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Original Research Article

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Hepatitis B in Pregnancy: Knowledge, Access to Screening and Vaccination in a Low-Resource Setting, Cameroon.

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ABSTRACT

Background: Hepatitis B virus (HBV) infection is a global public health problem with a high burden in Sub-Saharan Africa. This burden is more felt in the paediatric population, mother to child transmission (MTCT) being a major mode of infection. This study sought to assess the knowledge of pregnant women on HBV and their access to screening and vaccination.

Methods: A cross-sectional study was carried out in the South West Region, Cameroon from 15th January to the 15th April, 2018 involving third trimester pregnant women attending antenatal care (ANC) and those in the post-partum period admitted at the maternity wards of some hospitals. Data was collected using a structured questionnaire and analyzed using SPSS version 23. Knowledge was evaluated using a series of twelve questions. Vaccination status was determined from vaccination cards and ANC registers.

Results: Of the 349 women studied, 31.8% were knowledgeable with scores of $\geq 6/12$. High educational level (P= 0.002) and occupation as a health worker (P < .001) were associated with good knowledge. Ninety (90.0%) had been screened for hepatitis B surface antigen (HBsAg) during pregnancy while 14.6% had been vaccinated. Determinants of vaccination were monthly income >60.000FCFA (OR: 5.7 CI: 1.6-19.9), urban residence (OR: 4.0 CI: 1.1-15.0) and regional level of ANC health facility (OR: 12.4 CI: 2.0-76.4).

Conclusion: Only about three in ten women were knowledgeable on HBV infection. Ninety percent were screened during pregnancy but only ten percent were vaccinated. These results show that despite the high rate of HBV screening in this setting, most women have poor level of knowledge about this infection and its prevention. We recommend that health education on HBV should be provided to pregnant women especially during antenatal visits and that preventive measures be re-enforced in South West Region.

Key words: Hepatitis B, Pregnancy, Prevalence, Determinants, Access, screening, vaccination, Cameroon.

1. INTRODUCTION

Infection with Hepatitis B virus (HBV) is a major public health problem worldwide. Burdens of the disease are mainly in WHO Western Pacific Region and WHO African Region where 6.2% and 6.1% of the adult population is infected respectively [1]. Approximately 2 billion persons are infected worldwide of which 240 million are chronic carriers of hepatitis B virus (HBV) virus [2]. It is an important cause of morbidity and mortality and approximately 800.000 infected persons die yearly of complications of chronic hepatitis mainly liver cirrhosis and hepatocellular carcinoma (HCC) [2]. Sub-Saharan Africa is described as an area of high endemicity with an average prevalence above 8% [1,3]. Few studies in Cameroon have reported the prevalence of HBV in different sub-populations as 11.9%, 19.9% and 7.7% in the general population, among children, and among pregnant women respectively [4–6]. A more recent study at Buea health district showed a prevalence of 9.7% in pregnant women [7]. These results place Cameroon at a high endemicity for HBV infection (> 8% prevalence) and reveal that the disease burden in Cameroon is in the pediatric population [1,5,8].

Mother-to-child-transmission (MTCT) is a major mode of HBV transmission worldwide, which is problematic since around 90% of infected infants progress to chronic hepatitis B. This risk is much

higher than from horizontal transmission where the rate of chronicity is 30–50% when infected before 6 years of age and <5% when infected in adulthood [1,9,10]. Perinatal transmission being one of the commonest route of transmission, prevention of MTCT is therefore an essential step in reducing the burden of disease [11,12]. For this reason, routine screening of all pregnant women for hepatitis B surface antigen in each pregnancy, introduction of hepatitis B vaccine into the expanded program on immunization (adopted in 2005 in Cameroon) as well as neonatal HBV immunoprophylaxis at birth and vaccination of pregnant women at high risk of HBV is recommended [13–16]. Despite all these measures put in place, the prevalence of hepatitis B in Cameroon as a whole, and in Cameroonian pregnant women remains high with a prevalence of 7.7% in 2013 similar to 7.85% in a study done on samples collected ten years earlier [4,17].

