

Seroprevalence of Hepatitis B and Syphilis Infections among Infertile Women attending Aminu Kano Teaching Hospital

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Abstract

Infertility is defined as the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse. Hepatitis B is an infectious inflammatory illness of the liver caused by the Hepatitis B virus (HBV) that affects Hominoidea and is also a sexually transmitted disease. The aim of this study is to determine the seroprevalence of Hepatitis B and syphilis infections and to assess the socio-demographic and other risk factors associated with HBV and Treponema pallidum among infertile women attending Aminu Kano Teaching hospital. Exactly 2mls of venous blood was aseptically collected from 150 (100 test group and 50 control group) subjects and analysed using rapid test strips (LabACON) for hepatitis b surface antigen (HBsAg) and Treponema pallidum to detect antigen and antibodies respectively. The study revealed the prevalence of 4.0% for HBV among infertile women attending Aminu Kano Teaching Hospital and 0% for Treponema pallidum which showed that Treponema pallidum and HBV infection is unlikely to result in infertility. There were also no significant differences in the number of sexual partners between the test subjects and control subjects. Routine screening of syphilis and HBV is recommended for women during their antenatal.

Keywords: Infertility, *Treponema palladium*, *Hepatitis B virus*, sexual intercourse

INTRODUCTION

Infertility is defined as the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (WHO, 2010). Infertility is primary if the couples are unable to get pregnant, while secondary infertility is the inability to get pregnant after an earlier pregnancy. Worldwide, infertility is generally quoted as occurring in 8-12% of couples (Inhorn, 2003). However, the incidence varies from one region of the world to the other, being highest in the so-called infertility belt of Africa that includes Nigeria (Okonofua, 2003). In contrast to an average prevalence rate of 10-15% in the developed countries, the prevalence of infertility has been notably highly variable in sub-Saharan Africa ranging from 20-46% (Alvarez, 2006). This has been attributed to the high rate of sexually transmitted diseases, complications of unsafe abortions, and puerperal pelvic infections (Idrisa, 2005). About 30% of infertility is due to female problems, 30% to male problems, and 30% to combined male/female problems, while in 10%, there is no recognizable cause (Inhorn, 2003) Institutional-based incidence of infertility reported in some parts of Nigeria are 4.0%

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(Abiodun *et al.*, 2007) 15.4%, (Obuna, 2012) and 48.1% (Adeyemi *et al.*, 2009) from Ilorin (North central), Abakaliki (Southeast), and Oshogbo (Southwest), respectively. There is a scarcity of data on infertility in North-Western Nigeria.

Syphilis is a contagious sexually transmitted disease (STD) caused by the spirochete *Treponema pallidum*; a thin helical cell approximately 0.15µm x 6-50µm (Nester *et al.*, 2004). *Treponema pallidum* subspecies pallidum is a gram-negative, very mobile bacterium (Nester *et al.*, 2004). Its small size makes it invisible on light microscopy; therefore, it must be identified by its distinctive undulating movements on dark field microscopy. The bacteria can survive briefly outside the human body. Thus, transmission almost always requires direct contact with the infectious agent through acquired or congenital (Okonko *et al.*, 2012). *Treponema pallidum* enters the body through mucous membranes or minor breaks or abrasion on the skin. It thereafter migrates to the regional lymph nodes and rapidly spreads throughout the body (Nester *et al.*, 2004). People who engage in unprotected and promiscuous sex, prostitution, and intravenous drug use, as well as, females with frequent sex for drug or money are at major risk of contracting the disease. Health workers have been reported to be at increased risk of occupational exposure (Norbert *et al.*, 2005). Unless prompt diagnosis and treatment of syphilis are performed, serious complications including male and female infertility may result, and in pregnancy, adverse outcomes such as still-birth, prenatal death and serious neonatal infections may result (Schmid, 2004)

Hepatitis B is an infectious inflammatory illness of the liver caused by the hepatitis B virus (HBV) that affects hominoidea, including humans (Anugweje *et al.*, 2012). Hepatitis B virus (HBV) is highly infectious and associated with long term morbidity and mortality due to complications like cirrhosis, portal hypertension and hepatocellular carcinoma. It is estimated that worldwide more than 2 billion people have been infected by HBV and 350 million people have a chronic infection (Anugweje *et al.*, 2012). The virus is 50 - 100 times more infectious than HIV and 10 times more infectious than hepatitis C virus (HCV). Additionally: the virus is relatively easy to be transmitted from one infected individual to another by blood-to-blood contact, during birth, unprotected sex, sharing needles and has a relatively higher prevalence in the tropics (Shazia *et al.*, 2012).

