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Knowledge and Attitudes on Childhood Immunisation among Parents in Bintulu Hospital

Man Fung CHIN[1], Shirlie CHAI[2,3]

[1] *Pharmacy Department, Bintulu Hospital, Sarawak*

[2] *Pharmacy Department, Miri Hospital, Sarawak*

[3] *Clinical Research Centre Miri, Sarawak*

Corresponding author name and email: Man Fung CHIN (chinmf@moh.gov.my)

ABSTRACT

Introduction: Childhood immunisation is one of the World Health Organisation's (WHO) strategies for reducing vaccine-preventable diseases and mortality and improving the quality of life in the population. Parental perception regarding vaccination is very important in promoting vaccination and compliance with the immunisation schedule. The objective of this study was to assess the knowledge and attitude on childhood immunisation, and the associated factors among parents of paediatric patients in Bintulu Hospital, Sarawak.

Methods: A cross-sectional study was conducted among parents of paediatric patients aged 0-12 years old who were admitted to the Paediatric Ward in Bintulu Hospital from April to July 2020. The self-administered questionnaires consisted of seven questions each to assess knowledge and attitude on childhood immunisation. Data entry and statistical analysis were performed using SPSS software version 23.0. Descriptive statistics were used to summarise parents' demographics and linear regression analyses were used to determine the associated factors. *P*-values of <0.05 were considered statistically significant.

Results: A total of 131 parents participated in this study. The majority understood the importance of routine vaccination in preventing infectious diseases and their complications (91.6%) and knew the timing of the first dose in the vaccination schedule (94.7%). Less than half responded correctly

with regards to whether administration of multiple vaccines at the same time have no negative impacts on child immunity (45.0%) and the contraindications to vaccination (38.2%). Parents agreed that childhood immunisation is important (99.2%), yet some were unsure if it is associated with side effects (38.2%). Gender ($P<0.001$) and education level ($P=0.030$) were significantly associated with parents' knowledge score, whereas the number of children ($P=0.031$) was associated with their attitude score.

Conclusion: The parents possessed the knowledge and showed applaudable attitudes in some aspects of childhood immunisation. However, future educational interventions should target the lacking aspects to further increase the acceptance of childhood immunisation among parents.

Keywords: Childhood immunisation, parents, knowledge, attitude

INTRODUCTION

According to the World Health Organisation (WHO) report in 2018, approximately 19.4 million children under the age of one year did not receive the basic vaccine (1). Childhood immunisation is a very effective healthcare intervention in reducing the mortality rate of infants and toddlers due to vaccine-preventable diseases. Studies had shown that 2.5 million lives around the world are saved by vaccination and prevent 750,000 more from disabilities (2).

All countries should introduce immunisation against poliomyelitis, diphtheria, pertussis, tetanus, measles, and tuberculosis infection especially in countries with higher incidence according to the WHO Expanded Programme on Immunisation (EPI) (3). In the year 2018, 129 countries had reached at least 90.0% coverage of the third dose of Diphetria, Tetanus, and Pertussis vaccines (DTP3) (1). EPI recommended that every country determine its own immunisation schedule as no single schedule is ideal for all countries. The most crucial principle of any immunisation programme was that protection must be achieved before infants are at high risk of disease (3).

