Evaluation of Pharmacists' Knowledge on Scabies Management at District Hospitals in Kedah State, Malaysia: A Questionnaire Survey

Guo Hong Tan[1*], Christine Shalin Selvaraj[1], Fatimah Zahra Azme[1], Saidatus Sofwanah Razak[1]

[1]*Department of Pharmacy, Sik Hospital, Kedah*

Correspondence to: Guo Hong Tan (tanguohong0908@gmail.com)

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ABSTRACT

Introduction:

Scabies is a common skin infection in developing countries. Appropriate choice and application of topical medications are fundamental in ensuring safe and effective scabies management. This study aimed to evaluate the knowledge level of pharmacists in scabies management.

Methods:

A cross-sectional, multicentre study was conducted among pharmacists from five district hospitals in Kedah, Malaysia. A self-administered questionnaire, developed based on the Malaysian Clinical Practice Guidelines was employed. The questionnaire underwent both content and face validations.

Results:

A total of 69 pharmacists (98.6%) completed the self-administered questionnaire. The mean knowledge score was 70.8% ± 8.8%. Although most respondents answered correctly, there was a substantial knowledge gap in some aspects of scabies management, method of application, and selection of the most appropriate scabies medication for specific populations. Simple and multiple linear regressions showed that working experience, number of scabies cases encountered, and location of undergraduate study did not significantly affect the knowledge score.

Conclusion:

Our study demonstrated that pharmacists in public district hospitals in Kedah, Malaysia, were able to correctly answer most of the questions regarding scabies. However, further education for pharmacists should focus on enhancing their understanding of scabies management, particularly regarding appropriate medication choices for specific populations and medication application sites.

Keywords:

Scabies, pharmacists, topical drug administration, parasites

INTRODUCTION

Scabies is a skin infestation caused by the mite *Sarcoptes scabiei*, which burrows into the skin and leads to intense itching and rash formation.[1] Globally, scabies affects an estimated 300 million people annually, with a higher prevalence in resource-limited settings.[1,2] According to the World Health Organization, scabies imposes a considerable burden on healthcare systems in developing countries, where complications significantly increase treatment costs.[3] Transmission occurs primarily through prolonged skin-to-skin contact, and its hallmark symptom is pruritus that typically worsens at night or after a hot bath.[4,5]

If left untreated, persistent scabies and scratching can result in secondary bacterial infections, most commonly caused by Group A *Streptococcus* and *Staphylococcus aureus*.[6] Impetigo is a frequent manifestation of such infections. More severe complications can include folliculitis, cellulitis, abscess formation, post-streptococcal glomerulonephritis, septicaemia, rheumatic heart disease, and in extreme cases, death.[6,7] Diagnosing scabies can be particularly challenging due to its symptoms mimicking other dermatological conditions, especially for less experienced healthcare professionals.[6-8]

Following initial infestation, an asymptomatic period of two to six weeks may occur before symptom onset.[8] During this incubation phase, infected individuals can unknowingly transmit the mites, potentially leading to widespread outbreaks in closed or crowded communities.[8]

Effective scabies management hinges on the level of knowledge among healthcare providers. Some studies have associated greater knowledge of scabies with increasing age, higher levels of education, and recent review of medical information.[9,10] In contrast, other research has found no significant association between age or clinical experience and knowledge, thereby underscoring the need for continuous medical education, particularly for primary care physicians.[11,12] Given the implications of poor scabies knowledge—such as delayed diagnosis, ineffective treatment, ongoing transmission, and underreporting—it is essential to examine potential knowledge gaps among frontline healthcare providers.[13]

In Malaysia, the true burden of scabies is difficult to determine as it is not a notifiable disease and reporting is not mandatory. However, several local studies have provided insight into its prevalence. A study conducted in Pos Piah, Sungai Siput, Perak, among the indigenous population found scabies to be the most common skin infection, affecting 11.9% of the community.[14] Similarly, research by Kaur and Nadeswary in the Jengka Triangle, Pahang, reported an 11.6% prevalence of scabies among 5,590 individuals examined, with both sexes equally affected.[15] Children and teenagers had the highest prevalence, particularly those aged 5–9 years.[15]Another study conducted in a welfare home

in Penang found that 31% of children were infected with scabies, with the highest prevalence noted among boys aged 10–12 years.[16]

