

Prevalence and determinants of pentavalent booster immunization in children aged three to five years in Denpasar, Bali

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ABSTRACT

Background and purpose: Pentavalent booster immunization coverage in Denpasar City is reported to be relatively low. This study aims to determine the prevalence and determinants of pentavalent immunization uptake.

Methods: A cross-sectional study was conducted in one *banjar* (hamlet) which was selected purposively in the work area of Public Health Centre (PHC) I West Denpasar, Bali Province. *Banjar* was selected with consideration of the diversity of local residents and migrants. All mothers who had children aged 3-5 years (138 people) in the *banjar* were chosen as respondents. Interviews were conducted in each respondent's house with variables included age, education, employment, parity, region of origin, knowledge on immunization, perception of susceptibility to and severity of disease, perceptions of benefits and barriers to immunization, sources of information, family support and acceptance of immunization. Data analysis was performed with poisson regression to determine the determinants of pentavalent booster immunization.

Results: The majority of respondents were aged <30 years, high school education or above, unemployed, had 1-2 children and were from Bali. The proportion of respondents who reported that their children had been given pentavalent immunization in children aged three to five years was found to be 78.3%. Immunization prevalence was found to be higher in the population that originated from Bali (82.1%). Determinants of pentavalent immunization are perceptions of benefits (APR=4.78; 95%CI: 1.35-16.96) and more sources of information (APR=1.21; 95%CI: 1.04-1.41).

Conclusion: The prevalence of pentavalent booster immunization is found to be lower than the average prevalence of the Bali Province but higher than the reported coverage of Denpasar City. The determinants of immunization acceptance was perception of high benefits and more sources of information. Information dissemination on the benefits of pentavalent booster immunization in children needs to be enhanced through health workers and various media to increase the coverage of pentavalent immunization.

Keywords: pentavalent immunization, perceived benefits, source of information, Bali

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INTRODUCTION

Some diseases preventable by immunization are still found in particular areas in Indonesia. In 2014 there were 422 diphtheria cases in East Java with 9 deaths and 33 tetanus cases with 15 deaths.¹ This was most likely related to the low coverage of basic immunization. The 2013 Indonesia Basic Health Research showed that complete basic immunization coverage was 59.2%, incomplete 32.1% and not immunized 8.7%.² Reasons for not immunizing included: fear of fever, family refusal, child becoming sick, distance to immunization facilities, lack of knowledge about immunization services and lack of time.² Immunization coverage in Bali Province is higher than the national coverage and ranks second highest compared to other provinces with 80.8% complete, 18% incomplete and 1.2% not immunized.² The immunization coverage of Denpasar City was lower than the average of Bali Province which was 77.5%.³

The immunization program for the prevention of *Haemophilus influenzae* type b (Hib) infection began in 2013 and its administration is integrated with diphtheria, pertussis, tetanus and hepatitis B immunizations. The packaging is combined into one dose called the pentavalent vaccine. Pentavalent immunization is given as basic immunization three times in children aged 2-11 months and one time booster at the age of 18-36 months.⁴

Data from the Bali Province Health Office shows that the coverage of the pentavalent booster immunization in 2015 amounted to 83.6% and Denpasar City was at the second lowest after Karangasem District with the coverage of 67.3%.⁵ In Denpasar City, many private health services provide immunizations using their own vaccines from non-government suppliers and generally they do not report the number of immunized children to the local health office. In addition, the proportion of immigrants in

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the city of Denpasar is quite high,⁶ and this is likely related to the immunization coverage, as migrants mostly come from provinces with lower immunization coverage compared to Bali Province.²

PHC 1 West Denpasar is one of the PHCs in Denpasar City that has pentavalent booster immunization coverage of 47.3%,⁷ which is below the Denpasar average. Informal interviews with 15 mothers of children under five who visited private practice doctors and PHC I West Denpasar show that nine children had received pentavalent booster immunization and five children had not received pentavalent booster for several reasons, namely late information regarding the age of pentavalent booster immunization, the assumption that basic immunization is enough, parents are busy working, feeling pity to see their child injected and the high price of vaccine. One child did not receive basic and booster immunizations for reasons of religious beliefs.

Studies related to the determinants of pentavalent immunization are very limited. Most studies report on the determinants of other basic and booster immunizations with varying results. Some studies show that the low coverage of basic and booster immunizations is associated with maternal age,^{8,9,10} education,^{8,11,12} employment,^{8,13} parity,^{9,14,15} knowledge,^{8,16,17} perception of immunization benefits,^{15,18,19} low family support^{8,13,20} and lack of information.¹⁵ Other studies show no association between immunization in infants and toddlers with maternal age, education and employment.^{15,21}

This study aims to determine the association between maternal characteristics (age, education, employment, parity, region of origin), perceptions of susceptibility to and severity of disease, perceptions of the benefits and barriers to immunization, family support and number of information sources with acceptance of pentavalent booster immunization.

METHODS

The cross-sectional study was carried out in the working area of PHC 1 West Denpasar, Bali Province, where the pentavalent immunization coverage was lower than the target. PHC 1 West Denpasar covers 63 *banjar* (hamlets) and one of the 63 *banjar* was purposively chosen as a study location based on consideration of having a proportional number of indigenous and immigrant populations.

