

Risk Factor for Hepatitis B Family Transmission in Kupang Province of East Nusa Tenggara, Indonesia

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ABSTRACT

Background: Hepatitis B is a worldwide problem caused by hepatitis B virus (HBV). Basic Health Research 2013 estimated that there were 1,2% of the population in Indonesia with Hepatitis, and the highest prevalence was in the East Nusa Tenggara (4,3%). Transmission can be through vertical (perinatal) and horizontal (home contact).

Aim: To analyze the risk factors for transmission at home contact from students with HBsAg reactive.

Methods: On November 2015, there was a screening examination of HBsAg status with ELISA sandwich method on 341 students of Kota Kupang Senior High School and obtained 45 samples with HBsAg reactive. Continued seven months later on June 2016, 23 students were still reactive to HBsAg. After examination with HBsAg reactive, there were 89 samples of family members became respondents. The data were statistically analyzed with Chi-Square (X^2) and Odds Ratio.

Results: There was no significant relationship between HBsAg status with sex and age. But, there was a significant relationship between HBsAg status with education (OR=0,184, 95%, 0,059-0,579) and marital status (OR=0,204, 95%, 0,07-0,597).

Conclusion: The presence of family members with reactive HBsAg could transmit HBV to other family members. The higher education and unmarried family member could minimize the intrafamilial transmission on HBV.

Keywords: Risk Factors, Home Contact, HBsAg Reactive

INTRODUCTION

Hepatitis B virus (HBV) infection is a serious global public health problem^{1,2}. The infection may be transmitted through sexual intercourse, parenteral contact or from an infected mother to the baby at birth and, if contracted early in life, may lead to chronic liver disease, including cirrhosis and hepatocellular carcinoma^{3,4}.

HBV infection has a worldwide distribution that infected more than 2 billion people^{5,6}. Around 240 million of them are in the chronic stadium and at risk of serious illness and death from cirrhosis and hepatocellular carcinoma (HCC)¹² - diseases that are estimated to cause 500 000–700 000 deaths each year worldwide^{1,2,5}.

Blood and other body fluids, including saliva, tears, cement, and vaginal secretions^{7,8}, carried HBV and become the media of transmission. Depending on the epidemiological pattern within a geographic area, the main ways of transmission are sexual intercourse, parenteral contact, or infection of the baby at birth from an infected mother^{3,5}. One of the most important factors that contribute was the mother transmission to children (MTCT) - also called vertical transmission from pregnant women to their children during pregnancy^{8,9,10}.

National Health Research 2013 estimated 7.1% prevalence of HBsAg. This result leaving from 9.4% in 2007 and means that Indonesia is moving from high to moderate endemicity of Hepatitis B¹¹. The five provinces with the highest prevalence of hepatitis are East Nusa Tenggara (4.3%), Papua (2.9%), South Sulawesi (2.5%), Central Sulawesi (2.3%) and Maluku (2.3%). Kambuno¹² reported the prevalence of positive HBsAg in the Blood Transfusion Unit of PMI in the Province of East Nusa

Tenggara 2017 was 3.5%. Other studies report that HBV infection data in hemodialysis patients in general hospitals Prof. Dr. W.Z. Johannes Kupang was 11%¹³.

HBV infection was strongly associated with having a family member infected with hepatitis B, mainly mother, father, and siblings sharing personal objects, and having a history of blood transfusion^{7,14-17}. Some previous studies had demonstrated that sharing personal objects with family members (safety razor, dishes, cutlery, glasses, face towels, and toothbrush) was strongly associated with HBV transmission^{17,18}. Several studies have already reported the transmission by sharing infected objects. Therefore, drug users, who share syringes and other objects contaminated with blood, usually have a high risk of HBV infection^{15,19}.

Alizadeh *et al.*,²⁰ reported one hundred and fifteen family members, including mothers, fathers, sisters, brothers, daughters, and sons, husbands, and wives, were enrolled. Twelve (11%) of all family members were HBsAg positive. Fifty (56.2%) were isolated HBsAb positive, and only one person (2.5%) was isolated HbCAb positive. Brothers and fathers were having higher rates of HBsAg marker²¹.

Kambuno²² found the transmission of HBV infection of 15.15% in home contact, and further research showed that there was no relationship between sex, age, education, and marital status with hepatitis B infection^{13,22}. This study aimed to analyze the risk factors of family transmission of HBV from students with reactive HBsAg.

MATERIALS AND METHOD

This research consisted of 2 phases: the first phase was a screening test of 341 blood samples at three high schools

in Kupang City on November 2015. There were 45 students (13.2%) had HBsAg positive. The second phase, carried out in July 2016, was taking 23 students and 89 members of their family with reactive HBsAg. The sample used was venous blood from students, and members of the student household contact with 5 ml for each proband and stored at 4°C. Data were analyzed statistically with chi Square and the Crammer Coefficient Analytic Correlation test.