Pharmacists play a crucial role in the management of scabies, including providing health education on its transmission and prevention, as well as counselling on treatment regimens. However, no studies to date have assessed pharmacists' knowledge of scabies management in Malaysia. Existing studies have primarily focused on dermatologists, general practitioners, or medical students.[9,11,17] Given that scabies is frequently treated in primary healthcare settings and outpatient departments of district hospitals, this study aimed to evaluate the knowledge of scabies management among pharmacists working in non-specialised public district hospitals in the state of Kedah, Malaysia.

METHODS

Study Design, Population and Setting

This cross-sectional, multi-centre study was conducted at all five public non-specialised district hospitals in Kedah, Malaysia, namely Sik Hospital, Yan Hospital, Baling Hospital, Jitra Hospital and Kuala Nerang Hospital. All pharmacists practising in the hospitals were invited to participate. Pharmacists who primarily engaged in administrative works, not involved in patient counselling, or on leave during the study period were excluded.

Questionnaire Development and Validation

The questionnaire used in this study (Supplementary File 1) was developed by study researchers based on the Guideline for Management of Scabies in Adults and Children published by the Ministry of Health, Malaysia in 2015.[18] The first part of the questionnaire contains socio-demographic information and the second part of the questionnaire contains 18 main questions covering pathophysiology (five questions), clinical manifestations (two questions), diagnostic tools (one question) and management including patients, close contacts and fomites (ten questions). Some of the questions contain a few sub-questions.

The questionnaire then underwent content validation by two dermatologists and face validation by ten pharmacists. For the content validation, two visiting dermatologists rated all questions in terms of relevance on a scale of least relevant to most relevant. If an expert rated an item with a scale of 1 or 2, it meant the item was least relevant or not so relevant in terms of content, while a rating of either 3 or 4 would mean the question was relevant or very relevant to measure the knowledge on scabies management. A score of 1 or 2 was recorded as 0, and a score of 3 or 4 was recorded as 1. The content validity index (CVI) was then calculated.[19] The CVI obtained was 0.97 for all items which was acceptable as the cut-off score was at least 0.80 for two experts.[19] Subsequently, the questionnaire underwent face validation by ten pharmacists, focusing on the clarity and comprehensibility of the questions. All ten raters' scores were tabulated to calculate the overall face validity index (FVI).[20] The FVI obtained for this questionnaire was 0.98 across all raters which was higher than the acceptable cut-off score of at least 0.80, which means good clarity and comprehensibility of the questions.[20] This questionnaire passed both the content and face validations without any changes.

Data Collection

A data collector was selected for each hospital. The printed self-administered questionnaire was distributed to all eligible respondents from August to November 2020. Informed consent was obtained before administration of the questionnaire. The respondents were given one hour to answer the questionnaire under the supervision of data collectors and were not allowed to refer to references. There were 18 questions, many of which included multiple sub-questions. The maximum score was 71 points. A point was awarded for each correct answer. No point was given for incorrect or blank answers and no point was deducted for wrong answers. The score for each participant was calculated and then converted into a percentage.

Statistical Analysis

Data was entered manually into Microsoft Excel 2019 by a research assistant into a password-protected computer and data was counterchecked by a study investigator. The Statistical Package for the Social Sciences version 27 was used to analyse the data. Continuous variables were reported as mean ± standard deviation or median (interquartile range), while categorical variables were reported as numbers and percentages. Linear regression was used to determine the relationship between the independent factors and the knowledge score. A *P*-value less than 0.05 was considered statistically significant.

RESULTS

A total of 70 questionnaires were distributed, 69 pharmacists (98.6%) completed the questionnaire and one pharmacist did not complete the questionnaire. The respondents had a mean working experience of 5.8 ± 4.2 years and reported encountering a median of 10 cases yearly (Table 1).

