Knowledge, Attitudes and Practices (KAP) Model of Rabies Prevention Efforts Among Households in Low and Middle-Income Countries: A Systematic Review

Made Karma Maha Wirajaya[a], Putu Ika Farmani[b] and Putu Ayu Laksmini[c]
Faculty of Health Sciences, Health Information Management, Universitas Bali Internasional, Denpasar, Bali, Indonesia

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Abstract: Rabies is considered one of the infectious diseases caused by rhabdovirus. It is the deadliest disease in the world which contributes to more than 59,000 deaths every year globally. About 95% of human cases originate from Asia and Africa, and 99% of all human rabies is transmitted through dog bites. Poor public awareness of rabies hampers preventive and control measures against the disease. This current study aimed to determine whether knowledge, attitudes, and practice (KAP) are related to rabies experienced by households in low and middle-income countries. This study used a literature review approach by collecting 10 articles on Pubmed. The data were analyzed descriptively and presented in tabular form. This study found that most of the households had good knowledge, attitude, and practice related to rabies prevention efforts. However, differences were found between households from lower economic group and the upper middle economic group. Lower economic groups had less knowledge, attitudes, and behavior towards rabies prevention efforts than those from the upper middle groups. Factors that affect KAP related to rabies prevention were education, occupation, age, family size, and also dog ownership. This study shows that households in several countries already had a good KAP.

1 INTRODUCTION

Rabies is a zoonotic disease caused by the neurotrophic virus of the genus *Lyssavirus* and the family *Rhabdoviridae*. Humans can be infected with rabies through direct contact with animals suffering from rabies. Rabies can be transmitted either through biting, scratching, or licking injured skin. After the bite, the virus replicates in the muscles and then enters the central nervous system, causing an infection in the brain known as encephalitis. Rabies is mostly spread through infected dog bites (Murray P, Rosenthal K, 2013). Globally, rabies causes more than 61,000 human deaths (World Health Organization, 2013), and approximately 15 million dog-bite victims received post-exposure prophylaxis each year (World Health Organization, 2019). Asia and Africa were reported to have more than 95% of mortalities because of rabies, and about 43% of deaths occurred in Africa (Jibat T, Hogeveen H, 2015). Dog-bite rabies cases in Asia and Africa annually exceeded 31,000 and 24,000, respectively (Alie A, Assefa A, Derso S, 2015). According to the World Health Organization, rabies resulted in more than 60,000 human deaths every year. Children (aged 5-14 years) are the most vulnerable group to rabies infection (WHO, 2020) (Sessou P, et al., 2019).

Rabies diseases mostly occur more in lower-middle countries. In Ethiopia, rabies is highly endemic and causes approximately 10,000 deaths annually (Guadu T, Shite A, Chanie M, Bogale B, F. T. 2014). More than 50,000 dog-bite rabies cases and approximately 6,000 deaths were found in Pakistan, leading to huge economic losses(Coleman PG, Fèvre EM, 2004) (Ahmed T, Asghar MW, 2019). Rabies is a fairly big problem in other countries such as and Indonesia. Almost all areas of India except Andaman and Nicobar and Lakshadweep islands face the risk of

[a] https://orcid.org/0000-0002-2847-4019
[b] https://orcid.org/0000-0002-6657-8708
[c] https://orcid.org/0000-0001-6852-2305

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rabies infection. India has the highest stray dog population in the world. With unvaccinated dogs, the risk of transmitting rabies is even greater. West Bengal in India is known to have the highest number of rabies cases every year (Health Status Indicators: Cbhidghs, 2019). Meanwhile, only nine out of 34 provinces in Indonesia are rabies-free provinces (Kementerian Kesehatan Republik Indonesia, 2016). According to the Indonesian Ministry of Health, the number of rabies cases was 78,413 cases, of which 65,534 cases received the anti-rabies vaccine from 2011 to 2015. For example, Bali Province was ranked first for having a huge number of rabies cases amounting to 38,187 cases, followed by East Nusa Tenggara Province with 13,599 cases (Kementerian Kesehatan Republik Indonesia, 2020). Bangli, one of the districts in Bali province, was reported to have a high number of rabies cases (Nugroho DK, Diarmitha IK, Tum S, 2013). This trend may suggest that rabies prevention and control programs have not optimally run.

In developing countries, some deprived communities may not receive life-saving treatment such as Post-Exposure Prophylaxis (PEP) treatment because it is too expensive. Other than that, the reason is that individuals cannot visit clinics for treatment due to a lack of awareness about rabies (Buchy P, et al., 2017). This shows that the community has inadequate understandings of the dangers of rabies. Knowledge, attitudes, and practice (KAP) are possible factors that influence one's understanding. KAP surveys have widely been used throughout the world for studies related to public health such as health-seeking behavior and preventive practices against diseases (Sambo M, Lembo T, Cleaveland S, 2014). Results from the survey may provide basic data for planning, implementing, and evaluating national control programs (Espinoza-Gómez F, Hernández-Suárez CM, 2002). Therefore, this study focuses on reviewing the AKP against rabies in low- and middle-income countries.

