmark for the implementation of active health education programs in the future.

Therefore, the main purpose of this study is to examine aborigine 's understanding, attitude and practice of parasitic infection and hygiene awareness by focusing on their level of knowledge on parasitic infection, their attitude towards parasitic infections, and the best practices of preventing parasitic infections. It was aimed to develop useful hygiene set kits for the use of aborigine which are not only medicine but also set of personal hygiene or basic guideline for aborigine references.

MATERIALS AND METHODS

The study was approved by the International, University, Kulliyyah of Nursing Postgraduate and Research Committee (KNPGRC) (Date: 16/07/2018, decision no: 4/2018). The present study was performed under Helsinki Declaration of Good Clinical Practice.

This study was conducted in the aborigine villages Semoq Beri and Jakun at selected area which are Sungai Mas Village (Kuantan), Paloh Hinai Village (Pekan) and Paya Taman Village (Maran) from March 2019 until May 2019. Those study were recommended by the Local Department of Aborigine Development or JAKOA in considering their social, economic and health status. Convenience sampling was used on eligible respondent that fulfilled inclusion criteria; (I) aborigine that is currently living in that areas (Kuantan, Maran, and Pekan), (II) able to understand or read Malay language and (III) willingly to participate in the study. Recommendation sample size was 218 based on Raosoft.com calculation considering 5% margin error and 95% confidence interval. Children who present during the visit were invited to take part with consent of parents.

Validated questionnaires were distributed by trained research team in Malay language. Before questionnaires were given, a short oral briefing was given to explain the purpose and objective of this study. The participants were requested to answer questionnaires that contain five parts of questions which are; Part A consists of socio-demographic characteristics, Part B consists of water sources, sanitation and environment, Part C consists of personal health practice, Part D consist of personal health attitude and lastly Part E consists of knowledge of parasitic infections and anti-parasitic that has been commonly use.

Although the questionnaires used were validated,[5] contents of the questionnaire were first examined by the content experts and reviewed by local JAKOA

officer and each Head of Village to ensure the appropriateness of questions.

Data Analysis: The collected data were analyzed statistically by using SPSS software (Statistical Package for the Social Sciences) version 20.0. Descriptive analysis and Pearson's Chi-square test was used to were employed to analyze the data. The level of significance was defined as $p < 0.05$. Range score (Knowledge = Low : 0-26 , Moderate :27-39, High : 40-52; Attitude = Negative : 0-4, Neutral : 5-6, Positive : 7-8; Practice= Poor:0-15, Fair : 16-22, Good : 23-30).[5]

RESULTS

Socio-demographic Characteristics, Sources and Sanitation Environment: Among 218 who had been

Table 1. Socio-demographic characteristics, water sources, sanitation and environment of Aborigine communities from three districts in Pahang

Variables	Frequency (n)	Percentage (%)
Age		
≤17	24	27.3
≥18	64	72.7
Gender		
Male	28	31.8
Female	60	68.2
Education		
Never go to school	35	39.8
Primary school	43	48.9
Secondary school	10	11.4
University	0	0
Income (RM)		
<500	73	83
≥500	15	17
Occupation		
Working	48	54.5
Not working	40	45.5
No. of Residents		
< 7	75	85.2
≥ 7	13	14.8
Water Sources		
Pipe water	63	71.6
Rain water	1	1.1
Well	15	17
River	7	8
Others	2	2.3
Presence of Pets		
Yes	64	72.7
No	24	27.3
Presence of Toilet		
Lead to sewer pipes	54	61.4
Lead to septic tank	14	15.9
Lead to other places	11	12.5
Others	9	10.2
Electricity		
Yes	75	85.2
No	13	14.8
Presence of River		
Yes	60	68.2
No	28	31.8
Presence of Lake		
Yes	17	19.3
No	71	80.7
Presence of Pond		
Yes	11	12.5
No	77	8.5

approached in this research, only 88 respondents were consented to be part of the research samples. Therefore, total number of respondents was 88 out of 218 people with the response rate for the sample size was 40.4%. The number of successful respondents that had been approached in Sungai Mas Village, Kuantan were 31 peoples, while in Paloh Hinai Village, Pekan were 45 peoples and in Paya Taman Village, Maran were 12 peoples.

