

Hospital Prevalence of Hepatitis B & C Co- Infection with Tuberculosis: {A Case Study of Aminu Kano Teaching Hospital, Kano, Nigeria

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-----ABSTRACT-----

Epidemiological studies were carried out among 1320 patients admitted at Aminu Kano Teaching Hospital (AKTH) concerning the prevalence of hepatitis B & C and Co – infections with TB over a period of four years (2008 – 2012) .The grand diagnostic kits were used to analyze blood samples for hepatitis B virus (HBV) and hepatitis C virus (HCV) while sputum samples were analyzed for TB using the Zel Nielsen (ZN) staining technique. The aim of the present research is to carry out epidemiological studies concerning the prevalence of Hepatitis B & C co – infection with Tuberculosis (TB) in a well defined hospital based population. From the study, the overall sero-prevalence of hepatitis B and C were found to be 8.0% and 4.7% respectively. The relative risk of infection was found to be higher in males than in females ($p>0.05$) for the two hepatitis markers. Out of 1320 subjects screened 196 (14.8%) were smear positive for TB out of which 17(8.7%) were co-infected with HBV while 29(14.8%) were co-infected with HCV. Viral hepatitis constitutes a major public health problem worldwide. The consequences of chronic liver diseases put a considerable economic burden upon the communities afflicted with the diseases.

Key words: Co-infections, HIV, Prevalence, TB and Viral infections.

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I. INRODUCTION

Hepatitis is an inflammation of the liver caused by virus, bacterial infections, or continuous exposure to alcohol, drugs, or toxic chemicals, such as those found in aerosol sprays and paint thinners [1]. Hepatitis can also result from an autoimmune disorder in which the body mistakenly sends disease fighting cells to attack its own healthy tissue i.e. the liver. The signs and symptoms of acute viral hepatitis are similar regardless of the hepatitis virus responsible. Patients may experience a flu-like illness, and general symptoms include nausea, vomiting, abdominal pain, fever and fatigue, loss of appetite, and less commonly rashes and joint pain. Sometimes a condition called jaundice, a yellowing of the skin and eyes-develop [2]. These acute symptoms result from the damage the virus inflicts on the liver cells. The acute symptomatic phase of viral hepatitis usually lasts from a few days to several weeks; the period of jaundice that may follow can persist from one to three weeks. Complications of acute viral hepatitis include fulminate hepatitis, which is a very severe, rapidly developing form of the diseases, and chronic hepatitis, which is characterized by liver cell death and inflammation that lasts longer than six months. Hepatitis B (HBV) and hepatitis C (HCV) infections are common global health problems and they are spreading rapidly in developing countries due to lack of health education, poverty and illiteracy. Both of these infections can be transmitted through blood or body fluid, tattooing, through infected instruments, unsafe shave by barbers and sexual contacts [3].The development of serological tests for HB_sAg and their respective antibodies led to the recognition that HBV has a worldwide distribution and that infection rates in some parts of the world such as Africa, Asia and Oceania are extremely high. Serum hepatitis cases were associated with HBV infections [4]. A high incidence (16.0%) of HBV infection was reported in a rural community in Kano [5]. However, figures reported from various regions of Nigeria indicated that prevalence rate of the diseases seems to be on the increases. [6] reported 8.9% from Lagos, [7] reported 17.0% from Ibadan while 22.0% was reported from Maiduguri. The Hepatitis C virus (HCV) like HBV, also causes a life threaten infection. Approximately 170 million people worldwide are chronically infected with the hepatitis C virus (HCV) and the infection is often described as “silent” because people may be infected for 10 – 30 years with no exhibited symptoms [8]. The prevalence of HCV is not well documented in many countries partly due to the expense and practical difficulties involved in the detection of HCV RNA in the serum of infected individual [9]. According to the Centre for Disease Control and Prevention (CDC) anyone who received a blood transfusion prior to 1992 before accurate routine blood screening was established, may be infected with the virus [2]. Available data showed that the prevalence of HCV among local commercial blood donors in Nigeria ranged from 12.3 – 14% [10]. Although more recent studies among patients with sickle cell anemia in Lagos indicated 5.0% anti HCV prevalence [11]. Nigeria belongs to the group of countries highly endemic for viral hepatitis. Infant, about 75% of the Nigerian population is likely to have been exposed to hepatitis viruses at one time or the other in their life [12]. Viral hepatitis constitutes a major public health problem. The consequences of chronic liver disease put a considerable burden upon the affected communities and because there is no therapy for acute viral hepatitis, emphasis is placed on prevention through various control measures [13]. The development of successful control measures has depended to a large extent on the growing understanding of the epidemiology and biology of these viruses and on the availability of serologic assays to identify infected and immune individuals. The present study will greatly enhance our understanding of the epidemiology of these two important diseases.