Hepatitis B vaccine is the most effective measure for preventing HBV infection. After receiving all three doses, it provides a greater than 90% protection when received before being exposed[1,20]. This vaccine is not contraindicated in pregnancy and is safe both for the mother and fetus when administered at any of the three trimesters of gestation [21,22]. A meta-analytic study in Iranian pregnant women, 2017 estimated the HBV vaccination coverage at 9.8% [23]. In China coverage was estimated at 33% in pregnant women [24]. In Cameroon, a vaccination coverage of 2.7% was reported by Fomulu *et al* in 2012.

Several studies have assessed the prevalence of hepatitis B in pregnancy as well as the risk factors in Cameroon [4,7,25–27]. Hepatitis B vaccination in pregnancy is not one of the recommended vaccines during antenatal care (ANC) in Cameroon. However, it is fast becoming a standard of care in some health institutions because of its proven efficacy in the prevention of MTCT of hepatitis B. Despite this proven safety and protective effect of the vaccine, there is a paucity of data about the vaccination coverage in pregnant women in Cameroon. This study sought to assess the knowledge of pregnant women on HBV and their access to screening and vaccination.

2. MATERIALS AND METHODS

2.1 Study Design, Study Setting and Enrollment of Participants

This cross-sectional study was conducted at the antenatal clinics of three facilities in the south-west region (Buea, Limbe, Kumba) from 15th January to the 15th April, 2018. Two centres were selected from the secondary and one in the primary level of healthcare based on their high antenatal care client turnout. The study sites were the District Hospital Kumba (primary); the Buea and Limbe Regional Hospitals (secondary).

The study population included pregnant women in the third trimester attending antenatal clinics and women in the postpartum period admitted at the maternity ward in each of the selected centres. These women were informed about the study and requested to sign a written consent if they understood goals, procedures and accepted to participate in the study. Women in the first and second trimester and those who had never attended antenatal care for the ongoing pregnancy were excluded.

2.1 Sample Size Calculation and Sampling

The minimum sample size was calculated using the LORENZ formula [28]. The HBV prevalence used was 20.4% reported by Ducancelle et al, 2013 [26]. A minimum sample size of 271 was obtained with a 95% confidence and 5% accuracy and considering a 10% non-respondent rate. This sample size was then divided into the three hospitals according to their antenatal care turnout (BRH= 50 ANC clients/month giving a sample of 76 women; LRH= 60 ANC clients/month giving a sample of 90 women; DHK= 70 ANC clients/month giving a sample of 105 women). The study participants were chosen by convenience sampling.

2.2 Data Collection

97 A structured interviewer-administered questionnaire was used to collect data for both literate and

98 illiterate women in the language they best understood. The questionnaire contained questions about

99 socio-demographic characteristics. Questions to evaluate the level of knowledge of pregnant

100 women about Hepatitis B virus infection, their access to screening and vaccination were equally

101 asked. Prior to the use of the questionnaire in study participants, the questionnaire was pretested

102 in 30 pregnant women with the aim of revising poorly structured questions, estimate the average

103 time required to fill the questionnaire and thus validate the use of the questionnaire in our context.

104 Information retrieved from pre-test group was not included in the final analysis. After data

105 collection, the data were entered into CS Pro and then exported to SPSS version 23 for analysis.