MATERIALS AND METHODS

Study Area

This research was a descriptive cross-sectional study conducted at Aminu Kano Teaching Hospital (AKTH), The state is located at the north-western region of Nigeria laid between latitude 11°30'N and longitude 8°30'E with a total land area of 20,760 km² (Ado, 2009). Kano State borders Katsina to the Northwest, Jigawa state to the Northeast, Bauchi State to the south-east and Kaduna state to the Southwest.

Study Population

The study population consists of only infertile women (females within reproductive age who are unable to conceive with regular intercourse for a year or more) attending Gynecology clinic that agreed and consented to participate in the study, between the average age ranges of 18 - 45 years.

Ethical approval was obtained from the research ethical committee of Aminu Kano Teaching Hospital. A written and verbal consent was sought from the participants and a well-constructed questionnaire was equally administered to the participants' prior to sample

collection. Data for socio-demographic variables and potential risk factors were gotten from the filled questionnaire.

Inclusion and Exclusion Criteria

Female patients between the ages of 18 – 45, who couldn't conceive within a year or more despite exposure to regular sexual intercourse, attending AKTH Kano and are married, were included in the study. Adolescent, singles, fertile females, and those who refused to consent were excluded.

Sample Collection

Random sampling technique was used to collect the total number of 87 samples for Hepatitis B and 145 for Syphilis. Two (2) milliliters of venous blood was aseptically collected from each of the consenting participants into a labeled plain tube which was left to clot at room temperature and further centrifuged at 1500 rpm for 5 minutes. The resultant sera were separated into new labeled tubes.

Blood Sample Analysis

The sera and test reagents were allowed to warm to room temperature before use.

Detection of Hepatitis B virus Antigen

Hepatitis B infection was determined using HBsAg Rapid Diagnostic Test (LabACON Hangzhou Biotest Biotechnology Co., Ltd) to detect antibodies produced against Hepatitis B Virus.

All reagents and specimen were brought to room temperature. The test strip was removed from the foil pouch and placed on a clean dry laboratory working bench surface. About 60 µl of the specimen was applied to the sample pad. The result was read after 15 minutes.

Detection of Syphilis Antibody

All the 150 sera were analyzed using Syphilis Rapid Test Strip (LabACON Hangzhou Biotest Biotechnology Co., Ltd) to detect antibodies produced against *Treponema palladium* in the serum of infertile women. All reagents and sera were brought to room temperature. The test strip was removed from the foil pouch and placed on a clean dry laboratory working bench surface. About 60µl of the specimen was applied on to the sample pad. The result was read after 15 minutes.

Standard operating procedures (SOPs) were strictly followed and internal quality control materials included from the test kit were included in the assay.

The prevalence for Hepatitis B and syphilis was calculated using total positive results as the numerator over total numbers of patients enrolled in this study as denominator (total positive number/total sample number). Also, the data generated from the study were analyzed using Descriptive Statistics with 95% confidence interval (CI) was used. The data analysis was done using SPSS version 23 for Windows (SPSS Inc, Chicago, IL).

RESULTS

Table 1 shows the prevalence of Hepatitis B and syphilis infections among infertile women in relation to age where syphilis infection was found to be 100% negative in all subjects tested indicating 0.0% prevalence. However, 4.0% of the infertile women were found to be positive for hepatitis B virus.

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The age group with the highest prevalence rate 3(3.0%) was 20 – 29 years, followed by age group of 30 – 39 years with a prevalence rate of 1.0% while other age groups have 0.0% prevalence rate.

Table1. Prevalence of Hepatitis B and Syphilis infections among infertile women in relation to age

Variables	Age (years)	Total No. tested	Positive (%)	Negative (%)
Hepatitis B Virus				
	<19	2	0(0.0)	2(2.0)
	20 – 29	50	3(3.0)	47(47.0)
	30 – 39	40	1(1.0)	39(39.0)
	40 - 49	8	0(0.0)	8(8.0)
Total		100	4(4.0)	96(96.0)
Syphilis				
	<19	2	0(0.0)	2(2.0)
	20 – 29	50	0(0.0)	50(50.0)
	30 – 39	40	0(0.0)	40(40.0)
	40 - 49	8	0(0.0)	8(8.0)
Total		100	0(0.0)	100(100.0)

The distribution of marital status, educational level and occupation in relation to risk factors among the infertile women were shown in table 2. However, 98.0% of the infertile women were married with HBV prevalence rate of 4.0% while 2.0% of the infertile women were separated with 0.0% prevalence rate.