Table 1. Respondents' demographics (n=69)

Demographic	n (%)
Working experience (years), Mean (SD)	5.8 (4.2)
Estimated number of scabies cases encountered per year, Median (IQR)	10 (18.5)
Undergraduate education	
Local public university	41 (59.4)
Local private university	23 (33.3)
Overseas university	5 (7.2)

SD: standard deviation; IQR: interquartile range

Overall, the mean knowledge score was 70.8% ± 8.8%. All of the respondents (n=69, 100%) knew that mite was the causative agent of scabies. Majority of them (n=47, 68.1%) mistakenly responded that a bite by *Sarcoptes scabiei* causes itchiness and rashes in scabies. Almost half of the subjects answered wrongly for the incubation period of scabies for patients without previous exposure (n=34, 49.3%), and patients with previous exposure (n=30, 43.5%) as shown in Table 2. Approximately half of the respondents (n=34, 49.3%) misunderstood that scabies can be transmitted by staying in the same room with a scabies patient.

For questions related to the clinical manifestations, all respondents were able to identify that generalised, very intense and intractable itch were the typical symptoms of scabies. However, approximately half of the respondents mistakenly answered that the itch caused by scabies is worsened in cold weather (n=29, 42%); and that small erythematous papulovesicular lesions are predominantly present over the head, face, and neck in adults n=28, (40.6%).

With regards to investigations that can give relevant information for diagnosing scabies, all of the respondents (n=69, 100%) knew that dermatoscopy can be used to detect and confirm scabies. Most of them (n=62, 89.9%) knew that blood culture and sensitivity tests do not help in the diagnosis of scabies. Approximately half of them (n=35, 50.7%) knew that digital photography can help in diagnosing scabies.
Regarding the treatment of scabies, scabies contacts and fomites, all respondents (n=69, 100%) correctly identified Permethrin 5% cream/lotion as an appropriate treatment and acknowledged that antihistamines can be used to control itchiness associated with scabies. However, it is critical to highlight that a notable proportion of respondents held misconceptions regarding supportive management: mistakenly believed that calamine lotion was effective (n=25, 36.2%), thought daily bathing or sauna could treat scabies (n=21, 30.4%), and considered steroid creams to be a viable solution (n=13, 18.8%). Furthermore, some of the respondents (n=9, 13%) mistakenly thought that scabies medications should be applied thinly to the affected areas or until itchiness subsides. Additionally, the majority of the respondents were unsure of the timing of antibiotic commencement (n=43, 62.3%) and the selection of systemic antibiotics (n=39, 56.5%), underscoring a substantial knowledge gap regarding comprehensive scabies management.

In terms of selecting the most preferred treatment for specific patient populations, a significant majority of respondents exhibited considerable uncertainty regarding the proper choice of scabies medications. Alarmingly, only 4 (5.8%) respondents accurately identified the treatment for patients under 12 years old in accordance with the Malaysian Clinical Practice Guideline, underscoring a significant misunderstanding of treatment guidelines.

Simple and multiple linear regression showed that years of working experience, the number of scabies cases seen per year and the location of undergraduate education did not significantly affect the scabies knowledge score as shown in Table 3.

Table 2. Pharmacists' Knowledge on Scabies (n=69)

	Knowledge about scabies	Response, n (%)	
		Correct	Incorrect / Missing
	Pathophysiology		
1	**Causative agent of scabies**	69 (100.0)	0 (0.0)
2	**Cause(s) of itchiness and rashes in scabies**		
	The protein from *Sarcoptes scabiei*	42 (60.9)	27 (39.1)
	The protein from *Sarcoptes scabiei*'s egg	50 (72.5)	19 (27.5)
	The bite by *Sarcoptes Scabiei*	22 (31.9)	47 (68.1)
3	**Incubation period of scabies for those without previous exposure**	35 (50.7)	34 (49.3)
4	**Incubation period of scabies in individuals who have been previously infested with scabies**	39 (56.5)	30 (43.5)
5	**Mode of scabies transmission**		
	Being in the same room with a scabies patient	35 (50.7)	34 (49.3)
	Sleeping with a scabies patient	68 (98.6)	1 (1.4)
	Using clothes and linen of a scabies patient	65 (94.2)	4 (5.8)
	Using fork and knife of a scabies patient	58 (84.1)	11 (15.9)
	Sexual contact	48 (69.6)	21 (30.4)
	Sharing bodycare with a scabies patient	56 (81.2)	13 (18.8)
	Being in the same room with a scabies patient	35 (50.7)	34 (49.3)
	Clinical Manifestations		
6	**Typical symptoms of scabies**		
	Generalised, very intense and intractable itch	69 (100.0)	0 (0.0)
	Fever	61 (88.4)	8 (11.6)
	Cough and runny nose	67 (97.1)	2 (2.9)
	The itch is worst in the morning	52 (75.4)	17 (24.6)
	The itch is worst at night	61 (88.4)	8 (11.6)
	The itch is worsen in cold weather	40 (58.0)	29 (42.0)