106

107 **2.3 Data Analysis**

108 Knowledge was assessed by computing the number of correct responses to 12general knowledge

109 questions on Hepatitis B and scored. For each correct answer, a score of one (1) was allocated,

110 while the score of zero (0) was allocated for no answer and for incorrect answers. Scores were

111 stratified into four levels based on Essi and Njoya's2013 guide on assessment of knowledge in

112 KAP studies (Poor knowledge was considered for respondents with a total score of <3 marks(less

113 than 25% right answers); insufficient knowledge for scores ranging from 3 to5 (25 to 49% of right

114 answers), average knowledge for scores ranging from 6 and 8(50 to 69% of right answers) and

115 adequate knowledge for scores >8 (>70% of right answers) [29]. The vaccination status was based

116 on the vaccination card and ANC registers, in the absence of which the participant's recall was

117 used. All women who had a documentation of administration of at least a dose of hepatitis B

118 Vaccine were considered "vaccinated"; those who had received at least three doses of the vaccine

119 were considered "completely vaccinated" while those who had not completed their vaccination

120 schedule were considered "incompletely vaccinated". Participants who had never received a dose

121   of Hepatitis B vaccine were considered "not vaccinated". The screening status was based on the

122   documentation of HBsAg testing during the previous ANC sessions for the ongoing pregnancy.

123   Data was analysed with the Statistical Package for Social Sciences (SPSS) software version 23;

124   frequency tables were created for proportions, Chi-square test for associations between categorical

125   variables and one-way analysis of variance (ANOVA) for comparison of means between groups.

126   Significant variables from cross tabulation between knowledge, screening vaccination status and

127   sociodemographic variables were inserted into a binary logistic regression model. A p-value of

128   <0.05 was considered statistically significant.

129   ## 3. RESULTS

130   Out of a total of 353 potential participants who were approached for the study, 349 women were

131   recruited. Of these, 93 (26.6%) and 114 (32.7%) were enrolled at the Buea and Limbe Regional

132   Hospitals respectively (secondary centres); while142 (40.7%) were enrolled at the District Hospital

133   Kumba (Primary centre). Four potential participants did not consent for personal reasons, giving a

134   response rate of 98.9%. The ages of the participants ranged from 16 to 43 years with a mean age

135   of 27.35 ± 5.18 years in the general population. Majority were married or cohabiting 234 (67%)

136   while 115 (33%) were single. More than half 55 (58.5%) had < 60000 FCFA as monthly income

137   because the majority of the participants refused to disclose their income. The study included 191

138   (54.7%) pregnant women and 158 (45.3%) women in the post-partum period. All pregnant

139   participants were in the third trimester with gestational ages (weeks) ranging from 28 to 41weeks

140   and a mean of 32.2 ± 4.1weeks. Significant differences between participants in the different health

141   facilities were found in age, residence and gravidity. Table 1 summaries the socio-demographic

142   and obstetric characteristics of the respondents.

143

144   **Table 1. Socio-demographic characteristics of participants in the various centres**

Variables	BRH		LRH		DHK		TOTAL		p-value
	n	%	n	%	n	%	n	%	
Age									
<20	7	7.5	4	3.5	7	4.9	18	5.2	
20 < 25	28	28.6	27	23.7	36	25.4	91	26.1	
25 < 30	35	37.6	39	34.2	48	33.8	122	35.0	
30 < 35	21	22.6	37	32.4	38	26.7	96	27.5	**0.004**
>35	2	2.2	7	6.1	13	9.2	22	6.3	
Total	93	100	114	100	142	100	349	100	
Residence									
Urban	62	66.7	78	68.4	61	43.0	201	57.6	
Rural	31	33.3	36	31.6	81	57.0	148	42.4	**0.000**
Total	93	100	114	100	142	100	349	100	
Marital status									
Single	35	37.6	29	25.4	51	35.9	115	33.0	
Married	58	62.4	85	74.6	91	64.1	234	67.0	0.111
Total	93	100	114	100	142	100	349	100	
Income level									
<60.000fcfa	11	45.8	21	44.7	7	30.4	39	41.5	
>60.000fcfa	13	54.2	26	55.3	16	69.6	55	58.5	0.463
Total	24	100	47	100	23	100	94	100	
Gravidity									
1	47	50.5	38	33.3	39	27.5	124	35.5	
2-4	42	45.2	62	54.3	88	62.0	192	55.0	
≥5	4	4.3	14	12.2	15	10.6	33	9.5	**0.004**
Total	93	100	114	100	142	100	349	100	