Socio-demographic characteristics, sources, sanitation and environment shown in Table 1.

Table 2. Level of knowledge of Aborigine on parasitic infections.

Questions	**Responses, n(%)**	
	Yes	**No**
Have you heard about intestinal parasitic infection? If yes, where did you hear about parasitic infections?		
Clinic/Hospital	46 (52.3%)	42 (47.7%)
Social Media	8 (9.1%)	80 (90.9%)
School	7 (8.0%)	81 (92.0%)
Poster	1 (1.1%)	87 (98.9%)
Do Not Know	7 (8.0%)	81 (92.0%)
Others	19 (21.6%)	69 (78.4%)
Types or name of parasite that you know		
Roundworm	57 (64.8%)	31 (34.2%)
Whipworm	2 (2.3%)	86 (97.7%)
Protozoa	1 (1.1%)	87 (98.9%)
Hookworm	2 (2.3%)	86 (97.7%)
Strongyloides stercoralis	2 (2.3%)	86 (97.7%)
Others	30 (34.1%)	58 (65.9%)
Do you think that parasitic infections are good or bad for people's health?		
I think they are good for health	2 (2.3%)	86 (97.7%)
I think they are harmless	10 (11.4%)	78 (88.6%)
I think they are harmful for health	69 (78.4%)	19 (21.6%)
I do not know	7 (8.0%)	81 (92.0%)
What are the sign and symptoms of parasitic infection?		
Stomach ache	61 (69.3%)	27 (30.7%)
Diarrhoea	54 (61.4%)	34 (38.6%)
Vomiting	39 (44.3%)	49 (55.7%)
Loss of appetite	33 (37.5%)	55 (62.5%)
Pale face	19 (21.6%)	69 (78.4%)
Sluggish	35 (39.8%)	53 (60.2%)
Bloody stool	8 (9.1%)	80 (90.9%)
Itching	36 (40.9%)	52 (59.1%)
Others	10 (11.4%)	78 (88.6%)
How do people acquire parasitic infections?		
Eating contaminated foods	50 (56.8%)	38 (43.2%)
Eating raw foods	38 (43.2%)	50 (56.8%)
Dirty hands	54 (61.4%)	34 (38.6%)
Play with sand	51(58.0%)	37 (42.0%)
Not cut the nails	36 (40.9%)	52 (59.1%)
Not wearing shoes	41 (46.6%)	47 (53.4%)
Others	10 (11.4%)	78 (88.6%)
Have you had parasitic infections?	34 (38.6%)	54 (61.4%)
How you prevent from parasitic infections?		
Anti-parasite drugs	74 (84.1%)	14 (15.9%)
Washing hands	51 (58.0%)	37 (42.0%)
Wearing slippers	45 (51.1%)	43 (48.9%)
Washing foods	42 (47.7%)	46 (52.3%)
Cooking water	41 (46.6%)	47 (53.4%)
Cutting the nails	45 (51.1%)	43 (48.9%)
Others	16 (18.2%)	72 (81.8%)

Table 3. Personal health attitude and practice among Aborigine against parasitic infections.

