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# Development of rabies eradication package, a family-based health promotion media to prevent rabies in Buleleng, Bali, Indonesia



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Komang Hendra Setiawan<sup>1,4\*</sup>, Ari Natalia Probandari<sup>1,2</sup>, Eti Poncorini Pamungkasari<sup>1,2</sup>,  
Didik Gunawan Tamtomo<sup>1,3</sup>

## ABSTRACT

**Background:** Rabies occurred in Bali since 2008, and in 2017 rabies cases were still found in Bali, including in Buleleng Regency. Prevention of rabies in Bali must involve the participation of the community, especially family, which is in direct contact with dogs. This study aims to develop family-based health promotion media, which is later called as the rabies eradication package, to overcome rabies in Buleleng, Bali.

**Methods:** This study uses the research and development (R&D) method, which consists of 5 phases, namely analysis, design, development, implementation, and evaluation. At the implementation and evaluation stage, researchers used a quasi-experimental approach. The total number of samples used was 100 families taken from 2 villages. The variables measured were the level of knowledge and attitudes towards the prevention of rabies. Data were analyzed using the Mann-Whitney U test from SPSS

software version 20 for Windows.

**Result:** This study develops rabies eradication package as a family-based health promotion media. This package consists of a rabies eradication book, a dog vaccination card, a medical history cards, and bite wound treatment tools. Of the 100 respondents in the study sample, 50 respondents who were included in the treatment group and received a rabies eradication package for 1 month, experienced a significant increase in knowledge ( $p < 0.001$ ) and attitudes ( $p < 0.001$ ) in the prevention of rabies compared to the control group.

**Conclusion:** Rabies eradication package can be used as a family-based health promotion media to increase rabies prevention efforts because it can increase knowledge and attitudes in preventing rabies

<sup>1</sup>Doctoral Program in Medical Science, Postgraduate Program, Universitas Sebelas Maret, Surakarta, Indonesia

<sup>2</sup>Department of Public Health, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia

<sup>3</sup>Department of Anatomy, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia

<sup>4</sup>Department of Public Health, Faculty of Medicine, Universitas Pendidikan Ganesha, Singaraja, Indonesia

\*Corresponding to:  
Komang Hendra Setiawan;  
Doctoral Program in Medical Science, Postgraduate Program, Universitas Sebelas Maret, Surakarta, Indonesia;  
[komanghendras@gmail.com](mailto:komanghendras@gmail.com)

Received: 2019-04-29  
Accepted: 2019-07-31  
Published: 2019-08-01

**Keywords:** Rabies, Health Promotion, Research and Development, Knowledge, Attitude

**Cite this Article:** Setiawan, K.H., Probandari, A.N., Pamungkasari, E.P., Tamtomo, D.G. 2019. Development of rabies eradication package, a family-based health promotion media to prevent rabies in Buleleng, Bali, Indonesia. *Bali Medical Journal* 8(2): 546-550. DOI: [10.15562/bmj.v8i2.1512](https://doi.org/10.15562/bmj.v8i2.1512)

## INTRODUCTION

The World Health Organization (WHO) groups several types of infectious diseases into the Neglected Topical Diseases (NTDs) group, one of them is Rabies. In Indonesia, Bali is one of the provinces that has experienced the spread of rabies since 2008. The first cases of rabies appearing in Badung Regency then spread throughout the districts in Bali Province. There were recorded 4 cases of rabies in humans in Bali in 2008, then increased to 28 cases in 2009, and increased again to 82 cases in 2010. After that there were 23, 8, 1, 2, 15, 5 and 1 rabies cases in humans in a row from 2011 to 2017.<sup>1,2</sup> In 2017, Rabies dogs are found in some villages in Buleleng Regency, one of the largest regency in Bali.

Rabies is spread through various intermediary animals such as dogs, cats, monkeys, bats, ferrets, and others. Among these animals, dogs are the most

animals that spread rabies to humans.<sup>3</sup> However, the prevention of rabies through mass killing of dogs around the world has proved ineffective.<sup>4,5</sup>

Rabies prevention must be carried out by involving the active role of the community through promotive and preventive measures. Some research reports in the world include: Jemberu et al. in 2013 who conducted a study in Ethiopia, Wasay et al. in 2012 who studied in Karachi Pakistan, and Digafe et al in 2015 who conducted a study in Ethiopia, all of them suggested that the obstacle in dealing with rabies is a lack of public knowledge in carrying out prevention behavior.<sup>3,6,7</sup>

The prevention of rabies in Bali must involve the participation of the community. The smallest group in the community is the family, which is the most vulnerable in direct contact with dogs. Therefore family-based health promotion is crucial in preventing rabies infection. Health promotion requires good media in order to get maximum

results. Based on the aforementioned, this study aims to develop family-based health promotion media, which is later called as the rabies eradication package, to overcome rabies in Buleleng Regency, Bali.