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147

148 On the assessment of knowledge, 195 (55.9%) of participants had a poor knowledge about HBV

149 infection, MTCT of HBV and HBV vaccination with knowledge scores <3. Only 74 (21.2%) of

150   participants had good knowledge (knowledge score $\geq$ 8). Table 2 summarizes the knowledge of

151   study participants on Hepatitis B.

152

153   **Table 2. Knowledge, screening and vaccination status of the participants.**

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Variables	Frequency (n= 349)	Percentage (%)
Knowledge		
Good (score ≥8)	74	21.2
Average (score 6-7)	37	10.6
Insufficient (score 3-5)	43	12.3
Poor (score <3)	195	55.9
Previously screened		
Yes	314	**90.0**
No	35	10.0
Previously Vaccinated*		
Yes		
Completed (3 doses)	9	**10.9**
Incomplete	38	1.1
respecting schedule	4	10.9
Incomplete not		
respecting schedule	51	14.6
Total		
No	298	**85.4**

155

156   ***Vaccination status was based on participant's recall (3.9%) and vaccination cards (96.1%).**

157

158   Knowledge about HBV was obtained from various sources; among all respondents, common

159   sources included counseling sessions (79.5%), discussions with relatives and friends (27.3%) and

160   the media (16.9%).

161   As shown in Table 2, 314 (90.0%) respondents had previously been screened for HBV infection

162   during the ongoing pregnancy, and 51 (14.6%) had received at least one dose of hepatitis B vaccine.

163   Only 9 (2.6%) were completely vaccinated. Thirty-eight (10.9%) were incompletely vaccinated

164   but were following their normal vaccination schedule while 4 (1.1%) were incompletely vaccinated

165   and had missed their subsequent doses by more than two years. An evaluation of associations

166   between knowledge, previous screening and vaccination with sociodemographic variables was

167   done using cross tabulation and significant variables were entered into a binary logistic regression

168   model (Tables3 to 6).

169   Following a univariate analysis, health workers (OR: 0.9 CI: 0.9-1.0), respondents attending ANC

170   in a regional hospital (OR: 3.4 CI: 3.0- 5.4) and respondents with more than primary level of

171   education (OR: 0.1 CI: 0.0- 0.4) were more likely to have good knowledge p-values = 0.002, 0.000

172   and 0.000 respectively (Table 3). However, on multivariate analysis none of the factors were found

173   to be predictors of good knowledge (Table 4). The tables 3 to 6 show predictors of good knowledge,

174   screening and vaccination in the respondents.

175

176   **Table 3. Factors associated with good knowledge on Hepatitis B.**

Variables	Knowledge level		Odds ratio	Confidence interval	p-value
	Good	Not good			
Age					
<35	67(20.5%)	260(79.5%)	0.6	0.2-1.4	0.277
>35	7(31.8%)	15(68.2%)			
Occupation					
Health worker	4(100%)	0(0.0%)	0.9	0.9-1.0	**0.002**
Not health worker	70(20.3%)	275(79.7%)			
Level of Education					
≤ Primary	2(3.6%)	54(96.4%)	0.1	0.0-0.4	**0.000**
> Primary	72(24.6%)	221(75.4%)			
ANC hospital					
Secondary	47(33.3%)	94(66.6%)	3.4	2.0- 5.7	**0.000**
Primary	27(13.0%)	181(87.0%)			

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Table 4. Predictors of good level of knowledge on Hepatitis B.