Table 2. Continued

	Knowledge about scabies	Response, n (%)	
		Correct	Incorrect / Missing
7	**Typical symptoms of scabies**		
	Small erythematous papulovesicular lesions predominantly present over the head, face, and neck in adults.	41 (59.4)	28 (40.6)
	Diffuse lesions are common on the face, scalp, neck, palms and soles of infants and young children.	55 (79.7)	14 (20.3)
	Scabies burrows are most easily found on the hands.	58 (84.1)	11 (15.9)
	The typical burrow is a serpiginous tract that measures 1 cm in length.	48 (69.6)	21 (30.4)
	Diagnosis		
8	**Diagnostic tools**		
	Dermatoscopy	69 (100.0)	0 (0.0)
	Digital photography	35 (50.7)	34 (49.3)
	Blood culture and sensitivity test	62 (89.9)	7 (10.1)
	Treatment of Scabies, Scabies Contacts, and Fomites		
9	**Treatment options for scabies**		
	Daily bathing or sauna	48 (69.6)	21 (30.4)
	Permethrin 5% cream/lotion	69 (100.0)	0 (0.0)
	Betamethasone valerate 0.1% cream	56 (81.2)	13 (18.8)
	Benzyl benzoate 10-25% lotion	67 (97.1)	2 (2.9)
	Precipitated sulphur 6-10% petroleum base	51 (73.9)	18 (26.1)
	Crotamiton 10% ointment	66 (95.7)	3 (4.3)
	Lindane 1% lotion/cream (Gamma Benzene Hexachloride)	59 (85.5)	10 (14.5)
	Calamine lotion	44 (63.8)	25 (36.2)
	Ivermectin	53 (76.8)	16 (23.2)
10	**Application site for scabies medications in adults**	60 (87.0)	9 (13.0)
11	**Method of application of scabies medications**		
	Permethrin 5% cream should be rinsed after 24 hours and then reapplied every 24 hours for 3 days and repeated one week later.	55 (79.7)	14 (20.3)
	Benzyl benzoate 10-25% lotion should be rinsed off after 24 hours and then reapplied every 24 hours for 2-3 days.	61 (88.4)	8 (11.6)
	Precipitated sulphur 6-10% in petroleum base should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days.	36 (52.2)	33 (47.8)
	Lindane 1% lotion/cream should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days and repeated one week later.	54 (78.3)	15 (21.7)
	Crotamiton 10% ointment should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days.	45 (65.2)	24 (34.8)
	Ivermectin should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days.	63 (91.3)	6 (8.7)
	Calamine lotion should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days.	60 (87.0)	9 (13.0)
12	**Selection of the most appropriate scabies medication for specific populations**		
	Classical scabies in infants < 2 months	22 (31.9)	47 (68.1)
	Classical scabies in children < 2 years	12 (17.4)	57 (82.6)
	Classical scabies in children < 12 years	4 (5.8)	65 (94.2)
	Classical scabies in adults	14 (20.3)	55 (79.7)
	Classical scabies in pregnancy/lactating women	38 (55.1)	31 (44.9)
	Crusted scabies	9 (13.0)	60 (87.0)
13	**Adverse effects of scabies medications**		
	Permethrin 5% cream/lotion may cause itching and burning stinging sensation on application.	47 (68.1)	22 (31.9)
	Lindane 1% lotion/cream may lead to neurotoxicity, cramps, and seizures in children.	65 (94.2)	4 (5.8)
	Benzyl benzoate 10-25% lotion is contraindicated in patients with seizure disorders.	46 (66.7)	23 (33.3)
	Precipitated sulphur 6-10% petroleum base has high toxicity.	46 (66.7)	23 (33.3)
14	**Treatment of secondary bacterial infection in scabies**		
	Treat with systemic antibiotics which cover gram positive and gram negative organisms.	30 (43.5)	39 (56.5)
	Timing of antibiotic commencement must start together with scabicides.	26 (37.7)	43 (62.3)
	Antiseptic soaks/bath e.g. potassium permanganate (1:10,000) can be used in impetiginised scabies.	64 (92.8)	5 (7.2)
	Topical antibiotics need to be used together with systemic antibiotics.	43 (62.3)	26 (37.7)

