



## Hand Foot and Mouth Disease (HFMD) Educational Workshop for Preschool Teachers: An Interventional Study

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### ABSTRACT

Hand, foot and mouth disease (HFMD) mainly affects children below five years of age. The disease can be prevented by focusing on hand hygiene, disinfection of premises, and cough etiquette. Teachers at pre-school play a vital role in inculcating good hygiene habits among children. This project aimed to determine pre and post-intervention level of knowledge, attitude and practices on HFMD among pre-schools teachers. This study involved pre-school teachers from Ampang, Selangor, Malaysia who were invited to a 5-hour event "HFMD: Infection Control Workshop". Questionnaires on knowledge, attitude and practice on HFMD were distributed before and immediately after the event. A total of 112 teachers were recruited. All were female, mostly (90%) from government pre-schools with the mean age of 35.8. Post-intervention total means a score of knowledge increased significantly, notably on the causative agent (23%) and complications of HFMD (26-45%). Mean attitude scores were also significantly increased, especially regarding the cleaning of toys and sharing of utensils. Meanwhile, practice scores were very high during pre-intervention but were insignificantly reduced post-intervention. The intervention improved respondents' knowledge and attitude significantly. Findings from this study highlighted the need to provide more HFMD program focusing on the basic information of the disease, including mode of transmission and clinical manifestation. We hope that the knowledge gained will be imparted to fellow teachers and children under their care towards minimizing the spread of HFMD.



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### INTRODUCTION

Hand, foot and mouth disease (HFMD) is caused by a group of enteroviruses such as coxsackie A16, A6, enterovirus EV71, EV72, and poliovirus. The disease mainly affects children under the age of 5, with an average age of 2.45 years and a ration of 1.54:1 male to female (Tao *et al.*, 2011). Infected children typically suffer from fever, vesicular eruptions, particularly in the cavities of the palm, the sole, and oral. Severe disease from strain EV71 causes encephalitis and death (Zhao *et al.*, 2017).

EV71 epidemics occur in Malaysia in a cyclical pattern of 2 - 3 years, mainly due to a decline in population immunity, which results in the accumulation of susceptible children between epidemics (NikNadia *et al.*, 2016).

The incidence of HFMD in Malaysia increased in 2018, leading to the closure of hundreds of kindergartens and pre-schools (The Star, 2018). The disease that is transmitted through close contact, infected surfaces and respiratory droplets can be prevented by hand hygiene, disinfection of premises and cough etiquette. Teachers, parents and caregivers play a vital role in the prevention of the disease by instilling good hygiene habits in children. They were considered to be the most common source of knowledge on personal hygiene for pre-school children (Ghanim *et al.*, 2016). However, home caregivers and mothers of pre-school children were found to have low knowledge level on HFMD and its associated prevention (Charoenchokpanit, 2013; Suliman *et al.*, 2017) Similar findings were also found in a study conducted among rural pre-school teachers (Yusop *et al.*, 2019).

Various hygiene and infectious diseases-related interventions had been done in pre-schools and kindergartens, and hand hygiene interventions were shown to improve children's awareness and proper hand hygiene practices (Lange *et al.*, 2019; Rani *et al.*, 2020). Similar interventions also reduced the incidence of HFMD and absenteeism due to illnesses (Liu *et al.*, 2019; Mohamed *et al.*, 2019). Nonetheless, almost all reported interventions included only children as their subjects. Given the endemicity of HFMD in the kindergarten and pre-schools, the level of knowledge among caregivers, specific health educational programs (intervention) for this particular group should be conducted to increase awareness of the disease and its prevention. We have, therefore embarked on this project to determine the pre and post-intervention level of knowledge, attitude, and practices on HFMD among pre-schools teachers.

## METHODOLOGY

This study involved pre-school teachers from Ampang, Selangor, Malaysia. All teachers from government and private pre-schools were invited; however, the attendees were selected by their superior. 112 teachers were invited to the "HFMD: Infection Control Workshop" event, which took place for five hours on 18 December 2018. The program began with the distribution of the questionnaire on the knowledge, attitude, and practice of HFMD at the registration desk. Participants were

asked to answer the questionnaire before they could proceed to the main hall for further activities.

The self-administered questionnaire was adapted and developed from previous studies (Lou and Lin, 2006; Charoenchokpanit, 2013; Suliman *et al.*, 2017). The first section covered sociodemographic data. The second section was about knowledge of HFMD consisted of 28 questions. The first question was an open-ended question asking about the definition of HFMD. The accurate answer received one mark, and the incorrect answer received 0 marks. Moreover, five questions were asked about general knowledge on HFMD, 11 questions on signs and symptoms, five questions on complications and six questions on the mode of transmission. The answer given was 'true', 'false' and 'don't know'. Participants received 1 point for each correct answer; with a maximum score of 27.