Personal Health Attitude			Personal Health Practice		
Questions	**Frequency (n)**	**Percentage (%)**	**Questions**	**Frequency (n)**	**Percentage (%)**
Do you think washing hands before eating is important?			**Do you wash your hands before eating?**		
Yes	88	100	Never	0	0.0
No	0	0.00%	Rarely	2	2.3
			Sometimes	3	3.4
			Always	83	94.3
Do you think using soap when washing hands is important?			**Do you use soap when washing your hands?**		
Yes	80	90.9	Never	5	5.7
No	8	9.1	Rarely	3	3.4
			Sometimes	12	13.6
			Always	68	77.3
Do you think washing hands after defecation is important?			**Do you wash your hands after defecation?**		
Yes	88	100	Never	0	0.0
No	0	0	Rarely	1	1.1
			Sometimes	2	2.3
			Always	85	96.6
Do you think cutting nails is important?			**Do you eat soil? (in small amount)**		
Yes	86	97.7	Never	88	100.0
No	2	2.3	Rarely	0	0.0
			Sometimes	0	0.0
			Always	0	0.0
Do you think wearing shoes when going outside is important?			**Do you wear shoes or slipper when go outside?**		
Yes	88	100	Never	1	1.1
No	0	0	Rarely	1	1.1
			Sometimes	5	5.7
			Always	80	90.9
Do you think having shower is important?			**Do you wash your hand with soap after playing with soil?**		
Yes	88	100	Never	0	0.0
No	0	0	Rarely	2	2.3
			Sometimes	9	10.2
			Always	77	87.5
Do you think washing the vegetables before eating is important?			**Do you wash vegetables before eating?**		
Yes	80	90.9	Never	0	0.0
No	8	8.1	Rarely	2	2.3
			Sometimes	6	6.8
			Always	80	80.9
Do you think boiling water before drinking is important?			**How often do you boil water before drinking?**		
Yes	78	88.6	Never	4	4.5
No	10	11.4	Rarely	0	0.0
			Sometimes	3	3.4
			Always	81	92.0

Knowledge, Attitude and Practice (KAP) of Aborigine on Parasitic Infections: Knowledge, Practice and Attitude of aborigine on parasitic infection shown in Table 2 and Table 3.

Hygiene Aid Kit Availability among Aborigine: Most of aborigine people have worm medication (81.8%) and hand sanitizer (62.5%) to prevent parasitic infections. In addition, majority of the respondents answered that they do have lice medicine (71.6%), anti-fungal medicine (93.2%), flea sham-

Table 4. Association between KAP on parasitic infection.

Variable	Practice		X^2	P-value	Attitude		X^2	P-value
Knowledge	Fair	Good	4.144	**0.042**	Neutral	Positive	0.123	0.725
Low	7 (8.1%)	79 (91.9%)			5 (5.8%)	81 (94.2%)		
Moderate	1 (50.0%)	1 (50.0%)			0 (0.0%)	2 (100.0%)		
Attitude	Fair	Good	6.128	**0.013**				
Neutral	2 (40.0%)	3 (60.0%)						
Positive	6 (7.2%)	77 (92.8%)						

Table 5. Association KAP with sociodemographic.

Sociodemographic background	Knowledge		X^2	*P-value*	Attitude		X^2	*P-value*	Practice		X^2	*P-value*
	Low	Moderate			Neutral	Positive			Fair	Good		
Residents' category												
< 7	73 (84.9%)	2 (100%)	0.355	0.551	5 (100.0%)	70 (84.3%)	0.919	0.338	8 (100.0%)	67 (83.8%)	1.525	0.217
≥ 7	13 (15.1%)	0 (0.0%)			0 (0.0%)	13 (15.7%)			0 (0.0%)	13 (16.2%)		
Occupation												
Not working	48 (55.8%)	0 (0.0%)	2.456	0.117	2 (40.0%)	46 (55.4%)	0.452	0.501	5 (62.5%)	43 (53.8%)	0.225	0.636
Working	38 (44.2%)	2 (100.0%)			3 (60.0%)	37 (44.6%)			3 (37.5%)	37 (46.2%)		
Income (RM)												
< 500	72 (83.7%)	1 (50.0%)	1.572	0.21	4 (80.0%)	69 (83.1%)	0.033	0.856	7 (87.5%)	66 (82.5%)	0.129	0.72
≥ 500	14 (16.3%)	1 (50.0%)			1 (20.0%)	14 (16.9%)			1 (12.5%)	14 (17.5%)		
Age (Years)												
≤ 17	24 (27.9%)	0 (0.0%)	0.767	0.154	0 (0.0%)	24 (28.9%)	1.988	0.159	4 (50.0%)	20 (25.0%)	2.292	0.13
≥ 18	62 (72.1%)	2 (100.0%)			5 (100.0%)	59 (71.1%)			4 (50.0%)	60 (75.0%)		
Educational level												
Never go to school	34 (39.5%)	1 (50.0%)	3.742	0.154	3 (60.0%)	32 (38.6%)	1.233	0.54	3 (37.5%)	32 (40.0%)	1.684	0.431
Primary school	43 (50.0%)	0 (0.0%)			2 (40.0%)	41 (49.4%)			3 (37.5%)	40 (50.0%)		
Secondary school	9 (10.5%)	1 (50.0%)			0 (0.0%)	10 (12.0%)			2 (25.0%)	8 (10.0%)		
Gender												
Male	26 (30.2%)	2 (100.0%)	4.385	**0.036**	1 (20.0%)	27 (32.5%)	0.341	0.559	4 (50.0%)	24 (30.0%)	1.341	0.247
Female	60 (69.8%)	0 (0.0%)			4 (80.0%)	56 (67.5%)			4 (50.0%)	56 (70.0%)		