## METHODS

This study was conducted in February until May 2018 in Buleleng Regency, Bali. This study uses the research and development (R & D) method which consists of 5 phases, namely analysis, design, development, implementation, and evaluation. Analysis, design, and development phases used qualitative approach, while implementation and evaluation phases using a quantitative approach.

The analysis phase is done to find out the needs of the family to carried out rabies prevention. A needs analysis was carried out by interviewing a representative of the health and the agricultural office, the village officials, and dog owners in Buleleng Regency. The purpose of this activity is to find out how the dog pets mean to the people in terms of socio-cultural aspects. Besides that, it was also explored what problems faced by dog owners and the community related to the prevention of rabies. Needs analysis is conducted as a basis for making health promotion media to be truly useful in accordance with what is needed by the family.

The design phase is the stage where the researcher carries out the process of designing the product before the product is made. The design is carried out according to the results of the needs analysis carried out in the previous stage. The development phase is the stage where the researcher makes a product in the form of family-based health promotion media, in accordance with the design that was made at the design phase. At this stage, a focused group discussion was also conducted, which involved the health office and the agricultural office of Buleleng government and also village officials. Activities carried out at this phase aim to perfect the products made by researchers.

The implementation & evaluation phases were carried out to find out the effectiveness of family-based health promotion media that researchers have made in the previous step. These phases used a quasi-experimental design. A total of 100 families from 2 villages (Ularan Village and Munduk Village) in Buleleng Regency were taken purposively as the research sample. These two villages were chosen because in 2017 there were rabies dogs in these villages. Samples are families that raise dogs. About fifty families from the first village were enrolled as the treatment group, whereas other 50 families from the second village as the control group.

The variables measured in this study were

knowledge and attitudes towards the prevention of rabies. The level of knowledge is measured using a questionnaire consisting of 20 questions with a value of 1 point for each question that is answered correctly. Attitudes are measured using a questionnaire consisting of 10 questions. Each question uses a Likert scale 1-5. The questionnaire used has gone through validity and reliability tests. Measuring the level of knowledge and attitudes towards prevention of rabies was carried out twice, before and after the intervention (pretest and posttest).

After the pretest, each sample in the treatment group received an intervention by giving them the family-based health promotion media for 1 month, while the second group didn't. At the end of the intervention, a measurement of the level of knowledge and attitudes towards rabies prevention in both groups was measured. At the time of data collection, the head of the family will be asked to fill out the prepared questionnaires, and if the head of the family is not available, it can be replaced by one adult family member. Data were analyzed using Mann-Whitney test due to not normally distributed using SPSS version 20 for Windows.

## RESULTS

The analysis phase is carried out by conducting in-depth interviews and review of documents to find out the existing problems and what are the needs needed to prevent rabies in Bali. Through interviews with representatives from the health and the agriculture office of Buleleng Government and a review of documents owned by them, it was found that there are 128 villages in Buleleng, and rabies cases in dogs were found in 56 villages in 2015, 33 villages in 2016, and 17 villages in 2017. This data shows that rabies is still present in Buleleng.

The results of interviews with families who look after dogs show that several reasons make them take care of dogs, namely: 1) The dog is considered very loyal to his owner. A dog can be as a protector, giving security and also dogs as friends; 2) Certain types of dogs have high economic value. Dogs have many fans, so dogs become commodities for sale; and 3) There is a religious attachment between humans and dogs, as dogs are mentioned in *Mahabarata*, one of the scriptures in Hindu religion. Besides that, the dog also plays a role in a particular ceremony called *Mecaru*.

Because of the reasons mentioned above, many families maintain dogs, so the dog population is high. On the other hand, there are still problems found in rabies prevention behavior in families, namely: lack of active participation by dog owners to vaccinate their dogs, lack of dog owner's

responsibility to control population and mobility of dogs and lack of knowledge about handling dog bite wounds (post-exposure prophylaxis/PEP).

The results of interviews with village officials show that the village government does not play an active role in rabies prevention. There is no customary rule in the village that regulates prevention of rabies, for example about the responsibility of people who care for dogs. From the data that has been obtained, the researcher concludes some of the problems that exist in the prevention of rabies as well as solutions to overcome these problems, which are described in Table 1.

The role of the community, include dog owners, in preventing rabies can be increased through health promotion activities. Therefore in this study, there are phases of design and development where the researcher develops a family-based health promotion media, which then called the rabies eradication package (*Paket Eradikasi Rabies*). The rabies eradication package consists of a rabies eradication book (*Buku Eradikasi Rabies*), a medical history card (*Kartu Riwayat Kesehatan*), and a dog bite wound treatment tool. To ensure the success of this package, the researcher discussed with officers from the agriculture office, the health office, and one of the village heads in Buleleng for rabies infection prevention program.