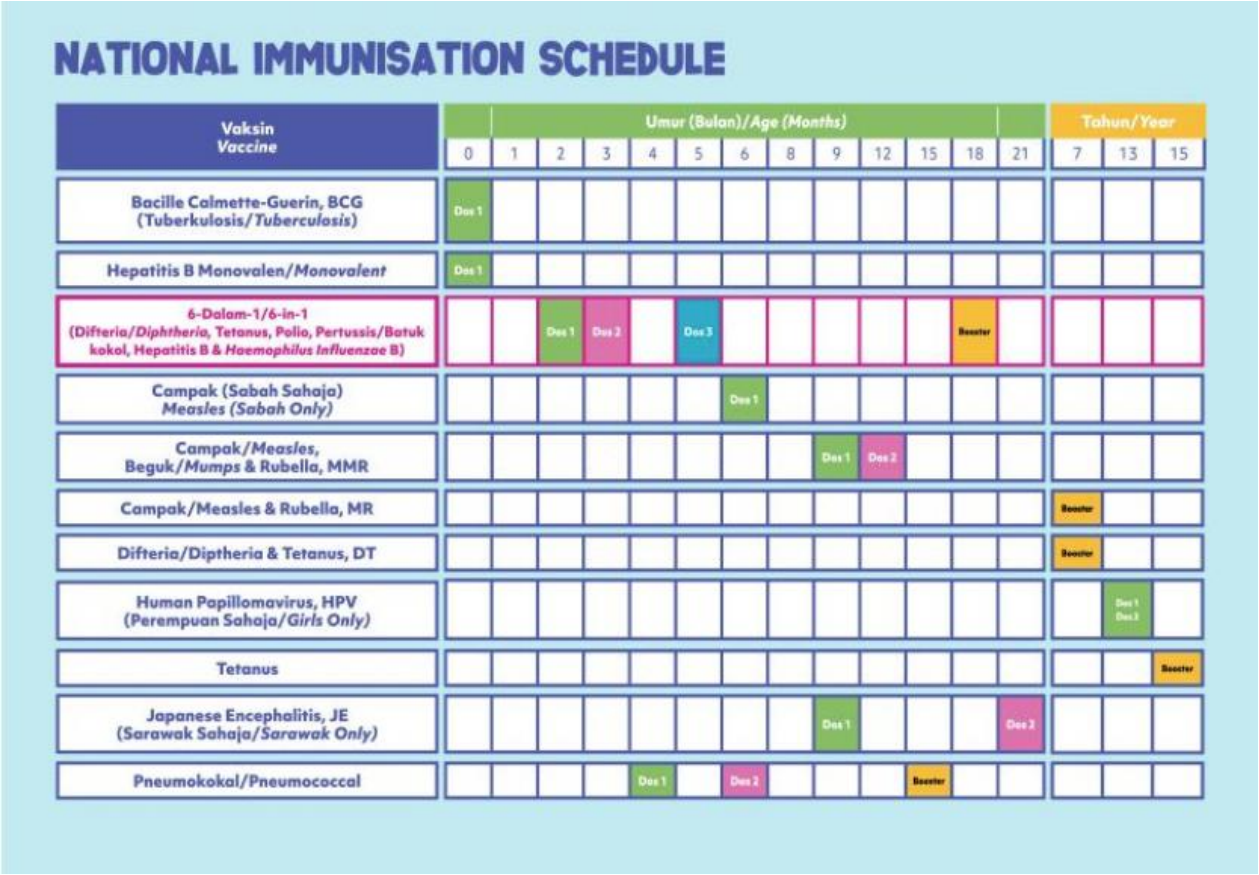

Figure 1: Immunisation schedule (4)

Figure 1 shows the latest recommended immunisation schedule in Malaysia. The first vaccine that was introduced in Malaysia about 60 years ago was Diphetria, Pertussis, and Tetanus (DPT) vaccine, followed by Bacille Calmette-Guerin (BCG) vaccine in 1961 and Oral Polio Vaccine (OPV) vaccine in 1972. The measles vaccine was introduced later in 1984, the rubella vaccine in 1988, and then the Hepatitis B vaccine in 1989 (3). The immunisation covers more than 90.0% of all vaccine-preventable diseases (3).

Various studies had shown many factors contributing to the practice of childhood immunisation among parents. One of them was parents' refusal of childhood vaccinations which increases the risk of exposure to the population. Malaysia reported its first polio case in Sabah in 2019 after the last occurrence in 1992. Furthermore, there were more than 20 diphtheria cases with 5 deaths reported in 2016 (5). The main reason for this outbreak was due to parents' refusal of childhood vaccination as they were concerned about the vaccine safety and had rather opted for natural remedies like homeopathy (5).

Information from multiple sources also affects parents' decision to childhood immunisation. There are lots of conflicting vaccine-safety information and misinformation on the internet which influenced parents' decisions. A study conducted in the United States concluded that if parents had enough accurate information about vaccination, their child will be immunised (6).

Parents' knowledge and attitudes were also reported to influence the practice of immunisation. According to Zagminas et al., most of the respondents had a positive opinion about vaccination, but between 20.0% and 40.0% of them showed insufficient knowledge on the matter (7). This study aimed to assess knowledge and attitude towards childhood immunisation and the associated factors among parents of paediatric patients in Bintulu Hospital, Sarawak.

METHODS

Study Design

We conducted a cross-sectional study among parents of paediatric patients aged 0-12 years old who were admitted to the Paediatric Ward in Bintulu Hospital from April to July 2020. All eligible parents were invited to participate and were explained the purpose of the study. Written informed

consent was obtained upon their participation. Parents were reminded that their participations were voluntary and they had the right to withdraw from the study at any time.