poo (73.9%) and soap (86.4%) in their home. As a result of this survey, we will classify common medications and disinfectants that would be recommended for use in the proposed hygiene aid kit.

Associations between Socio-demographic Characteristics and Knowledge, Attitude and Practice (KAP) on Parasitic Infections: Association between KAP on Parasitic infection shown in Table 4. However, association KAP with socio-demographic shown in Table 5.

DISCUSSION AND CONCLUSION

Despite the fact that Malaysia gained independence 64 years ago, issues of poor health and nutritional status of the aborigine population have been documented over the decades.[9] In spite of that, the Malaysia government has introduced various strategies and programmes to improve the quality life of the aboriginal people. Study has been conducted from the grass root to gain information on health status of the aborigines. This study shows that most of the aborigines in the Peninsular Malaysia still lives under the poverty line. This can be seen through the failure to get basic needs and proper living space. Even though most of the aborigine settlement are equipped with piped water, this study found that most of the toilets were not functioning. The community experience lack of clean tap water and prefer to defecate in the river which highly expose to the parasitic infections. This study result proves the study by Farar et al.[10] that lack of access to safe drinking water, living in contaminated environment, high literacy rate and unhygienic practices by these people are the causal agents for the parasitic infection. In addition, the Global Peach Foundation 2018 declared that the clean water issue is one of the water-related health challenges that aborigines faced. Due to that, many initiatives have been carried out to ensure that aborigines have access to safe and use of water for daily basis.[11]

This study discovered 86 (97.7%) respondents have low level in knowledge but significantly good in practice with the p value of 0.0042. This indicates that the indigenous people were less expose in health care and lack of information on the knowledge of parasitic infection. This result is similar to the previous study that this community prefer traditional knowledge inherit from one generation to another.[12] This study however contradict to the finding of Elyana et al.[5] where the aborigine in Terengganu are more informative and knowledgeable about intestinal parasitic infection (IPIs) compared to the Malay community. Study showed that aborigines have positive attitude and have a good practice where by 77 (92.8%) with p-value 0.013. This finding showed good correlated with Elyana et al.[5] in the previous study regarding attitude and practices of aborigine respondents towards parasitic infections, about 61.5% of aborigine respondents considered the parasitic infections are harmful to people's health with (p= 0.001). However, the findings indicated that participants from aborigine had considerably low levels of hygiene practices such as wearing outdoor shoes, not washing hands when dealing with dirt and eating unwashed fruit or vegetables. This study corroborates previously reported findings among caregivers in Tonle Sap Lake, Cambodia, regarding their hygiene practice in preventing diarrhoea in children under the age of five, with nearly 95% of participants having poor hygiene practice.[13]