A minimum sample size of 134 children aged 3-5 years was calculated based on 95% confidence level, absolute precision of 17%, proportion of complete immunization on good knowledge of 54% and on poor knowledge of 46%.¹⁶ A household census was

conducted in the selected *banjar* in February 2017 to collect the name of the heads of the families, number and age of children in the *banjar*. Of the 834 households, there were 138 households with children aged 3-5 years and all were selected as samples in this study. Interviews were conducted with mothers of children aged 3-5 years in each respondent's house in March-April 2017.

Data collected in this study refers to the Theory of PRECEDE-PROCEED²² and Health Belief Model (HBM)²³ which includes: acceptance of pentavalent booster immunization, age, education, employment, parity, knowledge, number of sources of information, family support, perceptions of susceptibility to and seriousness of disease, perceptions of benefits and barriers to pentavalent booster immunization. Mother's age is grouped into "<30 years" and "≥30 years" and education into "junior high school or lower" and "senior high school or higher". Knowledge includes about vaccine content, age of administration, benefits, contraindications, side effects and service providers. Furthermore, it is classified into "good" knowledge if the proportion of correct answer is ≥50% and "poor" if the proportion is <50%. Perception of susceptibility to disease was measured by one question about potential risk to get a disease if the child does not receive pentavalent booster immunization. Perception of the disease seriousness was measured by the presence or absence of fear of physical disability and life threatening impacts if they do not get pentavalent booster immunization and grouped into "high" seriousness if the score=2 and "low" if the score ≤1. Perception of immunization benefits is measured by four questions about the benefits to prevent diseases, increase immunity, reduce disability and reduce mortality in children, which then grouped into "high" benefits if the score is ≥3 and "low" if the score is ≤2. Perception of barriers to immunization was measured by five questions regarding parents' lack of time to immunize children, expensive vaccine prices, fear of children will become ill, vaccines perceived to contain dangerous substances and family restrictions. Furthermore, it is grouped into perceived "high" barriers if the score is ≥3 and "low" barriers if the score is ≤2. Family support was measured by four questions about providing information, giving advice, giving funds and assisting to take child to the immunization provider, which was then grouped into "high" family support if the score ≥3 and "low" family support if the score ≤2. The number of information sources calculated from sources of information about pentavalent booster immunization that includes: mass media, TV/radio, brochures, families, health workers or others. Furthermore, it is grouped into "high

number” of information sources if ≥ 4 and “low number” of information sources if ≤ 3 .

Bivariate analysis was conducted with chi-square test, and multivariate analysis with Poisson regression using backward method to determine the association between independent variables with the acceptance of pentavalent booster immunization. This study has been approved by the Ethics Committee of the Faculty of Medicine, Udayana University/Sanglah General Hospital, Denpasar on February 21, 2017.

RESULTS

Table 1 shows the characteristics of respondents who were predominately less than 30 years old (60.14%), had a high school education or higher (64.49%), unemployed (60.87%), had one or two children (83.33%) and originally from Bali (60.87%).

Table 2 shows the association between acceptance of pentavalent booster immunization and maternal sociodemographic characteristics, knowledge, perception, family support and information sources. Variables that have a p value < 0.25 are included in the multivariate analysis model. These variables consisted of age, employment, region of origin, knowledge, perception of susceptibility to and seriousness of the disease, perceptions of benefits and barriers to immunization, number of sources of information and family support.

Table 3 shows the adjusted proportion ratios of variables which significantly associated with the

acceptance of pentavalent booster immunization. The variables are the perception of high benefits (APR=4.78; 95%CI: 1.35-6.96; $p=0.02$) and the number of sources of information ≥ 4 (APR=1.21; 95%CI: 1.04-1.41; $p=0.01$).

DISCUSSION

Our study shows that 78.26% of children aged 3-5 years have received pentavalent booster immunization. This result is much higher than the pentavalent immunization coverage in PHC 1 West Denpasar in 2015 (47.3%).²⁴ Data on the coverage of pentavalent booster immunization in PHC were obtained from reports of private midwives, satellite PHC clinics and immunization registers, but does not include data from private health services that procure vaccines independently from non-government suppliers. The proportion of pentavalent booster immunization in this study was also relatively higher than the coverage in Denpasar City (67.3%).²⁴ The Denpasar City’s coverage was obtained from public health services reports (PHCs and hospitals) without including private services. However, the coverage found in this study was lower when compared to the pentavalent booster immunization coverage in Bali Province (83.6%).⁵ Of all districts/cities in Bali, coverages below the Bali Province’s average were found in Denpasar City (67.3%) and Karangasem District (58.9%).⁵ This is likely related to the social geographic conditions in the two districts. Low coverage in Karangasem District is likely related to the geographical