2 MATERIALS AND METHOD

2.1 Literature Search Strategy

This study used a systematic review approach to examine KAP-related research for rabies prevention. Literature was searched on Pubmed using some keywords such as "Knowledge, Perception, Practice of Rabies Prevention". Research in the articles was conducted in various countries.

2.2 Article Inclusion and Exclusion Criteria

Selected articles were full articles that were published in the last three years, had titles with KAP topics, used a cross-sectional design, focused on households or the community amounting to a minimum of 100 sampled respondents. Meanwhile, articles which only consist of letters or abstracts were excluded from the selection.

2.3 Article Selection

In the selection procedure, keywords i.e., "Knowledge, Perception, Practice of Rabies Prevention" were entered in Pubmed. The first search obtained 162 articles. Then, the number of articles was limited by publication year and full-text categories. The articles were published in the last three years and available in full texts. From the second selection, 43 articles were gathered. Then, the articles were selected based on the inclusion and exclusion criteria. This process resulted in 16 articles. In the last stage, 10 articles were eventually selected as they sufficed the predetermined inclusion criteria.

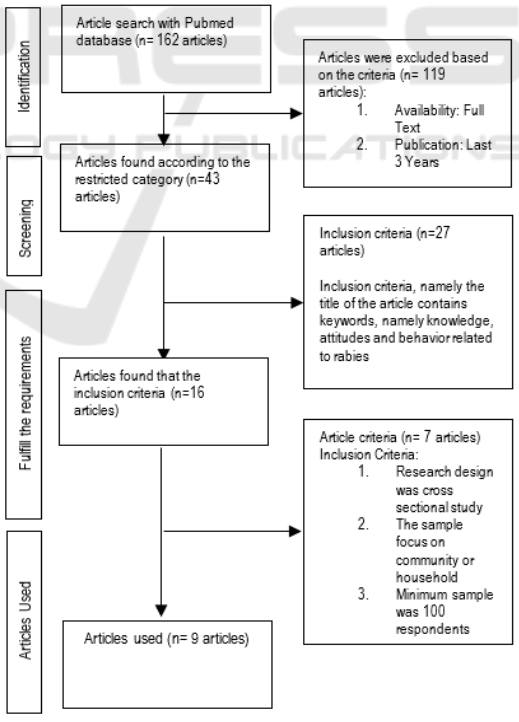

Figure 1: Selection process for knowledge, attitudes, and practices (KAP) of rabies prevention among households in low- and middle-income countries using the PRISMA method.

2.4 Data Extraction and Analysis

Data were analyzed descriptively and presented in a tabular form. Tables present KAP related to rabies prevention in middle and lower countries. Data extraction was provided in tables to give information about the research titles, method, design, sampling, data collection, and key information/results.

3 RESULT

Nine selected articles show KAP of rabies prevention in middle and lower middle countries as presented in Table 1.

Table 1: Knowledge, attitude, and practice (KAP) of rabies prevention in low- and middle-income countries.

Authors	Results
(Hagos, Weldegerima Gebremedhin, Kindie Fentahun Muchie, 2020)	Overall, people in Mekelle city, Ethiopia had good knowledge (56.1%), positive attitude (56.2%), and good practice (61.3%) of rabies prevention.
(Ahmed, Touseef, Sabir Hussain, 2020)	People who had pets at home were not vaccinated against rabies due to a lack of knowledge and awareness of rabies pre-exposure prophylaxis preventive efforts. They also less likely visited health services after having dog bites.
(Christopher, Paulus Mario, Cucunawangsih Cucunawangsih, 2021)	In general, most of the respondents in this study had good knowledge, positive attitudes and good practices of rabies prevention.
(Rahaman, M. Mujibur, Umme Ruman Siddiqi, 2020)	Most respondents had adequate KAP levels and positive thoughts of rabies prevention.
(Sivagurunathan, Chinnaian, Ramachandran Umadevi, 2021)	About 27.7% of the research participants had good knowledge of animal bites and rabies; 34.6% of the participants had good attitudes towards animal bites and rabies, and 18.1% of the participants had good practice after having animal bites.
(Glasgow, Lindonne, Andre Worme, Emmanuel Keku, 2019)	About 40% of the respondents were informed about the protective level of rabies vaccination. Respondents did not show a very high level of knowledge about animals that might be infected with rabies.
(Tiwari, Harish Kumar, Mark O'Dea, Ian Duncan Robertson, 2019a)	Overall, the community had good knowledge of rabies. Most people had good attitudes and practices of rabies prevention.
(Tiwari, Harish Kumar, Mark O'Dea, Ian Duncan Robertson, 2019b)	Respondents did not understand the disease, especially its transmission that dogs and other animals such as rabid animals carry through licking and scratching and its preventive measures. Respondents' attitudes and practices of rabies prevention in households were not good.
(Pal P, Yawongsa A, Bhusal TN, Bashyal R, 2021)	Male respondents who had higher education and better socioeconomic status were likely to have good KAP of rabies prevention. On the other hand, female respondents who had less education and less socioeconomic status were likely to have poor KAP. In general, the respondents had low knowledge of rabies, posing bad attitudes and practices of rabies prevention.

