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Knowledge and Epidemiological Risk Factors of Japanese Encephalitis in Community Members of Rupandehi District, Nepal

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Abstract- To study knowledge, attitude and risk factors of Japanese Encephalitis (JE), a research was conducted from May to November 2012 in Rupandehi district Nepal including household (HH) survey, pig survey and swine sero survey. Questionnaire survey on One hundred HH (50 pig raisers and 50 pig non raisers) to compare JE risk factors; 100 pig farmers to study roles of pig as risk factor for JE in human was conducted. Altogether 54% of respondents heard about JE with 60% (30/50) in pig raisers and 48% (24/50) in pig non raisers, which was not significantly different ($p > 0.05$). The media like Radio, TV, were found the most important source of information. The knowledge of JE was found significantly higher ($p<0.01$) in younger people (16-40 yr). The important predictors for knowledge of JE were education ($\beta 1 = 0.195$), access to media ($\beta 1 = 0.357$), and age ($\beta 1 = 0.165$) of respondents. In next 100 pig farmer's survey, 84.5% of pig farmers had seen mosquitoes in pig shed and 52% had seen mosquitoes biting pigs.

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Knowledge and Epidemiological Risk Factors of Japanese Encephalitis in Community Members of Rupandehi District, Nepal

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Abstract- To study knowledge, attitude and risk factors of Japanese Encephalitis (JE), a research was conducted from May to November 2012 in Rupandehi district Nepal including household (HH) survey, pig survey and swine sero survey. Questionnaire survey on One hundred HH (50 pig raisers and 50 pig non raisers) to compare JE risk factors; 100 pig farmers to study roles of pig as risk factor for JE in human was conducted. Altogether 54% of respondents heard about JE with 60% (30/50) in pig raisers and 48% (24/50) in pig non raisers, which was not significantly different ($p > 0.05$). The media like Radio, TV, were found the most important source of information. The knowledge of JE was found significantly higher ($p<0.01$) in younger people (16-40 yr). The important predictors for knowledge of JE were education ($\beta1 = 0.195$), access to media ($\beta1 = 0.357$), and age ($\beta1 = 0.165$) of respondents. In next 100 pig farmer's survey, 84.5% of pig farmers had seen mosquitoes in pig shed and 52% had seen mosquitoes biting pigs. Most farmers (68%) saw mosquitoes biting pigs everyday and major biting time was dusk (49%) and night (39%). There was significant association between knowledge on JE and their practices to avoid mosquitoes in pig shed ($p < 0.01$). The swine sero prevalence of JE was found to be 67.3% (37/55). Although the community members were at risk of JE but none of them had vaccinated against JE. Swine farmers vaccinated their pigs against infectious diseases like Foot and Mouth Disease and Swine Fever (44%) but none of them had vaccinated their pigs against JE. The pig and human vaccination, human awareness programs and provision of insecticide treated nets (ITNs) can significantly reduce JE in human.

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I. Introduction

Japanese Encephalitis (JE) was first clinically identified in 1871 in Japan and known as "summer encephalitis" (Mechenzie et al., 2007). In 1933, the virus responsible for Japanese Encephalitis B (JEB) was re-isolated and ultimately characterized in 1934, when it was experimentally inoculated into monkey brain and successfully reproduced the disease (Jani, 2009). JE appeared endemic within the Indochinese Peninsula including Cambodia, Laos, Thailand and Vietnam, and further on to Malaysia, Burma, Singapore (rare cases), Brunei (Erlanger et al., 2009). Then, within the following four decades, JE occupied subsequently most of the Asian continent from Pakistan to Sri Lanka on the east of its range (Solomon et al., 2000) and then Bangladesh, Nepal. Ardeid wading birds are the primary maintenance hosts, pigs are the main amplifying hosts, and Culex mosquitoes are the primary mosquito vectors (Igarashi, 2002). The disease was first recorded in Nepal in 1978 as an epidemic in Rupandehi & Morang District. The major objective of this research was to study knowledge, attitude of community members towards JE, to assess its risk factors which includes the Swine sero prevalence of JE.