Educationally, 81.0% of the infertile women were at secondary school level with HBV prevalence of 4.0% while 5.0% of the infertile women subjects have no formal education, 8.0% were at primary school level and 6.0% were at tertiary institution level with 0.0% HBV prevalence each.

Other factor reveal 81.0% of the infertile women were unemployed with HBV prevalence of 3.0% while 15.0% of the subjects and were self-employed with prevalence of 1.0% where as 3.0% and 1.0% of the subjects were government and private employees respectively with 0.0% prevalence rate.

The risk factors considered in this study were; history of blood transfusion and the number of sexual partners exposed to (monogamy or polygamy) as captured in the structured questionnaire, it revealed that 93.0% of the study subjects had no history of blood transfusion while 7.0% of them had history of blood transfusion out of which both group had 2.0% prevalence for HBV and 0.0% for Syphilis..

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Table 2. Prevalence of Hepatitis B Virus infection in relation to socio – demographic distribution and risk factors among the infertile women.

Variables	Total No. tested	No. Positive (%)	No. Negative (%)
Marital status			
Married	98	4(4.0)	94(94.0)
Separated	2	0(0.0)	2(2.0)
Total	100	4(4.0)	96(96.0)
Educational level			
No formal education	5	0(0.0)	5(5.0)
Primary education	8	0(0.0)	8(8.0)
Secondary education	81	4(4.0)	77(77.0)
Tertiary education	6	0(0.0)	6(6.0)
Total	100	4(4.0)	96(96.0)
Occupation			
Self employed	15	1(1.0)	14(14.0)
Government employed	3	0(0.0)	3(0.0)
Private employed	1	0(0.0)	1(1.0)
Unemployed	81	3(3.0)	77(77.0)
Total	100	4(4.0)	96(96.0)
Risk factors			
Blood transfusion	7	2(2.0)	5(5.0)
No. transfusion	93	2(2.0)	91(91.0)
Total	100	4(4.0)	91(91.0)
Monogamous	89	2(2.0)	87(87.0)
Polygamous	14	2(2.0)	12(12.0)
Total	100	4(4.0)	91(91.0)

Comparison of the prevalence of HBV between infertile women with husband exposed to single sexual partner and multiple sexual partners indicate equal prevalence rate of 2.0% (table 3).

Table 3. Comparison of Hepatitis B virus prevalence and risk factors among the infertile women

Risk factors	Total No. tested	Hepatitis B virus	
		No. positive (%)	No. Negative (%)
Blood transfusion	93	2(2.0)	91(91.0)
No blood transfusion	7	2(2.0)	5(5.0)
Total	100	4(4.0)	96(96.0)
Monogamous	86	2(2.0)	84(84.0)
Polygamous	14	2(2.0)	12(12.0)
Total	100	4(4.0)	96(96.0)

DISCUSSION

The study revealed the seroprevalence of HBV and Syphilis infections and identified the possible risk factors among infertile women attending Aminu Kano Teaching Hospital (AKTH). The study was able to demonstrate a prevalence rate of 4.0% for HBV and 0.0% prevalence rate for Syphilis.

The prevalence rate of 4.0% for HBV obtained in this study is closely in agreement with other investigations done with similar study populations in different parts of the world where a slightly higher prevalence rate were obtained; including studies conducted in

Cameroon 5.4% (Ndumbe *et al.*, 1992), Nigeria 5% (Buseri *et al.*, 2010) and in Ethiopia at Debre Tabor Hospital 5.3% (wale *et al.*, 2008). Studies with lower prevalence compared to our finding includes; 0.77% in Ahvaz imam Khomeini hospital south-west Iran (Khakhkar *et al.*, 2012), Saudi Arabia with 1.5% (Mansoor *et al.*, 2011), Spain 0.4% (Gutiérrez *et al.*, 2004), India 2.4% (Jindal *et al.*, 2012) and in Jimma southwest Ethiopia with a prevalence of 3.7% (Awole, 2005).