Data Collection Tool

Self-answered responses were recorded in a questionnaire adapted from a previous study conducted by Elbur et al. in 2014 (8). The self-administered questionnaire consisted of three sections to collect data on the parents' demographics, knowledge, and attitudes on childhood immunisation. The questionnaires consisted of seven questions each to assess knowledge and attitude. Responses to the questions on knowledge were recorded as "Yes", "No", and "Don't know". Each correct response contributed to one point, and zero points were given for unsure or incorrect responses. The maximum score on knowledge was seven points. Questions on attitude were collected on a five-point Likert scale (1–strongly disagree, 2–disagree, 3–not sure, 4–agree, 5–strongly agree). Reverse scoring was applied in scoring the question "*Child immunisation is prohibited in religion*". Parents were given ten minutes to answer the questionnaire.

Statistical Analysis

We performed the data entry and statistical analysis using Statistical Package for Social Sciences (SPSS) software Version 23.0. Descriptive statistics summarised the demographic variables and linear regression analyses were used to analyse the associated factors. *P*-values of <0.05 were considered statistically significant.

Sample Size Calculation

We calculated the sample size using G*Power software version 3.1.9.4. The estimated sample size was 131 respondents. The calculation was based on the conventional choice of level of significance, i.e. type one error of 5.0% (α=0.05), study power of 80.0% (β=0.2), the effect size of 0.15, five predictors, and 30.0% of unusable data.

Ethical Consideration

This study was registered in the National Medical Research Registry (NMRR-20-321-53743) and approved by the Medical Research and Ethics Committee, Ministry of Health Malaysia. Personal details and data collected from the questionnaire were strictly kept confidential with only the investigator and project administrator having access to it.

RESULTS

Parents' Demographics

A total of 131 parents participated in this study. The majority were female (91.6%), aged 29 years old or younger (55.7%), residing in town (73.3%), and had secondary education (73.3%). Table 1 shows the parents's demographics.

Table 1: Parents' demographics (n=131)

Background Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	11	8.4
Female	120	91.6
Age groups (in year)		
18-29	73	55.7
30-39	48	36.6
40-49	10	7.7
50 & above	0	0.0
Residence		
Town	96	73.3
Outside town	35	26.7
Educational level		
Tertiary	22	16.8
Secondary	96	73.3
Primary	13	9.9
Number of children		
1	34	25.9
2-3	69	52.7
>3	28	21.4

Parental Knowledge on Childhood Immunisation

A vast majority of parents understood the importance of routine vaccination in preventing children from some infectious diseases and complications (91.6%) and knew the timing of the first dose in the vaccination schedule (94.7%). However, fewer parents knew that children who are vaccinated are protected from most diseases during the first years of life (79.4%) and that the administration of multiple doses of the same vaccine is important for child immunity (88.5%). However, less than half of the parents knew that more than one vaccine given at the same time has no negative impacts on child immunity (45.0%). More than half of the parents agreed that there is no association between immunisation and autism (60.3%). More than one-third of the parents knew that common

colds, ear infections, and diarrhea are not contraindications for vaccinations (38.2%). Table 2 shows the responses to the questions on parents' knowledge of childhood immunisation.

Table 2: Knowledge on childhood immunisation

Item	n (%)		
	Yes	**No**	**Don't know**
Routine vaccination prevent children from some infectious disease and its complications	**120 (91.6)**	7 (5.3)	4 (3.1)
First dose in vaccination given at birth	**124 (94.7)**	1 (0.7)	6 (4.6)
Most diseases against which children are vaccinated occur during the first years of life	**104 (79.4)**	11 (8.4)	16 (12.2)
Multi-doses of the same vaccine given at intervals are important for child immunity	**116 (88.5)**	4 (3.1)	11 (8.4)
More than one vaccine at the same time have no negative impacts on child immunity	**59 (45.0)**	23 (17.6)	49 (37.4)
Immunisation can cause autism	6 (4.6)	**79 (60.3)**	46 (35.1)
Common colds, ear infection, and diarrhea are not contraindications for vaccination	**50 (38.2)**	29 (22.1)	52 (39.7)

Note: Responses in bold denote correct answers

Parents' Attitudes on Childhood Immunisation

The majority of parents believed that childhood immunisation is important (99.2%). A vast majority either strongly agreed or agreed that immunisation is more beneficial than harmful (90.8%) and that vaccines are safe for their children (96.2%). About three-quarters of the parents thought that childhood immunisation is not prohibited in religion (74.8%). About one-third strongly agreed or agreed that immunisation does not associate with side effects (38.2%). A majority either strongly agree or agree that compliance with immunisation schedule is important (93.8%) and immunisation keeps their children healthy (95.5%). Table 3 summarises the responses on this domain.