There is no significant association between attitude and knowledge (X^2 =0.123p=0.725). This finding correlates with previous study that sanitation with or without hygiene education, combination with deworming has further effect in reducing incidence and intensity of parasitic infection.[14]

The result demonstrated that there was significant relationship between genders with the level of knowledge at p-value is 0.036. The knowledge might be low due to the fact that the female prefers to stay at home as housewives.[12] Besides, according to Elyana et al.[5] a low-educational mom (< 6 years) had a considerably greater incidence of polyparasitism relative to women with at least 6 years of formal schooling (p = 0.009). This study backs up the finding that aboriginal women's lack of knowledge leads to insufficient nutrient intake in comparison to their physically active lifestyle.[15] This condition could further undermine the women's health as well as reproductive and productive capabilities in which the implementation of structural group health classes may improve health literacy among aborigine.[16]

Previous research discovered that aborigines have traditionally used natural products that having antiparasitic activity. However, the traditional product has not been commercially researched, leaving uncertainty about its effectiveness.[17] Another finding was that the majority of aborigines preferred modern treatment and safe health practices, despite the fact that home remedies are part of their treatment options.[18] However, Chin et al.[18] and Cheng et al.[19] discovered that aborigines had little knowledge of proper medication storage and use. Both studies also found that aborigines had the incorrect belief that

oral medications should be stored in the refrigerator. Furthermore, the majority of them had the incorrect practice of sharing their medication with their relatives.[18,19]. As a result, introducing commercialized anti parasitic products with proper health guidance will be an effective strategy in combating parasitic infection. In this study, 84.1 % of aborigines recognized that the anti-parasitic drug listed can prevent infection. However, looking for other forms of prevention, it remains a problem that must be addressed. This means recognizing consensus on managing parasitic infections is still unsatisfactory.

In conclusion, the higher authority shall continue to enhance programs to instil knowledge of the aborigine in their attitudes and practices towards their proper understanding on parasitic infections. The most crucial strategy is to establish a comprehensive and realistic parasitic control kit for the use of the aborigine. The combination of most common required medication, basic personal hygiene care and basic personal hygiene guide shall be introduced to aborigine. Actions and plans should be address from the central government in terms of mandates, distributions of allocation on health as well as formulation specific regulations for the aborigines on the important of understanding the harm of parasitic infections towards life.

Ethics Committee Approval: The study was approved by the International University, Kulliyyah of Nursing Postgraduate and Research Committee (KNPGRC) (Date: 16/07/2018, decision no: 4/2018).

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – MHJ, MLMI, NA; Supervision – MHJ, MLMI, NA; Materials – MHJ, NA; Data Collection and/or Processing – MHJ, NA, MLMI; Analysis and/ or Interpretation – MHJ, MLMI, NA; Writing –MHJ, NA.

Peer-review: Externally peer-reviewed.

Acknowledgement: The authors thank to the Kulliyah of Nursing and Research and Ethical Committee of International Islamic University Malaysia for approving this research. Many thanks are also given to the Local Development of Aborigine (JAKOA), Pahang for their cooperation in helping to conducting surveys among aborigine people in Kuantan, Maran and Pekan. The research under International Islamic University Malaysia Publication Research Grant Scheme, P-RIGS18-037 -0037.