The rabies eradication book is a small book that contains information about ways to raise dogs so that they are not infected with rabies, how to do the right PEP actions and basic knowledge about rabies. Input from health office officials is that the language used must be more simplified so that it is

easy for the general public to understand.

Advice from the agricultural service officer is to add a card as a place to record the dog's identity that is owned by the family and provided a column to write the date when the dog gets the vaccine. This card will control in administering dog vaccines. This card is called a dog vaccination card (*Kartu Vaksinasi Anjing*).

Another card in the rabies eradication package is a medical history card (*Kartu Riwayat Kesehatan*), in which when a dog bite occurs, the card is recorded the treatment carried out and the schedule for the administration of anti-rabies vaccines for family members who experience dog bite injuries. Another part of the rabies eradication package is wound treatment equipment from dog bitten consisting of soap, betadine, sterile gauze and gauze rolls. This wound care tool is given to improve the role of the family in handling bite wounds according to the PEP procedure, which can be seen in the rabies eradication book. During the discussion, the village head also suggested that when distributing rabies eradication packages, the receiving community should be given a prior explanation of how to use the package, because in his village many people have low education levels, so there are no mistakes especially in using bite care tools.

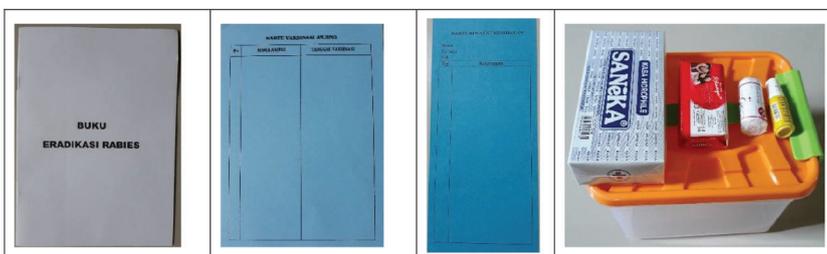
From the results of the discussion, improvements were made to the rabies eradication package consisting of rabies eradication books, dog vaccination card, medical history cards, and wounds treatment tools for a dog bitten (soap, betadine, sterile gauze, gauze rolls). When giving the rabies eradication package, the families who received it were explained how to use the package, especially when there was a bite case of an intermediary rabies animal. The distribution of the eradication package for rabies involved local village officials.

To find out how the rabies eradication package affects the family, researchers conduct implementation & evaluation using quasi-experimental methods. A total of 100 families became the study sample. Fifty families from Ularan village as a treatment group, and 50 families from Munduk Village as a control group. The level of knowledge and attitudes towards prevention of rabies was measured before and after treatment (pretest and posttest). The sample in the treatment group received a rabies eradication package for 1 month.

The Mann-Whitney U test was carried out against different variable scores at posttest-pretest between groups 1 and groups 2 to determine the effect of the intervention on the knowledge and attitudes of the respondents (Table 3). Based on the results it can be concluded that there is a

**Table 1. Problems with rabies prevention and solutions**

Problems	Solutions
Lack of active participation to vaccinate dogs	Changes in dog owners' behavior through health promotion at the family level
Lack of responsibility to control dogs population and mobility	
Lack of knowledge about PEP.	Health promotion must involve village officers
Lack of village government involvement in the rabies prevention program.	



**Figure 1.** Rabies eradication package

**Table 2. Baseline characteristics of the respondent between groups**

Variables	Group	
	1 (N=50)	2 (N=50)
<b>Gender</b>		
Male	47 (94%)	46 (92%)
Female	3 (6%)	4 (8%)
<b>Level of Education</b>		
Elementary	7 (14 %)	10 (20%)
Junior highschool	20 (40%)	18 (36%)
Senior highschool	17 (34 %)	20 (40%)
University	6 (12 %)	2 (4%)
<b>Age (Years)</b>	44.58±12.41	43.48±12.95

**Table 3. The effect of an intervention to the knowledge and attitudes of respondents**

Variables	Mean ± SD		P
	Group 1	Group 2	
<b>Knowledge (Scores)</b>			
Pretest	13,68 ±1,76	14,56 ±1,40	<0,001 <sup>a</sup>
Posttest	18,68 ±0,89	15,22 ±1,39	
Δpost-pretest	5,00 ±2,13	0,66 ±1,00	
<b>Attitude (Scores)</b>			
Pretest	39,24 ± 3,50	40,48 ± 3,47	<0,001 <sup>a</sup>
Posttest	45,26 ± 2,19	40,92 ± 3,43	
Δpost-pretest	6,02 ±3,16	0,44 ± 1,62	