II. MATERIALS AND METHODS

2.1. Study area

Aminu Kano Teaching Hospital (A.K.T.H.) was selected for the study, is one of the reference hospitals in the state where people from various parts of the state and neighboring states of various occupations attend. It serves as a Federal Government Tertiary Health Center and gives more than 60% of health care delivery in the state at large.

2.2. Study population

The studied population was a heterogeneous of different age groups, ethnicities and educational status. Biodata and other information were collected after obtaining written informed consent from each patient with the assurance that all information obtained would be treated with utmost confidentiality.

2.3. Study design

General descriptive epidemiological study was used to design out the survey. Cross-sectional (Prevalence) survey was carried out according to the ethical standards for human experimentation.

2.4. Sample size

A total of 1320 patients were recruited for the study. Three (3) ml of blood were collected from each patient by vein-puncture using sterile Syringes and needles into a sterile container with a screw cap. The blood samples collected were centrifuged at 2000rpm for 5 minutes in order to separate the sera. After centrifugation, the sera were labeled and stored in plastic tubes at 2°C – 8°C for analysis within 24 hours.

2.5. Virological Examination

Virological analysis for HBV and HCV was done on Patients admitted in the Aminu Kano Teaching Hospital over the period of four years (2008- 2012) in an attempt to assess the situation in the Hospital. All procedures for the test were based on recommendation of the manufacturers. The steps for the procedure are as follows:

Test strip, serum were allowed to equilibrate to room temperature 25-30°C Prior to testing. Test strip was removed from the sealed pouch and used as soon as possible with arrows pointing towards the serum. The test strip was immersed vertically in to the serum for at least 10-15 seconds and placed on a non-absorbent flat surface with the timer on and then observed for the red line (s) to appear. The results were read after 15 minutes. No result was interpreted after 30 minutes. Two distinct red lines indicate positive, one line in the control region (C) and another line in the test region (T). One red line in the control region (C) and no apparent red line or pink line in the test region (T) indicates negative. Results were invalid when Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques were the most likely reasons for control line failure.

2.6. Tuberculosis screening procedure:

In order to detect cases of TB Co-infections with HBV and HCV, three Sputum samples were collected from each subjects and examined for the presence of Acid fast bacilli using the Ziehl's Neelsen staining techniques. Sputum collection was done in the open air with the patients facing away from the wind and also away from others during expectoration [14]. Three sputum samples were usually collected within 24 hours for diagnosis, while two samples were collected for follow-up cases. Sputum samples were smeared using applicator stick in biosafety cabinets. The smears were air dried in the biosafety cabinet and the slides were then fixed by passing them through flame about 2-3 times. The slides were then stained by pouring strong carbol-fuchsin solution to cover the whole surface and then heated until steam rose without boiling and allowed to stand for 5 minutes. The slides were then tilted and washed with distilled water and decolorized with 3% acid alcohol for 3-5 minutes. The slides were then washed with distilled water and tilted to drained excess water. Counter staining was done with 0.1% methylene blue for 1 minute and then washed with distilled water. The slides were then placed on the slide rack and allowed to air dry. The smears were examined under X100 objective. Positive showed pink rod shape bacteria while the other substances appeared blue.