Code of Ethics Commission at the Faculty of Medicine, University of Nusa Cendana has registered this research (UN-15050021). All students and family members had agreed with the given informed consent.

RESULTS AND DISCUSSION

After the first screening on November 2015, there were 45 students with HBsAg positive. But, in the next six month, there were only 23 students still lived with HBsAg positive.

Table 1: Characteristic of Students with Chronic HBV Carriers

Variable	N (%)
Age	
• 15 – 16	10 (43.5)
• 17 - 18	13 (56.5)
Gender	
• Male	11 (47.8)
• Female	12 (52.2)
Vaccination status	
• Vaccinated	23 (100.0)
• Non Vaccinated	0 (0.0)
Family size	
• ≤5	17 (73.9)
• >5	6 (26.1)

Table one showed that all the respondents (100.0%) had been vaccinated and still with HBsAg positive. It meant that they had chronic HBV carriers and became the transmission media in their family. Most of them (73.9%) lived with a small number of family members.

Table 2 - Frequency Distribution of Hepatitis B Markers in Family Members

Family members	HBsAg Negative N (%)	HBsAg Positive N (%)
Grandparents	8 (9.0)	0 (0.0)
Parents (F:6, M:4)*	23 (25.8)	10 (55.6)
Sisters	16 (18.0)	5 (27.8)
Brothers	11 (12.4)	2 (11.1)
Others	8 (9.0)	1 (5.5)
Total	89(100.0)	18 (20.2)

*F: Father M: Mother

Table 2 showed that the family members of these students were 89 people and only 20.2% of them who had HBsAg positive. The great contribution of family members on HBV transmission was parents group (55.6%) consisted of six fathers and four mothers and followed by sisters (27.8%).

Table 3 - Characteristics of Family Members

Variable	HBsAg status n = 89		p	OR
	Positive N (%)	Negative N (%)		
Age ≤16	10 (55.6)	35 (49.3)	0,819	
>16	8 (44.4)	36 (50.7)		
Gender			0,823	
Female	9 (50.0)	34 (47.9)		
Male	9 (50.0)	37 (52.1)		
Education			0,003	0,184
High	5 (27.8)	48 (67.6)		
Low	13 (72.2)	23 (32.4)		
Marital Status			0,005	0,204
Unmarried	6 (33.3)	45 (63.4)		
Married	12 (66.7)	26 (36.6)		
Total	18 (20.2)	71 (79.8)		

Table three showed that most of the family members were adults (49.4%), unmarried (57.3%) and had a highly educated level (59.6%). The statistical result showed that there was a significant relationship between Education and Marital status (*p-value* < 0.05) with HBsAg Status.

HBV and HbsAg: Hepatitis B Virus (HBV) is a virus causing hepatitis infection, which has 45 – 120 days incubation period in the human liver cell. One of the body’s immunologic response toward HBV is HBsAg (*Hepatitis B Surface Antigen*) formation. HBsAg could be a diagnostic detector of HBV. If a person has an HBsAg positive, he or she might get HBV as a carrier and could contaminate others via his or her body’s fluid. But, if someone has an HBsAg positive more than six months, he has got chronic Hepatitis B³⁴.

On the first screening of this study, we could see there were 13.2 % of students with HBsAg positive. It meant that there were 13 students with HBsAg positive in every 100 students. It was almost twice from the national HBV prevalence (7.1%). All the students had an HBsAg vaccine when they’re born due to the government’s policy that newborn baby had to get HBsAg vaccine as a basic immunization. Unfortunately, even they’ve got the vaccine when they’re born, they still got chronic HBsAg. This condition became an interesting topic to have further analyze.

Home Contact or Intrafamily transmission: There are two ways of HBV transmission³²:

Vertical transmission: This transmission happens during the perinatal period. The contamination happens from the mother to the baby or known as Mother Transmission to Children. If the mother has HBsAg (+) and HBeAg (+), the baby will have a 90% chance of getting contaminated, and it usually becomes chronic. But if the mother has HBsAg (+) and HBeAg (-), the chance of contamination will be only 4%, and the baby is usually getting well.

Horizontal transmission: This transmission happens in a community, especially intra family. It happens through the contact of patients’ body’s fluid.

In this study, parents (55.6%) had a great contribution on HBV transmission among family members. There were some researches stated that HBV positive among

spouses^{26,31}. Vertical transmission happened from mother who had HBV to the newborn baby, and the baby could get chronic Hepatitis. Pregnant mother with HBsAg positive had a 98% chance to infect the fetus^{7,8}. Some researchers also stated that parents with chronic Hepatitis B could be the risk factor for his family in California³⁵ and in Anhui, China³⁶.