Table 3: Parents' attitudes on childhood immunisation

Item	n (%)				
	Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**
Child immunisation is important	100 (76.3)	30 (22.9)	1 (0.8)	0 (0.0)	0 (0.0)

Table 3: *Continued*

Item	n (%)				
	Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**
Immunisation is more beneficial than harmful	67 (51.1)	52 (39.7)	11 (8.4)	1 (0.8)	0 (0.0)
Vaccines for child immunisation are safe	68 (51.9)	58 (44.3)	5 (3.8)	0 (0.0)	0 (0.0)
Child immunisation is prohibited in religion	3 (2.3)	3 (2.3)	27 (20.6)	51 (38.9)	47 (35.9)
Immunisation associated with side effects	5 (3.8)	10 (7.6)	66 (50.4)	38 (29.0)	12 (9.2)
Compliance to immunisation schedule is important	67 (51.1)	56 (42.7)	7 (5.3)	1 (0.8)	0 (0.0)
Immunisation keeps your child healthy	80 (61.1)	45 (34.4)	6 (4.6)	0 (0.0)	0 (0.0)

Association between Parents' Demographics and their Knowledge and Attitudes on Childhood Immunisation

In this study, multiple linear regression analysis shows that gender and education level were significantly associated with the knowledge score (Table 4). Mothers were more likely to have 1.74 higher points in the knowledge score compared to fathers (95.0% CI: 0.88, 2.61; $P < 0.001$). For education level, we observed that parents with tertiary education were more likely to score 1.06 higher points compared to their counterparts with primary education (95.0% CI: 0.10, 2.02; $P=0.030$).

Our findings also showed a parsimonious model consisting of the number of children is significantly associated with the attitude score (Table 5). Parents with more than three children were more likely to score 1.60 points lower than those with one child (95.0% CI: -2.77, -0.43, $P=0.008$). In Model 2, parents with tertiary education tend to have higher attitude scores while controlling for other potential confounders. However, the association with attitude score was less obvious and not statistically significant while the number of children remains significant.

Table 4: Associated factors of knowledge score on childhood immunisation

Demographics	Mean (SD)	SLR[a]		MLR[b]	
		b[c] (95.0% CI)	*P*-value	Adjusted b[d] (95% CI)	*P*-value
Gender					
Male	3.45 (1.86)	Reference		Reference	
Female	5.12 (1.35)	1.66 (0.79, 2.53)	< 0.001	1.74 (0.88, 2.61)	< 0.001
Age groups (in year)					
18-29	4.74 (1.36)	Reference		-	-
30-39	5.31 (1.43)	0.57 (0.04, 1.11)	0.035		
40-49	5.10 (2.08)	0.36 (-0.61, 1.33)	0.463		
Residence					
Town	4.98 (1.47)	Reference		-	-
Outside town	4.97 (1.47)	-0.01 (-0.58,0.57)	0.979		
Educational level					
Primary	4.46 (1.51)	Reference		Reference	
Secondary	4.96 (1.50)	0.50 (-0.36, 1.35)	0.251	0.66 (-0.15, 1.47)	0.110
Tertiary	5.36 (1.22)	0.90 (-0.11, 1.91)	0.079	1.06 (0.10, 2.02)	0.030
Number of children					
1	4.71 (1.66)	Reference		-	-
2-3	5.16 (1.29)	0.45 (-0.15, 1.06)	0.141		
>3	4.86 (1.60)	0.15 (-0.59, 0.89)	0.686		

[a] Simple linear regression

[b] Multiple linear regression. No multicollinearity and interaction between independent variables detected. The model reasonably fits well and other model assumptions are fulfilled. No outlier detected.