II. Materials and Methods

Rupandehi was chosen a study site because it is an endemic district for JE (DHS, 2007), many community members have frequent mobility to India (DDC, 2010) and live pigs are imported from Indian endemic region to Nepal (DLS, 2010). Two study communities named Charange and Majuwa were selected as per the information on risk factors relating to JE from District Livestock Stock Office, District Hospital and Zonal hospital. The Charange and Majuwa were dense pig populated area of Rupandehi (DLSO, Rupandehi, 2011). To study knowledge, attitude and risk factors of JE, a research was conducted from May to November 2012 including HH survey, pig survey, sera collection and rapid kit for JE antibody. Using purposive random sampling, questionnaire survey was conducted on hundred households (50 pig raisers and 50 pig non raisers) to compare knowledge on JE risk factors; 100 pig farmers to study roles of pig as risk factor for JE in human. A total of 55 pig sera samples were taken from two research sites for JE surveillance.

III. Result

Fifty four percent (54/100, 95% CI: 44.2 to 66.6%) of the respondents heard about JE which was 60% (30/50, 95% CI: 46 to 72.8%) in pig raisers and 48% (24/50, 95% CI: 34.5 to 61.8%) in pig non raisers indicating a non significant difference among two respondent types. The media (television and radio) were

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found to be mostly used information source (56%) for JE and other vector borne diseases (VBDs) followed by health personnel (26%) and formal academic study (18%). Only 50.9% (28/54) of the respondents who heard of JE knew about mosquito as the vector, 50.9% (28/54) knew about its transmission cycle, and 49.1% (27/54) knew that JE could be treated. It was found that 50% of the community members were known about basic symptoms of JE (high fever, severe headache, neck rigidity and vomiting). The pig raisers were found to be less careful on the practices to avoid mosquito bite. The knowledge on JE was associated significantly with age ($\chi^2 = 3.931$; $p = 0.047$, Table 1).

Table 1 : Association of respondent characteristics to knowledge of JE

Respondent type	Knew about JE	Didn't know about JE	χ^2 (P value)
Adult	27 (50%)	14 (30.4%)	
Older	27(50%)	32 (69.6%)	3.931 (0.047)
Access to TV, radio	52 (96.3%)	36 (78.3%)	
No access to TV, radio	2 (3.7%)	10 (21.7%)	7.651 (0.006)

The access of HH to the source of information like Radio, Television was the best predictor of knowledge on JE. The explanatory variables selected for the knowledge of JE in community members as dependent variable were: access to information source (Radio, Television), Education status of respondents, and age factors of the respondents & the curve fitting of the model is adequate (F value= 5.112 & p= 0.002). The prediction model was $Y= \beta0+ \beta1X1+ \beta2X2+ \beta3X3 +e$ Where β0 is constant and β1, β2, β3 are partial correlation coefficient for explanatory variables X1 (Education status), X2 (Access to media) and X3 (Age of respondent), Y Knowledge on JE) being the response. Thus the fitted regression equation was: Y= 0.031+ 0.195 Education status + 0.337 Access to media + 0.165 Age factor.

In next 100 pig farmer's survey, 84.5% of pig farmers had seen mosquitoes in pig shed and 52% had seen mosquitoes biting pigs. Most farmers (68%) saw mosquitoes biting pigs everyday and major biting time was dusk (49%) and night (39%). Similarly, one third (33%) of pig raisers applied practices like disinfection, fumigation outside building, and removing stagnant water to avoid mosquitoes while the remaining 67% had done nothing. Half of farmers (50/100) reported being bitten by mosquito while working in the pig farms, 15% were in doubt, but 35% didn't suffer from mosquito bite. Only 44 (44%) of them had vaccinated their piglets against few infectious diseases like Swine Fever, FMD but none of them had vaccinated against JE. There was a significant association between knowledge on JE and their practices to avoid mosquitoes in pig shed ($\chi^2 = 10.684$; $p = 0.001$, Table 2).

Table 2 : Association of mosquito avoidance practices in pig shed to knowledge of JE

Pig farmer practice	Knew about JE	Didn't know about JE	χ^2 (P value)
Avoid mosquito	20(52.6%)	13 (21%)	
Don't avoid mosquito	18(47.4%)	49 (79%)	10.684 (0.001)
Total pig farmers	38	62	

A total of 55 sera samples were collected aseptically from pigs puncturing ear vein for rapid antibody detection of JE. The prevalence of JE was 67.3% (37/55) (Table 3).