Table 2. Continued

	Knowledge about scabies	Response, n (%)	
		Correct	Incorrect / Missing
15	**Statements regarding itchiness in scabies**		
	Itchiness usually persists for about one to two weeks after successful treatment.	59 (85.5)	10 (14.5)
	Antihistamine can be used to treat itchiness in scabies.	69 (100.0)	0 (0.0)
	Corticosteroids cannot be used to treat itchiness in scabies.	37 (53.6)	32 (46.4)
	Emollients cannot be used to treat itchiness in scabies.	35 (50.7)	34 (49.3)
16	**Management of scabies close contacts**		
	A contact is defined as someone who has had prolonged (> 10 minutes on any one occasion) skin to skin contact over the previous two months.	56 (81.2)	13 (18.8)
	Members of the affected household and all close contacts should be treated, even in the absence of symptoms, at the same time.	56 (81.2)	13 (18.8)
	All contacts need to be managed in exactly the same way as the patient.	43 (62.3)	26 (37.7)
	Only one treatment is needed for asymptomatic contacts whereas symptomatic contacts require two treatments (with permethrin 5%).	27 (39.1)	42 (60.9)
17	**Management of scabies fomites**		
	Underwear, clothing, towels, bed linen and personal effects such as slippers, bed jackets and dressing gowns used by the affected person in the 72 hours prior to treatment should be laundered using a hot water cycle (>50 ℃) or hot tumble dried to kill the *Sarcoptes scabiei*.	55 (79.7)	14 (20.3)
	If items are unable to be laundered or hot tumble dried, place them in a plastic bag and leave them for 72 hours before airing and reusing.	36 (52.2)	33 (47.8)
	Mattresses should be thoroughly vacuumed, ironed or steam cleaned, paying particular attention to the seams.	52 (75.4)	17 (24.6)
	Where possible, amenities such as toilets and chairs should not be shared (until 24 hours after the first treatment).	32 (46.4)	37 (53.6)
	Additional environmental controls, such as the use of an insecticide, are necessary.	33 (47.8)	36 (52.2)
18	**Definition of scabies treatment failure**		
	Treatment failure is defined as new papules/vesicles or burrows appearing at any stage after completion of a course of scabicides.	48 (69.6)	21 (30.4)
	Treatment failure is defined as the itch still persists at least 6 weeks after the first course of treatment of scabicides (particularly, if it persists at the same intensity or in increasing intensity).	41 (59.4)	28 (40.6)

Table 3. Association analysis between variables and pharmacists' knowledge score (n=69)

Variables	Simple Linear Regression			Multiple Linear Regression		
	b (95% CI)	t-statistics	*P*-value	Adj. b (95% CI)	t-statistics	*P*-value
Working Experience (Years)	0.492 (<0.001, 0.985)	1.995	0.050	0.326 (-0.274, 0.925)	1.086	0.282
Estimated number of scabies cases encountered per year	0.005 (-0.020, 0.030)	0.375	0.709	0.005 (-0.020, 0.030)	0.370	0.712
Undergraduate Education						
Local public university	Reference			Reference		
Local private university	-3.385 (-7.937, 1.167)	-1.485	0.142	-1.061 (-6.173, 4.051)	-0.415	0.679
Overseas university	-2.569 (-10.847, 5.708)	-0.620	0.538	-0.603 (-9.153, 7.947)	-0.141	0.888