On the other hand, higher prevalence was reported among a similar study population in Bangladesh 7.6% (Borgia *et al.*, 2012), Gonder Health Center Ethiopia with a prevalence of 7.3% (Tiruneh, 2008), in China 6.3% was reported by Terence *et al* (2017) and rural Hospitals of Southern Ethiopia with a prevalence of 6.1% (Yohanes *et al.*, 2011). Equally worthy of note is the recent finding of 9.4% HBV in Camaroon reported by Fouelifack *et al.* (2018) which is higher to the previous findings and relatively higher than the outcome of this study indicating tendency of relapse when awareness is not subtend. The relation to the seropositivity rate of HBV infection and socio-demographic data; none of the socio-demographic data of the respondents were statistically significant. This concurs with the research conducted in Spain with a prevalence of 0.4% (Gutiérrez *et al.*, 2004),

The study revealed that the highest prevalence of 3.0% for HBsAg was observed in the age group of 20 – 29 and this was followed by age group 30 – 39 years with a prevalence rate of 1.0%. This could probably be attributed to their vibrancy in term of sexual and social activities.

There was no established association between the risk factors of number of sexual partners in which the study subjects were exposed to and risk factors of history of blood transfusion to prevalence rate of Hepatitis B virus infection as study reveal 2.0% prevalence in both subjects. The outcome of this study does not agree with other studies conducted in Iran (Nikbakht *et al.*, 2012), and Bahir Dar city, Northwest Ethiopia (Yohanes *et al.*, 2016) which revealed previous history of blood transfusion as a potential risk factor. The low infection rate discovered in study could be due to increase awareness and strict adherence to screening of blood and blood products before transfusion (Awole, 2005).

The infertile women attending fertility clinic in this study were all found to be negative for Syphilis; different studies suggest that syphilis prevalence varies widely depending on the type of population being studied and the associated risk factors. But the reason behind why the prevalence rate was 0.0% in this study could be as a result of early screening of syphilis and effective treatment of symptomatic individuals.

The finding of syphilis in this study was in line with a similar study conducted in India by Jindal *et al.*, 2012, while Chopra *et al.*, (2015) had 0.5% prevalence and the one conducted in Spain that shows antibodies against *Treponema pallidum* were not detected in any of the case (Guttierez *et al.*, 2004) but of recent Sentis *et al.*, (2019) reported an increased in Syphilis case finding from 0.4% /10,000 in 2007 to 3.1% / 10,000 2015 indicating fluctuation in prevalence rate among certain selected group.

However; the finding of 4.0% from this study on HBV was significantly higher compared to similar studies conducted in Southern Nigeria 5.9% (Abieyuwa *et al.*, 2011), Iran, 0.8% (Nikbakht *et al.*, 2012), 2.9% in Bangladesh (Borgia *et al.*, 2012), 0.2% and 0.26% in Algeria in 2014 and 2008 respectively (World Bank report, 2020., Aidaoui, *et al.*, 2008), 1% in Ethiopia at Gonder University Teaching Hospital (Mulu *et al.*, 2007), 2.3% in Gonder Health center

(Tiruneh *et al.*, 2008), and 2.9% in Addis Ababa (Kebede *et al.*, 2000). A high prevalence (10.1%) was also reported among Chinese women (Po Mui Lam *et al.*, 2010).

CONCLUSION

In this study, the prevalence of Hepatitis B infection among the infertile women was found to be 4.0% while that of syphilis infection was 0.0% and this showed that syphilis and Hepatitis B infections are unlikely to result in infertility in the study area and among the study population. There are great variation in the prevalence HBV and Syphilis as compared to other areas and nations.

There was no statistical significance association between occupational status, educational status, and marital status including risk factors of history of blood transfusion, number of sexual partners the infertile women were exposed to and prevalence rate of Hepatitis B virus infection. However, the highest prevalence rate of 3.0% was among the age group of 20 – 29 years.

RECOMMENDATIONS

Based on the findings of the study the following recommendations were made;

Further studies on syphilis to include multiple study sites is recommended, routine laboratory screening of pregnant women for HBV infection during antenatal care and health education about identified risk factors especially transfusion of improperly screened blood and prevention methods should be given to patients and equally encouraged in our health facilities.

LIMITATION OF THE STUDY

Though the seroprevalence for Syphilis and HBsAg was figurative compared to the other studies, this study was done in one health institution. The study was unable to cover large subject size because of the paucity of the target subjects. However, we still feel that our findings sought reality. Moreover, this study includes only those clients who have gotten access to the hospital during the data collection period. It doesn't include those who didn't have access to come to the hospital during the study period which may underestimate the findings.

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