Some of the respondents were over 16 years old in this study. This condition was the same as Bai Kusnadi (2011)³³ research that there was a significant relationship between age and HBsAg status. Most of them were usually using tools together, such as using nail clipper or comb or toothbrushes, sexual contact, heavy contact with siblings through a bite wound³⁴. Other researchers stated that HBsAg positive in intra family contact was around 23,3% di Arak, Iran¹⁶, 2,3% di Nahavand, Iran²³, 10,6% di Guilan Province Iran²⁴, 37,1% di Hamadan cities²⁵, 30,5% di Turkey²⁶.

This study also found that there was a significant relationship between HBsAg positive toward education (*p-value*: 0.003; OR: 0.184) and marital status (*p-value*: 0.005; OR: 0.204). This result was in line with some researchers stated that there was a significant relationship between HBV infection with marital status, education an occupation in some nations such as South Brasil¹⁵, Iran²⁷, Mesir²⁸, Turkey²⁹, Palestina³⁰.

CONCLUSION

The prevalence of HBsAg positive in Kupang City High School students was 13.2. The presence of family members with reactive HBsAg could transmit HBV to other family members. Family members with higher education 0.184 times are at risk of not being infected with hepatitis B compared with low education. Unmarried family members are 0.204 times more at risk of being uninfected compared to those who are married.

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Conflict of Interests: The authors declare that there is no conflict of interests.

REFERENCE

1. Asia WRO for S-E. *Report of an Informal Consultation to Develop a "Regional Strategy" for the Control of Viral Hepatitis*; 2012.
2. WHO WHO. Global health sector strategy on viral hepatitis 2016-2021. *Glob Hepat Program Dep HIV/AIDS*. 2016;(June):56.
3. Darmawan E, Khobar KL, Turyadi, Nursanty NKD, Thedja MD, Muljono DH. Seroepidemiology and occult hepatitis B virus infection in young adults in Banjarmasin, Indonesia. *J Med Virol*. 2012;87(2):199-207.
4. Wijayadi T, Sjahril R, Ie SI, et al. Seroepidemiology of HBV infection among health-care workers in South Sulawesi , Indonesia. *BMC Infect Dis*. 2018;1-11.

5. World Health Organization. Prevention and control of viral hepatitis infection: framework for global action. *World Heal Organ*. 2012:28.
6. Ie SI, Turyadi, Sidarta E, et al. High prevalence of hepatitis B virus infection in young adults in Ternate, eastern Indonesia. *Am J Trop Med Hyg*. 2015;93(6):1349-1355.
7. Shedain PR, Devkota MD, Banjara MR, Ling H, Dhital S. Prevalence and risk factors of hepatitis B infection among mothers and children with hepatitis B infected mother in upper Dolpa, Nepal. *BMC Infect Dis*. 2017;17(1):1-9.
8. Fujiko M, Chalid MT, Turyadi, et al. Chronic hepatitis B in pregnant women: is hepatitis B surface antigen quantification useful for viral load prediction? *Int J Infect Dis*. 2015;41:83-89.
9. Khumaedi AI, Gani RA, Hasan I. Pencegahan transmisi vertikal hepatitis B: fokus pada penggunaan antivirus antenatal. *J Penyakit Dalam Indones*. 2016;3(4):225-231.
10. Pambudi R, Ramadhian R. Efektivitas vaksinasi hepatitis B untuk menurunkan prevalensi hepatitis B. *Med J Lampung Univ*. 2016;5(1):91-95.
11. Badan Penelitian dan Pengembangan Depkes RI. Riset Kesehatan Dasar Departemen Kesehatan Republik Indonesia. *RiskesdasDepkes RI*. 2007.
12. Kambuno, N., Sari, A., Nurdin, K., Novicadlitha, Y., & Siregar I. The relation of blood donors' characteristic toward prevalences of HBsAg and Anti-HCV on blood transfusion unit of PMI in Province of East Nusa Tenggara. In: Waangsir F, Kase S, eds. *Proceeding 1st. International Conference Health Polytechnic of Kupang*. Kupang, East Nusa Tenggara: Health Polytechnic of Kupang; 2018:303-310.
13. Irfan, Wawomeo A, Kambuno NT. Hepatitis B Virus Infection in Hemodialysis patient at Prof. DR. W.Z. Johannes Kupang Hospital, East Nusa Tenggara. *J Kesehat Prim*. 2019;4(1):63-69.
14. Muljono DH. Epidemiology of hepatitis B and C in Republic of Indonesia. *Euroasian J Hepato-Gastroenterol*. 2017;7(1):55-59.
15. Pereira VRZB, Wolf JM, Luz CA, et al. Risk factors for hepatitis B transmission in south Brazil. *Mem Inst Oswaldo Cruz*. 2017;112(8):544-550.
16. Sofian M, Banifazl M, Ziai M, Aghakhani A, Farazi A-A, Ramezani A. Intra-familial transmission of hepatitis B virus infection in Arak, central Iran. *Iran J Pathol*. 2016;11(4):328-333.
17. Nazzal Z, Sobuh I. Risk factors of hepatitis B transmission in northern Palestine: a case - control study. *BMC Res Notes*. 2014;7:190.
18. Barlean L, Saveanu I, Balcos C. Dental patients' attitudes towards infection control. *Rev Med Chir Soc Med Nat Iasi*. 2014;118(2):524-527.
19. Matos MAD ia. de, Ferreira RC arneir., Rodrigues FP ere., et al. Occult hepatitis B virus infection among injecting drug users in the Central-West Region of Brazil. *Mem Inst Oswaldo Cruz*. 2013;108(3):386-389.
20. Alizadeh AHM, Ranjbar M, Ansari S, Alavian MS, Shalmani MH et al. Intra-familial prevalence of hepatitis B virologic markers in HBsAg positive family members in Nahavand, Iran. *World J Gastroenterol*. 2005;11(31):4857-4860.
21. Jeong SH, Yim HW, Yoon SH, Jee YM, Bae SH, Lee WC. Changes in the intrafamilial transmission of hepatitis B virus after introduction of a hepatitis B vaccination programme in Korea. *Epidemiol Infect*. 2010;138(8):1090-1095.
22. Kambuno NT, Bessie MF, Tangkelangi M. Risk Factors of Intra-familial Hepatitis B Virus Transmission among Hepatitis B Patients in Kupang. *Glob Med Heal Commun*. 2019;7(2):150-155.
23. Alizadeh AHM, Ranjbar M, Ansari S, et al. Intra-familial prevalence of hepatitis B virologic markers in HBsAg positive