The third section focuses on the attitude towards hand hygiene. There were 10 questions with 5-point Likert Scale answer options, ranging from 'Strongly Disagree' to 'Strongly Agree'. For positive statement, one mark was given for respondents who answered 'strongly disagree', two marks for 'disagree', three marks for 'neutral', four marks for 'agree', five marks for 'strongly agree'; with a maximum score of 50. Reverse scoring was given accordingly for negative statement for this section. The last section was practice towards hand hygiene. There were 7 questions in this section and with three different answers (Always, Sometimes, Never) with a maximum score of 7. Respondents who answered 'always' for positive practice were given 1 mark, and those who answered 'sometimes' or 'never' were given 0 marks. Reverse scoring was given accordingly for negative practice for this section.

The event or interventional workshop consisted of a forum on HFMD in general and its challenges in pre-schools, interactive lecture regarding public health management of outbreak and hands-on session on HFMD prevention. Participants were divided into ten groups for the hands-on session that included four interactive stations; hand hygiene, cough etiquette, disinfection and infectious diseases. A similar set of questionnaires was provided at the end of the workshop. Upon departure, participants received a set of 'teaching aid kits' consisting of a thumb drive (with hand hygiene songs/videos, disinfection notes and hand hygiene/cough etiquette coloring sheets and puzzles). Data were statistically analysed using Statistical Package for the Social Sciences (SPSS) software Version 20; IBM Corp., Armonk, NY, the USA for Windows. Descriptive analysis was performed for demographic information.

**Table 1: Sociodemographic characteristics of respondents (N=91)**

Characteristics	Mean (SD)	Frequency (n)	Percentage (%)
<b>Age (years)</b>	35.81(7.68)		
<b>Ethnicity</b>			
Malay		90	97.8
India		1	1.0
<b>Gender</b>			
Male		2	2.2
Female		89	97.8
<b>Education level</b>			
SPM		19	20.9
Certificate		11	12.1
Diploma		46	50.5
Degree		15	16.5
<b>Types of kindergarten</b>			
Ministry of Rural Development		36	39.6
Ministry of Education		46	50.5
Private		9	9.9
<b>Occupation</b>			
Teacher		40	44.0
Headmaster/ entrepreneur		6	6.5
Kindergarten assistant		45	49.5

Bivariate analysis using Paired T-test was performed to determine the difference of mean total score pre and post-intervention for knowledge, attitude and practice.

A total of 112 teachers and assistant attended the workshop and answered the questionnaire. However, due to the data and information incompleteness, only 91 (81.2 per cent) survey forms were analysed. The mean age of the respondents was 35.81 (7.68). Most of the respondents were Malay (n=90, 7.8%), females (n=89, 97.8%) and have diploma (n=46, 50.5%). Majority were teachers and assistant (n=85, 93.5%) from government sectors (n=82, 90.2%). The sociodemographic characteristics of respondents are shown in Table 1.

#### **Knowledge of HFMD pre and post Intervention**

Table 2 showed the percentage of correct answer scores pre and post-intervention. For the general knowledge section, the scores of four out of five questions were increased after the intervention.

Meanwhile, only three out of eleven questions showed increment. For complication section, three questions showed more than 20% increment of correct answer score after the intervention.

#### **Attitude towards HFMD pre and post Intervention**

There was an increment of the mean score for all

questions regarding attitude, as shown in Table 3.

#### **Practice towards HFMD pre and post-intervention**

For practice, the percentage of correct answers ranged from 70 to 90% before the intervention. Post-intervention, the percentage slightly decreased among eleven questions while two other questions showed a slight increment, as shown in Table 4.

#### **Knowledge, Attitude and Practice towards HFMD pre and post Intervention**

The mean total score post-intervention for knowledge (24.36) and attitude (43.78) was higher than the mean total score for knowledge (22.39) and attitude (41.68) pre-intervention.

There were significantly different from the mean total score on knowledge and attitude on HFMD pre and post-intervention, as shown in Table 5.