Table 1 Characteristics of respondents

Characteristics	n	%
Age (years)		
<30	83	60.14
>30	55	39.86
Education		
Senior high school or higher	89	64.49
Junior high school or lower	49	35.51
Employment		
Unemployed	84	60.87
Employed	54	39.13
Parity		
1-2	115	83.33
≥ 3	23	16.67
Region of origin		
Outside Bali	54	39.13
Bali	84	60.87
Total	138	100.00

Table 2 Association between sociodemographic characteristics, knowledge, perceptions, family support and sources of information with acceptance of pentavalent booster immunization

Variables	Immunized		Not immunized		p
	n	%	n	%	
Age (years)					
<30	68	81.93	15	18.07	0.20
≥30	40	72.73	15	27.27	
Education					
Senior high school or higher	71	79.76	18	20.24	0.56
Junior high school or lower	37	75.51	12	24.19	
Employment					
Unemployed	69	82.14	15	17.86	0.17
Employed	39	72.22	15	27.78	
Parity					
1-2	90	78.26	25	21.74	1.00
≥3	18	78.26	5	21.74	
Region of origin					
Bali	69	82.14	15	17.88	0.17
Outside Bali	39	72.22	15	27.78	
Perception of susceptibility					
Yes	102	82.26	22	17.74	<0.01
No	6	42.86	8	57.14	
Perception of seriousness					
High (score ≥2)	104	85.25	18	14.75	<0.01 ^{*)}
Low (score ≤1)	4	25.00	12	75.00	
Perception of benefits					
High (score ≥3)	106	84.13	22	17.74	<0.01 ^{*)}
Low (score ≤2)	2	16.67	8	57.14	
Perception of barriers					
Low (score ≤3)	106	84.13	20	15.87	<0.01 ^{*)}
High (score ≥4)	2	16.67	10	83.33	
Knowledge					
High (score ≥4)	102	81.60	20	15.87	<0.01
Low (score ≤3)	6	46.15	10	83.33	
Family support					
High (score ≥3)	101	84.87	18	15.13	<0.01
Low (score ≤2)	7	36.84	12	63.16	
Number of information sources					
High (≥4)	50	90.91	5	9.09	<0.01
Low (≤3)	58	69.88	25	30.12	
Total	108	78.26	30	21.74	

*) Analysed with Fisher Exact test

Table 3 Adjusted proportion ratios of perceived benefits and the number of information sources to the acceptance of pentavalent booster immunization

Variables	APR	95%CI	p
Perception of benefits			
Low (score ≤ 2)	1.00		
High (score ≥ 3)	4.78	1.35-6.96	0.02
Number of information sources			
Low (≤ 3)	1.00		
High (≥ 4)	1.21	1.04-1.41	0.01

conditions of the district, while lower coverage in Denpasar City might be related to the large number of migrant residents. In our study, the coverage of pentavalent immunization in those originally from Bali was higher than that of the migrant population, which were 82.14% and 72.22%, respectively.

The results of our study show only two factors that are significantly associated with the acceptance of pentavalent booster immunization, namely the perception of benefits and the number of information sources. Other components in the HBM, which consisted of the perception of susceptibility, seriousness and barriers, however were not found to be significantly associated with the acceptance of pentavalent booster immunization. The perceived benefits of pentavalent booster immunization in this study included the roles of vaccines in preventing disease (92.03%), increasing immunity (91.30%), reducing disability (91.30%) and reducing morbidity from disease (91.30%). Studies on the acceptance of pentavalent immunization is very limited so that the results of this study are compared mostly with the results of basic immunization studies. The results of this study are consistent with studies in Aceh¹⁸ and Surakarta¹⁹ which show a significant association between perceived high benefits and the completeness of basic immunizations. Our study is also in line with a study in a developed country (Atlanta, USA) which shows that parents who had lack of understanding about the benefits of basic immunization tend to not provide complete immunization.²⁵

This study shows that mothers who received information from many sources tend to accept pentavalent booster immunization. In this study, most of the respondents received information from health workers (89.87%). Other sources of information consisted of brochures/posters (42.46%), family members (33.33%), newspapers (19.57%), television/radio (14.49%) and the internet (12.32%). Other studies which show the association between immunization acceptance and the number of information sources remain very limited. Other studies only show the association between immunization acceptance and history of receiving information.

A study in East Jakarta shows that there is no association between information obtained from health workers, educational institutions, print media and the internet with the completeness of basic immunization for children.¹⁵ The different results is likely due to the different sample characteristics in both study locations. In addition, the Jakarta study was conducted in 2009, when media information was lacking as opposed to when our study was conducted in 2017.

Our study limitation is the fact that it was carried out only in one *banjar* (hamlet) that selected purposively. Therefore that the interpretation and application of the results into a wider population should be conducted with caution.

CONCLUSION

The prevalence of pentavalent booster immunization in the work area of PHC 1 West Denpasar was 78.26%. The determinants of immunization acceptance were perception of high benefits and higher number of information sources. Information about the benefits of pentavalent booster immunization in children needs to be disseminated through health workers and various other media in order to increase the uptake of pentavalent booster immunization.

ACKNOWLEDGMENT

We would like to thank the Head of PHC 1 West Denpasar, Head of the *banjar* of Padang Sambian Village, West Denpasar and all respondents who participated in this study.

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