<sup>a</sup> = Non parametric Mann-Whitney U test; SD: Standard Deviation

Δ post-pretest = different scores posttest-pretest

significant difference between the different scores (Δposttest-pretest) on knowledge in the treatment group (group 1) compared with the control group (group 2) ( $p < 0,001$ ). In addition, the current study also shows a significant difference between the different scores (Δposttest-pretest) on attitude in the treatment group (group 1) compared with the control group (group 2) ( $p < 0,001$ ) (Table 3)

## DISCUSSION

Rabies is a zoonotic disease that is spread by dogs. If we think simply, then to overcome rabies, what must be done is to eliminate the entire dog population among humans. But that is not possible in Bali, because at the analysis phase of this research found that there were strong reasons for families in Bali to raise dogs. Balinese people have strong relationships with dogs culturally and religiously.<sup>8</sup>

Efforts to eliminate rabies through mass dog killings have been carried out in Bali, but this action

is not sufficient because rabies is still spreading in Bali. Therefore efforts to prevent rabies through mass killing of dogs are no longer recommended.<sup>4,5</sup> Prevention of rabies should be done through several steps, namely: dogs population and mobility control, vaccination of dogs, administration of anti-rabies vaccines in people at high risk such as laboratory staff, and implementation of PEP.<sup>9,10</sup> Steps to prevent rabies must involve the active role of the community through health promotion.

The rabies eradication package made by researchers in this study can be used as a family-based health promotion medium for rabies prevention programs. In accordance with predeceped theory, three factors influence health promotion, namely: predisposing factor, enabling factor, and reinforcing factor.<sup>11,12</sup> One part of the rabies eradication package, the rabies eradication book will play a role in increasing knowledge, which is a predisposing factor. The other parts of rabies eradication package, namely dog vaccination cards, medical history cards, and wound care tools are enabling factors to carry out PEP actions and vaccinate dogs. Village officials were involved when distributing rabies eradication packages to families so that this became a reinforcing factor in conducting health promotion for prevention of rabies.

The results of the implementation and evaluation showed that the intervention in the form of giving a rabies eradication package for 1 month significantly increased the knowledge score ( $p < 0,001$ ) of the respondents in the treatment group compared to the control group who did not receive an intervention. The rabies eradication book given at the time of intervention is a source of knowledge that can be learned repeatedly by respondents. Rehearsal learning strategies are very effective for increasing knowledge.<sup>13</sup> A previous study conducted by Wu et al. found that health information provided through Short Messages Service (SMS) was effectively increased respondents' knowledge about rabies because health information could be read repeatedly by respondents at any time.<sup>14</sup>

Besides to increasing knowledge, the intervention in the form of giving a rabies eradication package for 1 month also significantly increased the attitude ( $p < 0,001$ ) of respondents in the treatment group compared to the control group who did not receive the intervention. According to the previous study by Albarracin and Shavitt in 2018, a person's attitude is influenced by several factors such as factors within the person itself such as knowledge, emotions, life goals and also external factors such as other people's advice, social media, and others.<sup>15</sup>

However, in this study, the rabies eradication

package increased the knowledge of the respondents and became the messenger of health officers to the respondents so they could change the attitude of the respondents. The previous study by Wang et al. in 2015 found that the promotion of nutritional health through education also showed that the increase in knowledge was also followed by an increase in respondents' attitudes.<sup>16</sup>

## CONCLUSION

Problems with rabies prevention in Buleleng are lack of active participation from dog owners to vaccinate their dogs, lack of people the responsibility to control dogs population and mobility, lack of people knowledge about PEP and Lack of village government involvement in the rabies prevention program. The rabies eradication package can be used as a media for family-based health promotion to increase the active role of the community in preventing rabies. Giving rabies eradication packages for 1 month significantly increased the respondents' knowledge and attitudes in rabies prevention.

## CONFLICT OF INTEREST

The authors affirm that there are no conflicts of interest in this study.

## ETHICAL CLEARANCE

Ethical approval has been obtained from the Ethics Committee of Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia prior to the study being conducted

## FUNDING

The authors would like to thank DRPM Kemenristekdikti for financial support for this research.

## AUTHOR CONTRIBUTIONS

Komang Hendra Setiawan collected the data, performed the analysis, and wrote the paper. Ari Natalia Probandari conceived and designed the analysis. Eti Poncorini Pamungkasari contributed data or analysis tools and performed the analysis. Didik Gunawan Tamtomo conceived and designed the analysis and wrote the paper.

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