Table 3 : Sero-prevalence of JE in pigs of community members in Rupandehi

District	Site	Farms	Total pigs	Avg. pig/farm	Pigs >6 months	Sera samples	Rapid kit test	
							+ve	-ve
Rupandehi	Majuwa	9	151	16.77	67	25	17	8
	Charange	15	308	20.53	97	30	20	10
Total		24	661	26.70	164	55	37	18

IV. Discussion

a) Risk factor of JE among community members

The community members ranked mosquito bite as major cause of fever both in Rupandehi and Kapilvastu. In community member at Rupandehi, 54% (54/100) and in Kapilvastu, only 12 % (12/100) of respondents knew about JE which was found different from that of Morang (USAID, 2010) where 32 % of respondent were aware of JE. As per the research of Pandit (2010), in Mandya district of Karnataka, about 42% of respondents had knowledge of JE and in Koppal district, 19.85% of the heads of household had the knowledge of JE. Similarly, 38% of the respondent pig farmers in Rupandehi had known about JE which supports the knowledge in pig farmers of Kathmandu (42%) (Dhakal et al., 2012) and contrast among in pig farmers (10%) of mountain districts (Thakur et al., 2012)

of Nepal. This variation of knowledge might have influenced by the socioeconomic and education status of respondents (USAID, 2003). The lower level of knowledge in Kapilvastu might have been due to low economic and education status. The major source of information regarding VBDs were found to be media like Radio, Television. Similar research was supported by USAID (2003) as they had found that knowledge and awareness of VBDs increased with radio ownership. The younger age, high literacy rate and access to the media were found important predictors for Knowledge on JE. According to CDC (2011) 40% of respondent (20/50) get bite while working in the field and 60% got bite while in house at different time in house which is similar to our finding. In similar research of USAID (2003), 85% use bed nets among those aware of JE compared to 68% among those not aware but it avoidance practices were not significantly associated with the knowledge.

b) Swine sero prevalence of JE

The prevalence of JE was found was different in different places. Our research is contrast with that of Thakur et al., (2012) their results showed that 16.7% (17/102), 4% (4/100), 6.6% (10/151) and 44.6% (45/101) of pigs had anti-JEV antibodies in Sindhupalchowk, Dolakha, Solukhumbu and Kavrepalanchowk districts respectively. The higher prevalence of JE in pigs in our research site could be because of higher prevalence of culine mosquitoes but is was similar to that of Kathmandu (Pant, 2006). Sero prevalence of JE in pigs varies considerably across geographic locations, and the result of this study is slightly larger than estimates of sero positivity from other Asian countries: 49% in Bali, 6% in Java, Indonesia (Yamanaka et al., 2010); 4.5% in Ishigaki Island, Japan (Nidaira et al., 2009); and 33.3% in Tibet (Li et al., 2011). The higher sero prevalence could be high vector prevalence and their breeding in nearby rice field of the southern belt of Nepal. The expansion of the JE virus-endemic area depends on irrigated rice farming and pig rearing (Oya and Kurane, 2007). High densities of JE vector were reported in rice fields after the rainy season when there is plenty of water and temperatures are high, facilitating larval grow in large numbers (Sunish and Reuben 2001). Conlan (2012) identified proximity to rice fields (OR 2.93, 95% CI 1.57–5.45), pig ownership (OR 2.24, 95% CI 1.17–4.26), and older age (OR 1.21, 95% CI 1.09–1.33) as being independently associated with the risk of JE. A research in laos showed that peak JEV transmission coincides with the start of the monsoonal wet season and poses the greatest risk for human infection. Many of the ecological, environmental, climatic and human behavioral factors are involved in the JE virus spread (Solomon, 2006). The practice of paddy cultivation, proximity of houses to water bodies and suitable climatic factors were the most important environmental factors associated with several recent JE outbreaks in Northeast India (Phukan et al., 2004).

V. Conclusion

The community members in Rupandehi were found at high risk of JE as the amplifying hosts harvest large prevalence of JE virus and agro-ecological scenario favors transmission of JEV from maintenance hosts to amplifying host. Many pig farmers were illiterate so the training regarding the piggery management along with the measures to be prevented from vector borne diseases like JE should be provided through informal teaching learning process like farmer's trainings and demonstration. This is an important public health disease governed by many environmental, social, climatic and ecological factors. Thus, stakeholders are required to address the problems remaining inside the umbrella of One Health Strategy.

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