b=crude regression coefficient; Adj. b=Adjusted regression coefficient

DISCUSSION

This study was the first to assess the knowledge of scabies among pharmacists working in district hospitals in Kedah, Malaysia. Overall, the level of knowledge regarding scabies among pharmacists in public district hospitals in Kedah was deemed acceptable. However, the limited availability of comparable studies—both locally and internationally—and the absence of a standardized knowledge assessment tool restricted the ability to benchmark these findings against existing literature. Nonetheless, research involving other healthcare professionals and medical students has been conducted. For example, a study involving medical students in Jos, the capital of Plateau State, Nigeria, reported poor knowledge of scabies among clinical-year students.[17] International studies have similarly revealed inadequate knowledge of scabies among general practitioners.[11,21] In Belgium, 59% of general practitioners demonstrated satisfactory knowledge, while in Pakistan, only 36% showed an adequate awareness level.[11,21] By contrast, approximately 80% of dermatologists in Belgium achieved acceptable scores in scabies-related knowledge.[21]

While some studies suggest that older age—often associated with greater clinical experience—is linked to better knowledge of scabies, our study did not find this association.[11,17,21] Supporting this, a study among general practitioners in Karachi, Pakistan, found no significant relationship between age or years of experience and scabies awareness.[11]

However, a study from Ghent, Belgium, indicated that dermatologists possessed better knowledge than general practitioners, which was influenced by the estimated number of scabies cases managed annually.[9]

Scabies has an incubation period of 2 to 6 weeks. Reinfection within six months of an initial episode may result in quicker symptom onset due to immunological memory.[2,18] Nearly half of the respondents in this study answered incorrectly when asked about the incubation period for both first-time infections (49.3%) and reinfections (43.5%). These findings align with other studies that have reported similar knowledge gaps. For instance, a study conducted in Saudi Arabia found a correct response rate of 66.9%, while research in Türkiye showed that only 29.3% of physicians knew the correct incubation period.[10,22]

Accurate knowledge of medication dosing and appropriate application sites is crucial for the effective treatment of scabies. However, this study revealed that not all respondents correctly identified medication regimens, including application site, duration, dose, and frequency. Furthermore, the majority of pharmacists were unable to identify suitable treatment options for specific populations. Inappropriate use of medication not only compromises treatment effectiveness but may also lead to preventable adverse drug reactions.[23] The limited availability of certain scabies treatments in some healthcare facilities, coupled with variations in patient demographics, may contribute to this knowledge gap. These pharmacists may also have had limited hands-on experience, fewer training opportunities, and restricted access to reference materials. Therefore, targeted educational interventions focusing on scabies treatment protocols are warranted.

Although scabies mites do not survive long outside the human body, they can be transmitted via contaminated fomites.[4,24] Hence, appropriate management of close contacts and potentially contaminated items is essential to prevent reinfection.[18,25] Pharmacists play a key role in counselling patients on these preventive measures. However, practical limitations—such as high patient loads and long waiting times at ambulatory pharmacies—can hinder the provision of thorough counselling.[26,27] This may account for the poor awareness among respondents regarding the steps necessary to prevent reinfection, as they may not routinely offer such guidance to patients.

In addition, pharmacists are instrumental in identifying and preventing adverse drug reactions. A lack of awareness regarding the potential side effects of scabies medications could lead to underreporting, thereby jeopardizing patient safety.[28,29] This study found that some pharmacists were unsure about the common adverse effects associated with scabies treatments. This uncertainty may stem from limited exposure to medications that are unavailable in their respective facilities.

Limitations of the study

This study has several limitations. Firstly, as it employed a self-administered questionnaire, respondents may have been subject to recall bias, particularly in estimating the number of scabies cases seen per year. Secondly, data on the types of scabies cases encountered (adult or paediatric) and the specific medications available at each facility were not collected. Thirdly, the study did not assess respondents' attitudes and practices in managing scabies patients. These omissions limited our ability to provide deeper justifications for the observed knowledge scores. Additionally, although all practising pharmacists in public district hospitals in Kedah were invited to participate, the total sample size was relatively small (n = 69), which may have reduced the statistical power of the analysis, preventing the detection of statistical significance. Future studies should consider investigating the types of scabies cases encountered, the availability of treatment options, pharmacists' detailed working experience, and their attitudes and practices toward scabies management.