[c] Crude regression coefficient

[d] Adjusted regression coefficient

Coefficient of determination (R^2) = 0.133

Table 5: Associated factors of attitudes score on childhood immunisation

Demographics	Mean (SD)	SLR[a]		MLR[b]			
				Model 1		Model 2	
		b[c] (95% CI)	*P*-value	Adjusted b[d] (95% CI)	*P*-value	Adjusted b[d] (95% CI)	*P*-value
Gender							
Male	29.18 (2.56)	Reference		-	-	-	-
Female	29.39 (2.39)	0.21 (-1.29, 1.71)	0.782				
Age groups (in year)							
18-29	29.67 (2.40)	Reference		-	-	-	-
30-39	29.21 (2.35)	-0.46 (-1.34, 0.41)	0.296				
40-49	28.00 (2.26)	-1.67 (-3.25, -0.09)	0.039				
Residence							
Town	29.43 (2.34)	Reference		-	-	-	-
Outside town	29.23 (2.58)	-0.20 (-1.14,0.74)	0.677				
Educational level							
Primary	29.08 (2.40)	Reference		-	-	Reference	
Secondary	29.11 (2.43)	0.04 (-1.33, 1.41)	0.251			-0.20 (-1.56, 1.15)	0.768
Tertiary	30.68 (2.01)	1.61 (-0.02, 3.23)	0.079			1.13 (-0.49, 2.74)	0.171
Number of children							
1	29.71 (2.50)	Reference		Reference		Reference	
2-3	29.72 (2.34)	0.19 (-0.94, 0.98)	0.969	0.19 (-0.94, 0.98)	0.969	0.15 (-0.81, 1.11)	0.755
>3	28.11 (2.02)	-1.60 (-2.77, -0.43)	0.008	-1.60 (-2.77, -0.43)	0.008	-1.31 (-2.49,-0.13)	0.031

[a] Simple linear regression

[b] Multiple linear regression. The model reasonably fits well and other model assumptions are fulfilled. No outlier detected.

[c] Crude regression coefficient

[d] Adjusted regression coefficient

Coefficient of determination (R^2) = 0.077 (Model 1); 0.117 (Model 2)

DISCUSSION

Our findings demonstrated that only less than half of the respondents knew that the administration of more than one vaccine at the same time has no negative impacts on child immunity (45.0%). We also found that only slightly more than half of the respondents were not sure or did not know that common cold, ear infection, and diarrhea are not contraindications for vaccination (61.8%). This is very alarming as there is no scientific evidence to support parents' fears of combined vaccines (9). Such misconceptions could delay immunisation, putting children at risk of vaccine-preventable diseases. Moreover, a substantial number of respondents were uncertain about the association between vaccination and autism (35.1%), despite strong evidence supporting vaccine safety pertaining to autism or autistic-spectrum disorders (10-12).

This study also revealed that parents had applaudable attitudes on childhood immunisation, especially on the importance, benefits, and safety of childhood immunisation. However, many remained uncertain about the side effects and role of religious belief in childhood immunisation. According to Nnenna et al., one-fifth of the mothers would not continue immunisation if their children experienced any vaccine-related side effects (13). Therefore, health care providers should educate mothers that the vaccine-related side effects are usually local reactions like pain, swelling, and redness at the injection sites, while more serious side effects may include fever, irritability, drowsiness, and rash (14).

This study reported a significant association between gender and parents' knowledge in immunisation. A study done by Abdullah et al. in 2018, showed that mothers were twice more likely to have adequate knowledge than fathers due to mothers receiving more childhood immunisation information from the healthcare providers during clinic visits (15). In our study, mothers obtained higher knowledge scores compared to fathers, similar to a study conducted in Kelantan, Malaysia (16). However, the result contrasts that of an Indonesian study which showed that females had lower knowledge scores (17). The study reported a similar finding with other studies from various countries in the role of education in parental knowledge, in which parents with higher education were reported to possess more knowledge (16-18). As such, to dispel misconceptions, more exposure concerning vaccinations during primary and secondary education curricula are warranted as this will equip the general population with the right knowledge at a younger age.

Education also plays a potential role in the parents' attitude. However, in our study, the association was less obvious and the educational level was not significantly associated with attitudes scores, consistent with the previously published work (17). Other studies had conflicting findings, which reported that literate respondents or parents with lower education were less likely to have favorable attitude (16, 18). Besides, we also found a significant association between the number of children and the attitude towards childhood immunisation, in which parents with more than three children were more likely to have lower points. This contrasts the observation by Mukhtar et al., who studied the healthcare staff in a tertiary hospital (16). This could possibly contribute to the difference in their vaccination attitude as they have greater health awareness and interest in science.

Despite our major findings, this study has some limitations. As this is a single-center study in Sarawak, the results might not be generalisable to the parents with different characteristics and may not adequately represent the Malaysian population as a whole.

CONCLUSION

In conclusion, the respondents possessed the right knowledge and showed applaudable attitude in some aspects of childhood immunisation. However, healthcare providers should continue to play an important role in addressing the lacking aspects to further increase the acceptance of childhood immunisation among parents.

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