- family members in Nahavand, Iran. *World J Gastroenterol*. 2005;11(31):4857-4860.
24. Mansour-ghanaei F, Joukar F, Yaseri M, Soati F, Atrkaroushan Z. Intrafamilial spread of hepatitis B virus in Guilan Province-North of Iran. 2013;4(4):250-257.
 25. Ranjbar M, Golzardi Z, Sedigh L, Nekoozadeh S. Intrafamilial seropositivity of hepatitis in patients with hepatitis B and C virus in hepatitis clinic in Hamadan , Iran. 2012;11(1):32-36.
 26. Ucmak H, Kokoglu O faruk, Celik M, Ergun UGO. Intra-familial spread of hepatitis B virus infection in eastern Turkey. *Epidemiol Infect*. 2007;135:1338-1343.
 27. Sali S, Bashtar R seyed A. Risk Factors in Chronic Hepatitis B Infection: A case-control study. *Hepat Mon*. 2005;5:109-115.
 28. Talaat M, Radwan E, El-Sayed N, Ismael T, Hajjeh R, Mahoney FJ. Case-control study to evaluate risk factors for acute hepatitis B virus infection in Egypt. *East Mediterr Heal J*. 2010;16(1):4-9.
 29. Ozer A, Yakupogullari Y, Beytur A, et al. Risk Factors of hepatitis B virus infection in Turkey; A population - based, case-control study. *H*. 2011;11(4):263-268.
 30. Zaher N, Sobuh I. Risk factors of hepatitis B transmission in northern Palestine : a case-control study. *BMC Res Notes*. 2014;7(190):1-6.
 31. Abbas Z, Siddiqui AR. Management of hepatitis B in developing countries. *World J Hepatol*. 2011;3(12):292-299.
 32. Dalimartha,S. 2006. Ramuan Tradisional Untuk Pengobatan Hepatitis. Jakarta :Penebar Swadaya.
 33. B. Kusnadih, S. Nurjdanah. 2011. FaktorRisikoTransmisilntrafamialPenderita HBsAg Positif di Kota Mataram Nusa Tenggara Barat. repository.ugm.ac.id
 34. Mustofa S, Kurniawaty E. 2013. Manajemen gangguan saluran serna : Panduan bagi dokter umum. Bandar Lampung: Aura Printing & Publishing. hlm.272-7
 35. Ha NB, Trinh HN, Nguyen TT, Leduc T-S, Bui C, Ha NB, et al. Prevalence, Risk Factors, and Disease Knowledge of Chronic Hepatitis B Infection in Vietnamese Americans in California J Canc Educ. 2013;28:319-24
 36. Li X, Zheng Y, Liao A, Cai B, Ye D, Huang F, et al. Hepatitis B virus infections and risk factors among the general population in Anhui Province, China: an epidemiological study. *BioMed Central Public Health*. 2012;12(272):1-7