CONCLUSION

This study found that pharmacists practising in public district hospitals in Kedah, Malaysia, were generally able to answer most questions on scabies correctly. However, there remains a need for targeted educational interventions to strengthen their knowledge in key areas of scabies management. These include the appropriate selection of scabies medications for specific populations, correct medication regimens (including dose, duration, and application sites), treatment of secondary bacterial infections, management of close contacts and potentially contaminated fomites, and awareness of adverse drug reactions associated with scabies treatments.

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CONFLICT OF INTEREST

All authors declare no conflict of interest.

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ETHICAL APPROVAL

The study was registered with the National Medical Research Register, Malaysia (NMRR-19-2683-50436), and was approved by the Medical Research Ethics Committee, Malaysia. The study was conducted in compliance with ethical principles outlined in the Malaysian Good Clinical Practice Guideline and the Declaration of Helsinki.

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SUPPLEMENTARY FILE 1

Questionnaire

1. What is the causative agent of scabies (indicate single best response): (1 mark)

A. Mite
B. Fungus
C. Bacteria

2. Which of the following cause(s) itchiness and rashes in scabies? (3 marks)

The proteins from *Sarcoptes scabiei*	YES / NO
The proteins from *Sarcoptes scabiei's* egg	YES / NO
The bite by *Sarcoptes scabiei*	YES / NO

3. The incubation period of scabies for those without previous exposure is usually: (1 mark)

A. 1-5 days
B. 5-7 days
C. 2-3 months
D. 2-6 weeks

4. The incubation period of scabies in individuals who have been previously infested with scabies is usually: (1 mark)

A. 1-5 days
B. 5-7 days
C. 2-3 months
D. 2-6 weeks

5. Scabies can be transmitted by (more than one answers is allowed): (6 marks)

Being in the same room with a scabies patient	YES / NO
Sleeping with a scabies patient	YES / NO
Using clothes and linen of a scabies patient	YES / NO
Using fork and knife of a scabies patient	YES / NO
Sexual contact	YES / NO
Sharing bodycare with a scabies patient	YES / NO

6. Which of the following are the typical symptoms of scabies? (6 marks)

Generalised, very intense and intractable itch	YES / NO
Fever	YES / NO
Cough and runny nose	YES / NO
The itch is worst in the morning	YES / NO
The itch is worst at night	YES / NO
The itch is worsen in cold weather	YES / NO

7. Are the following statements regarding scabies true or false? (4 marks)

Small erythematous papulovesicular lesions predominantly present over the head, face, and neck in adults	True / False
Diffuse lesions are common on the face, scalp, neck, palms and soles of infants and young children	True / False
Scabies burrows are most easily found on the hands	True / False
The typical burrows is a serpiginous tract that measures 1 cm in length	True / False

8. What type of investigation can give information relevant for diagnosing scabies? (3 marks)

Dermatoscopy	YES / NO
Digital photography	YES / NO
Blood culture and sensitivity test	YES / NO

SUPPLEMENTARY FILE 1

Questionnaire

9. Which of the following options is an treatment option for scabies (multiple answers are permitted): (9 marks)

Daily bathing or sauna	YES / NO
Permethrin 5% cream/lotion	YES / NO
Betamethasone valerate 0.1% cream	YES / NO
Benzyl benzoate 10-25% lotion	YES / NO
Precipitated sulphur 6-10% petroleum base	YES / NO
Crotamition 10% ointment	YES / NO
Lindane 1% lotion/cream (Gamma Benzene Hexachloride)	YES / NO
Calamine lotion	YES / NO
Ivermectin	YES / NO