#### **DISCUSSION**

The intervention applied various methods of delivery to ensure better understanding and active participation. The forum allowed participants to ask questions and share experience in handling HFMD infection in their respective premises. Interactive methods have been shown to improve outcome enhance knowledge on infection prevention (Koo

**Table 2: Knowledge of HFMD pre and post Intervention**

Knowledge on HFMD	Pre-Intervention (N=91)		Post-Intervention (N=91)	
	Correct (n, %)	Incorrect (n, %)	Correct (n, %)	Incorrect (n, %)
<b>General knowledge</b>				
Children are the highest risk group to be infected with HFMD*	91 (100.0)	-	91 (100.0)	-
HFMD is classified as a fatal disease*	73 (80.2)	19 (19.8)	88 (96.7)	3 (3.3)
All HFMD patients need to be hospitalised	32 (35.2)	59 (64.8)	29 (31.9)	62 (68.1)
HFMD can be treated*	90 (98.9)	1 (1.1)	89 (97.8)	2 (2.2)
HFMD is caused by virus infection*	64 (70.3)	27 (29.7)	89 (97.7)	2 (2.2)
<b>Common Signs and symptoms</b>				
Fever*	89 (97.8)	2 (2.2)	89 (97.8)	2 (2.2)
Diarrhea	42 (46.2)	49 (53.8)	29 (31.9)	62 (68.1)
Ulcer at throat or mouth	88 (96.7)	3 (3.2)	87 (95.6)	4 (4.4)
Vomiting	33 (36.3)	58 (63.7)	11 (12.1)	80 (87.9)
Blisters on the palms*	90 (98.9)	1 (1.1)	90 (98.9)	1 (1.1)
Blisters on the feet*	89 (97.8)	2 (2.2)	89 (97.8)	2 (2.2)
Blisters at the diapers area*	60 (65.9)	31 (34.1)	70 (76.9)	21 (23.1)
Loss of appetite*	86 (94.5)	5 (5.5)	87 (95.6)	4 (4.4)
Headache	22 (24.2)	69 (75.8)	22 (24.2)	69 (75.8)
Red eyes	33 (36.3)	58 (63.7)	33 (36.3)	58 (63.7)
Short of breath	26 (28.6)	65 (71.4)	32 (35.2)	59 (64.8)
<b>Complications</b>				
Meningitis*	43 (47.3)	48 (52.7)	68 (74.7)	23 (25.3)
Myocarditis	33 (36.3)	58 (63.7)	22 (24.2)	69 (75.8)
Encephalitis*	24 (26.4)	67 (73.6)	70 (76.9)	21 (23.1)
Acute flaccid paralysis	33 (36.6)	58 (63.7)	40 (44.0)	51 (56.0)
Death*	63 (69.2)	28 (30.8)	81 (89.0)	10 (11.0)
<b>Mode of transmission</b>				
Skin contact	6 (6.6)	85 (93.4)	2 (2.2)	89 (97.8)
Blister fluid contact*	83 (91.2)	8 (8.8)	89 (97.8)	2 (2.2)
Saliva*	81 (89.0)	10 (11.0)	87 (95.6)	4 (4.4)
Food	35 (38.5)	56 (61.5)	37 (39.8)	56 (60.2)
Feces/ excretion*	42 (46.2)	49 (53.8)	44 (47.3)	49 (52.7)
Respiratory droplets*	77 (84.6)	14 (15.4)	88 (96.7)	3 (3.3)

\*refer to yesis the correct answer

**Table 3: Attitude towards HFMD pre and post Intervention**

Attitude on HFMD	Pre-Intervention (mean/SD) (N=91)	Post-Intervention (mean/SD) (N=91)
I agree that children under the age of five are at high risk for HFMD*	4.54 (0.82)	4.63 (0.85)
I am worried if there are children playing in the playground during the HFMD outbreak*	4.42 (1.15)	4.60 (0.81)
I am worried if children under my care playing with other children during the HFMD outbreak	4.56 (0.86)	4.63 (0.80)
I think that HFMD disease can be controlled by not accepting HFMD-infected children in my kindergarten	4.30 (1.10)	4.45 (1.00)
Proper handwashing practices can prevent HFMD infection*		
Proper handwashing practices can prevent HFMD infection*	4.58 (0.91)	4.66 (0.87)
There are many benefits that I can obtain if I constantly monitor my children's health*	4.54 (0.82)	4.61 (0.88)
Washing children's toys regularly using cleansing fluids is not necessary	3.29 (1.65)	3.75 (1.58)
I'm worried that my method of washing hands isn't right*	3.90 (1.10)	4.04 (1.17)
I agree that HFMD-infected children's feeding equipment can be shared with other children	3.27 (1.63)	4.06 (1.45)
I think properly washed dishes can be used for other children*	4.08 (1.07)	4.32 (0.89)

\*refer to positive statement

*et al.*, 2016).

Knowledge of HFMD among pre-school teachers and assistants was significantly increased after the intervention. This is in agreement with another recent study by Phung et al., where intervention resulted in improvement of knowledge on HFMD among caregivers (Phung, 2019). The most notable improvements were seen for the following questions; 'HFMD is caused by a virus' (23%), 'Complication of HFMD is death' (26%), and 'Complication of HFMD is encephalitis' (45%). Even though complications are rare, knowledge about the complications of HFMD is essential so that teachers or parents will be more alert when the infected children show unusual symptoms.