Variables	Good knowledge	AOR(Confidence Interval)	A p-value
Age			
<35	67(20.5%)	0.3(0.6-1.4)	0.254
>35	7(31.8%)		
Occupation			
Health worker	4(100%)	0.3(0.0-2.1)	0.999
Not health worker	70(20.3%)		
Level of education			
≤ Primary	2(3.6%)	0.3(0.03-2.2)	0.218
>primary	72(24.6%)		
ANC hospital			
Regional	47(33.3%)	2.5(0.8-8.0)	0.113
Peripheral	27(13.0%)		

Table 5. Predictors of Screening for Hepatitis B.

Variables	Previous screening (yes)	AOR (Confidence Interval)	A p-value
Age			
<35	279(90.3%)	0.5(0.06- 5.0)	0.577
>35	20(90.9)	1	
Occupation			
≤60.000FCFA	247(89.8%)	1	
>60.000FCFA	70(94.6%)	1.0(0.2-5.7)	0.961
Level of education			
≤ Primary	48(85.7%)	0.5(0.1- 2.4)	0.376
>primary	269(91.8%)	1	
ANC hospital			
Regional	136(96.5%)	5.6(1.1-28.4)	**0.036**
Primary	181(87.0%)	1	

195 **Table 6. Predictors of HBV vaccination.**

196

Variable	N (%)	AOR (95% CI)	p- value
Knowledge			
Good knowledge	25(32.5)	2.6(0.8- 9.1)	0.124
Poor knowledge	52(67.5)	1	
ANC health facility			
Regional hosp.	48(62.3)	12.4(2.0- 76.4)	**0.007**
Primary.	29(37.7)	1	
State of client			
Pregnant	49(63.6)	2.4(0.5- 11.5)	0.261
Post-partum	28(36.4)	1	
Residence			
Urban	45(58.4)	4.0(1.1- 15.0)	**0.037**
Rural	32(41.6)	1	
Monthly income			
>60000	34(44.2)	5.7(1.6- 19.9)	**0.007**
<60000	43(55.8)	1	

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198

199 Pregnant women attending ANC at the regional hospitals were more likely to have been screened

200 during the ongoing pregnancy (OR: 5.6, CI: 1.1-28.4, p= 0.036) and vaccinated than their

201 counterparts (AOR 12.4(2.0- 76.4) p= 0.007). Furthermore, those living in urban areas (p= 0.037)

202 and those with a monthly income of greater than 60.000FCFA (p= 0.007) were more likely to have

203 been vaccinated. However, a good knowledge on HBV infection was not significantly associated

204 with HBV vaccination (Table 6).

205 **4. DISCUSSION**

206 Limiting Mother to child transmission of HBV infection has been identified as the main axis of

207 care in order to envisage eradication of HBV infection worldwide. Screening asymptomatic people

208 is an important instrument of disease detection, diagnosis and intervention but also a means of

209 detecting candidates eligible for vaccination. Given that infected pregnant women stand the chance

210   of transmitting the HBV infection to their newborn babies, we decided to conduct a cross-sectional

211   study to determine what proportion of pregnant women attending ANC in Buea are knowledgeable,

212   screened and/ or vaccinated during pregnancy to limit MTCT of HBV in the southwest region. The

213   information gathered from this piece of work will be used by the health care providers in the region

214   to scale up their current practices as concerns PMTCT of HBV infection.

215   In the current study, the predominant age group of the respondents was 25<30years. This is similar

216   to the results of Adeyemi *et al*, Nigeria 2013 who described a predominant age group of 26-35

217   years which is within the reproductive age bracket and this emphasizes the need for preventive

218   measures in all women of childbearing age [30].

219   **I**n our study, 31.8% of women had at least an average level of knowledge while up to 55.9% had

220   a poor knowledge on HBV infection. Good knowledge about HBV was found to be more likely

221   in women who attended antenatal care at the secondary level of healthcare, those with higher levels

222   of education and in health workers. The two latter may be due to their relatively higher exposure

223   to the healthcare services and information on HBV infection. Good level of knowledge was

224   associated with attending ANC in ahigher health care level on the other hand could be due to

225   increase standards of care probably attributable to the greater number of specialists who have been

226   shown (Paul*et al,* Cameroon, 2017) to have a relatively higher level of knowledge on HBV

227   infection as opposed to other health care workers [31].