4 DISCUSSION

Rabies remains an important global public health problem, especially in low and middle-income countries. It is considered a neglected tropical disease; however, the public's knowledge and awareness of the disease are still lacking and limited. Recent work by the World Health Organization under the umbrella of "Zero Rabies by 2030" is aimed to minimize the risk of rabies transmitted through dog bites in many countries (Yurachai O, Hinjoy S, 2020).

Most respondents from low-middle-income countries had good knowledge of rabies. In Ethiopia, 88.2% of all respondents had heard of rabies. They mostly had their dogs vaccinated. This indicates that their knowledge is quite good about rabies management. In India, especially in rural areas, people have good knowledge of rabies including transmission and dangers of rabies, animals that transmit rabies, and management of rabid animal bites. This current study also found that smaller households (<6 members) were more aware of rabies vaccination compared to larger households. In addition, smaller family sizes (<6 members) and animal ownership affected public knowledge about rabies besides socioeconomic status. Higher socioeconomic status tends to contribute to better possession of knowledge about rabies than lower socioeconomic status. Overall, Bali had performed good rabies management, given that most of the people had a good education and knowledge of rabies. Although several countries showed good knowledge of rabies, some countries such as Pakistan lack

information about rabies. The community in Gaibandha area, Bangladesh, showed good knowledge of rabies. Most respondents identified rabies as the deadliest disease, which can be transmitted through dog bites and manifested in forms of sudden behavior changes. A similar finding was also found in Nepal. In conclusion, factors that influence knowledge of rabies are education and social status.

Geographic area i.e., rural areas was a place where people mostly had no vaccinations or awareness. Dogs are often found roaming freely on the streets of rural areas (Tiwari, Harish Kumar, Mark O'Dea, Ian Duncan Robertson, 2019b). This current study shows that the respondents did not vaccinate their pets against rabies. They mostly did not seek medical attention when bitten by a dog. Poor knowledge of rabies contributes to the risk of developing rabies cases. Besides in India, people in urban Pakistan posed very low knowledge of rabies. Only 27.7% of participants had adequate knowledge of animal bites and rabies. A similar situation was found in Grenada. It means that only a few people understand the transmission of rabies and how to prevent and treat rabies. In general, animals that are susceptible to rabies are commonly identified by people. Most people are only aware of dogs as rabies-transmitting animals but not other animals. As a result, limited knowledge about rabies also prevents people from detecting signs of rabies in animals.

Most households from low-middle-income countries performed good attitudes and practices of rabies prevention. In Ethiopia, 56.25% respondents showed good attitudes and preventive practices as well. This shows that the community has a good awareness of rabies. Shirsuphal village in Western India was dominated by people who had good attitudes and practices of rabies prevention. They mostly understood how to handle and seek health services. People bitten by dogs treated their wounds using soap and water or come to health services. Most people from Bali province and Gaibandha had good attitudes and practices of rabies prevention. Most of them understood about rabies treatment and the importance of leashing and vaccinating dogs. Any dogs suspected of having signs such as rabies were reported by the community to the authorities.

Lack of reporting rabies cases and infrequent visit to health services because of rabid animal-suspected bites were found among people from India and Panchkula. The same treatment practiced by people in Bali and Gaibandha was also done by people in India. A low number of vaccinated animals were often found. Rabies surveillance was still not optimal. Some health workers did not understand how to handle rabies. The government, therefore, needs to launch programs that can control stray dogs, provide civet traps and public education, report people bitten by animals. Moreover, people from Nepal generally used more traditional medicine to treat wounds as a result of dog bites rather than health services.

5 CONCLUSION

Overall, people in low and middle-income countries had good knowledge, attitudes, and practices of rabies prevention. However, some did not have good enough knowledge, attitudes, and practices of rabies prevention. Factors influencing these three aspects are family size, animal ownership, socioeconomic status, and age. Developing knowledge, attitudes and practices of rabies prevention may reduce rabies cases.

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