Nearly 60% of respondents answered yes for this statement; "All HFMD infected patients need to be hospitalised". Most HFMD infections are mild and only require outpatient treatment. Hospitalisation is warranted for those with moderate to severe dehydration and complications. Regarding symptoms of HFMD, most respondents were aware of the typical clinical manifestations such as fever, mouth ulcer and vesicles on the soles, palms and perianal

region. Other symptoms such as diarrhoea, vomiting, shortness and breath and neurological symptoms had also been reported and associated with severe HFMD infections (Sun et al., 2018). Apart from saliva, respiratory droplets and blisters' fluid, most respondents also thought that HFMD spread via skin and food. Less than half of them were aware that HFMD also spread via feces. A study in China suggested that fecal-oral might be the primary transmission mode of HFMD among children (Sun et al., 2016).

Attitude on HFMD was also significantly increased after the intervention. The mean score for two negative statements "Washing children's toys regularly using cleansing fluids is not necessary" and "I agree that HFMD-infected children's feeding equipment can be shared with other children" showed significant increment after the intervention. In the childcare setting, respiratory droplets and saliva of infected patients could easily spread to other children by sharing toys, stationeries and utensils. Thus, proper disinfection of shared items frequently touched areas, and the environment should be done regularly according to guidelines ( MOH Singapore,

**Table 4: Practice towards HFMD pre and post Intervention**

Practice on HFMD	Pre-Intervention (N=93)		Post-Intervention (N=91)	
	Always (n, %)	Sometimes / never (n, %)	Always (n, %)	Sometimes / never (n, %)
I cover my mouth while sneezing*	89 (97.8)	2 (2.2)	86 (94.5)	5 (5.5)
I cover my mouth while coughing*	87 (95.6)	4 (4.4)	86 (94.5)	5 (5.5)
I wash my hands when preparing food for the children*	91 (100.0)	-	89 (97.8)	2 (2.2)
I wash my hands after using the toilet*	91 (100.0)	-	87 (95.6)	4 (4.4)
I cleaned my hands after changing children's diapers*	88 (96.7)	3 (3.3)	85 (93.4)	6 (6.6)
It took me at least 20 seconds to wash my hands*	74 (81.3)	17 (18.7)	65 (71.4)	26 (28.6)
I brought children under my care to public places during the HFMD outbreak	76 (83.5)	15 (16.5)	84 (92.3)	7 (7.7)
I forbid children to put toys into their mouths*	82 (90.1)	9 (9.9)	85 (93.4)	6 (6.6)
I clean toys using disinfectant*	80 (87.9)	11 (12.1)	74 (81.3)	17 (18.7)
I clean the premises every day*	78 (85.7)	13 (14.3)	77 (84.6)	14 (15.4)
The school checks the children's HFMD signs at the entrance*	72 (79.1)	19 (20.9)	72 (79.1)	19 (20.9)
The school provides a day off for children with HFMD*	89 (97.8)	2 (2.2)	86 (94.5)	5 (5.5)
I will make sure students wash their hands thoroughly*	91 (100.0)	-	85 (93.4)	6 (6.6)

**Table 5: Knowledge, Attitude and Practice towards HFMD pre and post Intervention (N=91)**

Variable	Mean (SD)		t-statistics (df)	P-value
	Pre-intervention	Post-Intervention		
Total knowledge score (full score : 28)	17.48 (3.40)	19.21 (3.09)	-3.870 (90)	<0.001**
Total attitude score (full score:50)	41.51 (6.79)	43.78 (6.31)	-3.123 (90)	0.002
Total practice score (full score:13)	11.95 (1.26)	11.66 (2.20)	1.251 (90)	0.214

*p* is significant at  $p < 0.001^{**}$ , *p* is significant at  $p < 0.05^{*}$

2019). This study showed that respondents had a decent level of practice even before the intervention. This finding could be attributed to a recent outbreak of HFMD and series of talks on preventive measures conducted by the Ministry of Health to curb the disease spread.

number of respondents due to limited budget, inadequate facilities and trainers. Highly rejected survey forms (18%) were mainly due to improper instruction to the participants, particularly during the peak period (where a group of participants mobbed the counter).

This study provided baseline data on the knowledge, attitude and practice regarding hand, foot and mouth disease. However, it was limited by the small

**CONCLUSION**

The intervention improved respondents' knowledge and attitude significantly. Findings from this study highlighted the need to provide more HFMD program focusing on the basic information of the disease, including mode of transmission and clinical manifestation. We hope that the knowledge gained will be imparted to fellow teachers and children under their care towards minimising the spread of HFMD.

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**Conflict of Interest**

The authors declare no conflict of interest for this study.

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