228   The results also reveal a high rate of HBsAg screening of pregnant women with a 90% screening

229   rate. This result is similar to the findings of Walker et al in the USA; 2016 who had reported a

230   screening rate of 98.5% [32]. It is however higher than the 8.5% reported by Adeyemi et al 2013,

231   Nigeria. [30] This may be due to the relatively higher proportion of health practitioners in

232   Cameroon who have incorporated HBsAg screening into the routine ANC as compared to those in

233   Nigeria.

234 The vaccination rate of 14.6% for at least a dose of HBV vaccine was the highest reported

235 nationwide [4, 25, 33]. This may be due to adoption of maternal HBV vaccination of non-infected

236 pregnant women in some of our study areas. The result is however lower than the 33% reported by

237 Chan et al in China, 2009 probably due to socio-economic differences between the two settings

238 [24].

239 Attending ANC at the secondary health care level was associated with higher rates of screening

240 and vaccination probably due to increased standard of care as compared to the primary level.

241 Living in an urban residence and having a higher monthly income were significantly associated

242 with a higher vaccination rate probably related to the relatively easier accessibility to health care

243 and also to information on the disease and its prevention via the media as supported by their

244 relatively higher Knowledge on HBV earlier stated.

245 These findings may mean that vaccination is poor among pregnant women in our society and that

246 more effort needs to be directed towards instituting guidelines and well-structured protocols for

247 these services in adults.

248 **5. CONCLUSION**

249 Only about three in ten women were knowledgeable on HBV infection. Ninety percent were

250 screened during pregnancy but only ten percent were vaccinated. High vaccination rates were

251 associated with; antenatal care provided at the secondary health care level, good knowledge,

252 screening, urban residence and high monthly income. These results show that despite the high

253 rate of HBV screening in this setting, most women have poor level of knowledge about this

254 infection and its prevention. We recommend that health education on HBV should be provided

255 to pregnant women especially during antenatal visits and that preventive measures be re-

256 enforced in our setting.

257 **Limitations of Study**

258   The assessment of level of knowledge of the participants on hepatitis was not exhaustive using

259   twelve questions but these questions were selected in such a way that they suited the study

260   objectives and a scoring system ensure objectivity, reproducibility and reliability. Information on

261   the vaccination status was obtained from the participants so there was a risk of recall bias, however

262   this was reduced by the fact that most of them (96 %) had vaccination cards. By selecting high

263   volume centers providing both first and second levels of health care in the region, it permitted

264   generalization of the findings which is a limitation of the study. Despite these limitations, this study

265   addressed issues on Hepatitis B in pregnancy in a country where routine screening and vaccination

266   have not been instituted as a national policy

267 **Declarations:**

268 **Ethics Approval and Consent to Participate**

269   Ethical clearance was obtained from the Faculty of Health Sciences Institutional Review Board of

270   the University of Buea (N^O 2018/ 128/ UB/ SG/IRB/ FHS) and administrative authorization from

271   the Regional Delegation of Public Health for the South West Region of Cameroon. Participants

272   had the study protocol carefully explained to them and participation was voluntary. Written

273   informed consent was obtained from all participants. All procedures were standard involving

274   minimum risks.

275 **Consent for publication**

276   Not applicable

277 **Availability of data and materials**

278   The data sets supporting conclusion of this study are available from the corresponding author

279   upon reasonable request.

280

281 **List of abbreviations;**

282   **ANC**: Antenatal care; **CI:** Confidence interval; **HBsAg**: Hepatitis B surface antigen; **HBV**:

283 Hepatitis B virus; **MTCT**: Mother to Child Transmission; **WHO**: World Health Organization.

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