10. In adults, the drug should be applied (indicate single best response): (1 mark)

A. apply thinly to the affected areas
B. until itchiness resolved
C. from neck downwards to all over the body

11. Are the following statements true or false? (7 marks)

Permethrin 5% cream should be rinsed after 24 hours and then reapplied every 24 hours for 3 days and repeated one week later	True / False
Benzyl benzoate 10-25% lotion should be rinsed off after 24 hours and then reapplied every 24 hours for 2-3 days	True / False
Precipitated sulphur 6-10% in petroleum base should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days	True / False
Lindane 1% lotion/cream should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days and repeated one week later	True / False
Crotamiton 10% ointment should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days	True / False
Ivermectin should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days	True / False
Calamine lotion should be rinsed off after 24 hours and then reapplied every 24 hours for 3 days	True / False

12. Kindly select the best treatment for the following patients: (6 marks)

A. Daily bathing or sauna
B. Permethrin 5% cream/lotion
C. Betamethasone valerate 0.1% cream
D. Benzyl benzoate 10 – 25% lotion
E. Precipitated sulphur 6 to 10% Petroleum base
F. Crotamiton 10% Ointment
G. Lindane 1% Lotion/cream (Gamma benzene hexachloride)
H. Ivermectin
I. Calamine lotion

Classical scabies in infants <2 months	
Classical scabies in children <2 years	
Classical scabies in children <12 years	
Classical scabies in adults	
Classical scabies in pregnancy/lactating women	
Crusted scabies	

SUPPLEMENTARY FILE 1

Questionnaire

13. Are the following statements true or false? (4 marks)

Permethrin 5% cream/lotion may cause itching & burning stinging sensation on application	True / False
Lindane 1% lotion/cream may lead to neurotoxicity, cramps, and seizures in children	True / False
Benzyl benzoate 10-25% lotion is contraindicated patients with seizure disorders	True / False
Precipitated Sulphur 6 to 10% Petroleum base has high toxicity	True / False

14. Are the following statements regarding secondary bacterial infection in scabies true or false? (4 marks)

Treat with systemic antibiotics which cover gram positive and gram negative organisms	True / False
Timing of antibiotic commencement must start together with scabicides	True / False
Antiseptic soaks/bath e.g. $KMnO_4$ (1:10,000) can be used in impetiginized scabies	True / False
Topical antibiotics need to be used together with systemic antibiotics	True / False

15. Are the following statements regarding itchiness in scabies true or false? (4 marks)

Itchiness usually persists for about one to two weeks after successful treatment	True / False
Antihistamine can be used to treat itchiness in scabies	True / False
Corticosteroids cannot be used to treat itchiness in scabies	True / False
Emollients cannot be used to treat itchiness in scabies	True / False

16. Are the following statements regarding treatment of scabies contacts true or false? (4 marks)

A contact is defined as someone who had prolonged (>10 min on any one occasion) skin to skin contact over the previous two months	True / False
Members of the affected household and all close contacts should be treated, even in the absence of symptoms, at the same time	True / False
All contacts need to be managed in exactly the same way as the patient	True / False
Only one treatment is needed for asymptomatic contacts whereas symptomatic contacts require two treaments (with permethrin 5%)	True / False

17. Are the following statements regarding treatment of fomites true or false? (5 marks)

Underwear, clothing, towels, bed linen and personal effects such as slippers, bed jackets and dressing gowns used by the affected person in the 72 hours prior to treatment should be laundered using a hot wash cycle (>50^{o}C) or hot tumble dired to kill the *Sarcoptes scabiei*	True / False
If items are unable to be laundered or hot tumble dried, place them in a plastic bag and leave them for 72 hours before airing and reusing	True / False
Mattresses should be thoroughly vacuumed, ironed or steam cleaned, paying particular attention to the seams	True / False
Where possible, amenities such as toilets and chairs should not be shared (until 24 hours after the first treatment)	True / False
Additional environment controls, such as the use of an insecticide, are necessary	True / False

SUPPLEMENTARY FILE 1

Questionnaire

18. Are the following statements regarding treatment failure true or false? (2 marks)

Treatment failure is defined as new papules/vesicles or burrows appearing at any stage after completion of a course of scabicides	True / False
Treatment failure is defined as the itch still persists at least 6 weeks after the first course of treatment of scabicides (particularly, if it persists at the same intensity or is increasing in intensity)	True / False