REFERENCES

1. International Work Group for indigenous Affairs. 2019. https://www.iwgia.org/en/malaysia. Accessed July 12, 2019.
2. Hotez PJ. Aboriginal populations and their neglected tropical diseases. PLoS Negl Trop Dis. 2014;8(1):e2286. doi:10.1371/journal.pntd.0002286
3. World Health Organization WHO. Soiled Transmitted Helminths Infection 2020. https://www.who.int/news-room/fact-sheets/detail/soil-transmitted-helminth-infections. Accessed April 1, 2020.
4. Perignon M, Fiorentino M, Kuong K, et al. Stunting, poor iron status and parasite infection are significant risk factors for lower cognitive performance in Cambodian school-aged children. PLoS One. 2014;9(11):e112605. doi:10.1371/journal.pone.0112605
5. Elyana FN, Al-Mekhlafi HM, Ithoi I, et al. A tale of two communities: intestinal polyparasitism among Aborigine and Malay communities in rural Terengganu, Malaysia. Parasit Vectors. 2016;9:398. doi:10.1186/s13071-016-1678-z
6. Lee SC, Ngui R, Tan TK, Aidil RM, Lim YA. Neglected tropical diseases among Two Indigenous Subtribes in Peninsular Malaysia: Highlighting Differences and Co-Infection of Helminthiasis and Sarcocystosis. Plos One. 2014;9:e107980.
7. Chin YT, Lim YA, Chong CW, et al. Prevalence and risk factors of intestinal parasitism among two indigenous sub-ethnic groups in Peninsular Malaysia. Infect Dis Poverty. 2016;5(1):77. doi:10.1186/s40249-016-0168-z
8. Al-Delaimy AK, Al-Mekhlafi HM, Lim YA, et al. Developing and evaluating health education learning package (HELP) to control soil-transmitted helminth infections among Aborigine children in Malaysia. Parasit Vectors. 2014;7:416. doi: 10.1186/1756-3305-7-416
9. Cultural Survival. Health, Disease and Survival. A Biomedical And Genetic Analysis of the Orang Asli of Malaysia 1999 https://www.culturalsurvival.org/publications/cultural-survival-quarterly/health-disease-and-survival-biomedical-and-genetic . Accessed April 20, 2021
10. Farrar J, Hotez P, Junghanss T, Kang G, Lalloo D, White N. Manson's tropical diseases, 23rd ed. Edinburgh: Saunders Elsevier; 2014.

11. International Institute of Global Health. Health for All : Indigenous Peoples Included 2018. https://iigh.unu.edu/publications/articles/health-for-all-indigenous-peoples-included.html . Accessed July 20, 2019.
12. Kardooni R, Kari F, Yahaya SR, Yusup SH. Traditional knowledge of orang Asli on forests in peninsular Malaysia. Indian j Tradit Knowl. 2014;13(2):283-291.
13. Merali HS, Morgan MS, Boonshuyar C. Diarrheal knowledge and preventative behaviors among the caregivers of children under 5 years of age on the Tonle Sap Lake, Cambodia Res Rep Trop Med. 2018;9:35-42. doi:10.2147/RRTM.S156702
14. Hawdon JM. Controlling soil-transmitted helminths: time to think inside the box? J Parasitol. 2014;100(2):166-88. doi: 10.1645/13-412.1
15. Ali O, Isa ZM. Nutritional status of women and children in Malaysian rural populations. Asia Pac J Clin Nutr. 1995;4(3):319-324.
16. Nash S, Arora A. Interventions to improve health literacy among Aboriginal and Torres Strait Islander Peoples: a systematic review. BMC Public Health. 2021;21(1):248. doi:10.1186/s12889-021-10278-x
17. Panda SK, Luyten W. Antiparasitic activity in Asteraceae with special attention to ethnobotanical use by the tribes of Odisha, India. Activité antiparasitaire chez les Asteraceae avec une attention particulière pour l'utilisation ethnobotanique par les tribus d'Odisha en Inde. Parasite. 2018;25:10. doi:10.1051/parasite/2018008
18. Chin VY, Sia MK, Choy LK, Sum SM, Selvadurai S. Education and awareness of modern health care amongst aboriginal people: The case of the Jakuns of Peninsular Malaysia. Geografia-Malaysian Journal of Society and Space. 2017;11(13):79-85.
19. Cheng YX . Chong CP , Kiew CF, Bahari MB. An assessment of health and social-economic status among Lanoh ethnic sub-group of Orang Asli (indigenous peoples) in Air Bah I village, state of Perak, Malaysia. J Appl Pharm Sci. 2014;4:32-37. doi:10.7324/JAPS.2014.401006