2.7. Statistical analysis of data

Results were expressed as percentages by Cross-tabulation using SPSS 14 Version Soft ware. ANOVA was used to compare categorical data at 95% confidence interval and significance level were taken at $P \leq 0.05$

III. RESULTS

The results of the studies on TB Co-infections with HBV and HCV are presented in Table 1- 4 and Fig. 1- 2. Out of total 1320 subjects screened for TB, 196 were sputum smear positive, giving a prevalence rate of 14.8% (Table 1). Of the 196 subjects that were sputum smear positive for TB, 17(8.7%) were co-infected with HBV while 29 (14.8%) were co-infected with HCV. The rate of HBV/TB Co-infection was highest (4.2%) among the 21-30 years bracket and higher among females subjects (9.1%) than in males (8.4%) as shown in tables 3 and 4 respectively .Fig 1 and 2 Illustrates the age and sex related distribution pattern for HCV/TB Co-infection among the subjects respectively. Cases of HCV/TB Co-infection occurred most frequently in the 41-50 years age group and the rate was higher among males (65.5%) than in females (34.6%) subjects.

Table 1: Age related Distribution pattern of TB subjects examined.

	AGE							Total
	10-20	21-30	31-40	41-50	51-60	61-70	71-80	
Number examined	5	48	82	45	14	2	0	196
%	0.4	3.6	6.2	3.4	1.1	0.2	0.0	14.8
Number examined	58	396	433	159	65	8	5	1214
%	4.4	30.0	32.8	12.0	4.9	0.6	0.4	100

Table 2: Age related rate of HBsAg / TB co- infection among TB Positive subjects.

	AGE						Total
	10-20	21-30	31-40	41-50	51-60	61-70	
Number of subjects co-infected	1	7	5	2	1	1	17
%	5.9	41.2	29.4	11.8	5.9	5.9	100
Number of subjects not co-infected	4	41	77	43	13	1	179
%	2.2	22.9	43.0	24.0	7.3	0.6	100
Total	5	48	82	45	14	2	196
%	2.6	24.5	41.8	23.0	7.1	1.0	100

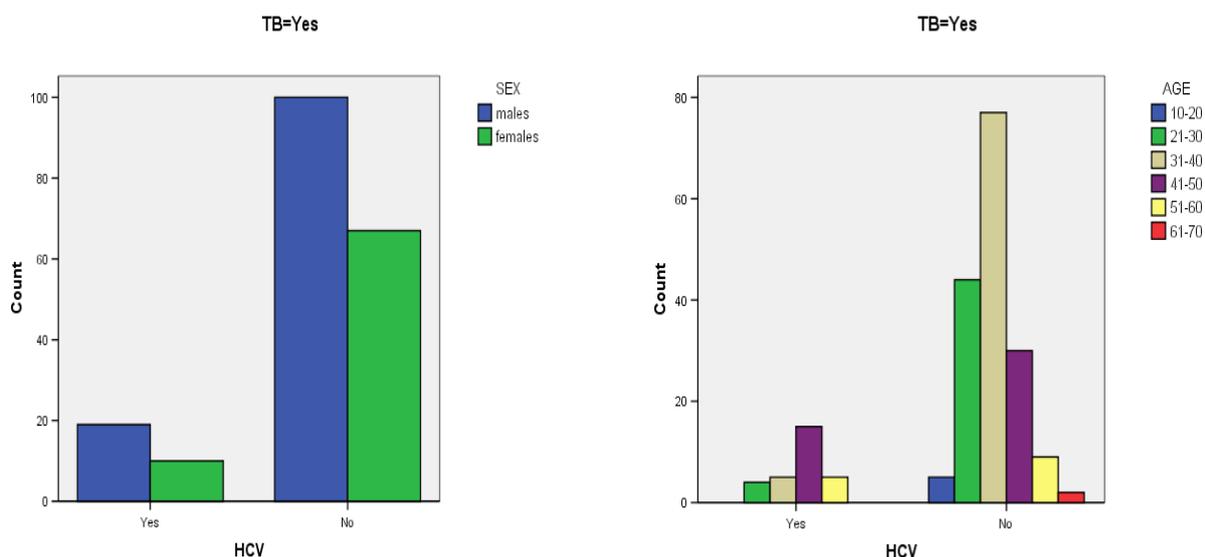
Table 3: Sex related rate of HBsAg / TB co- infection among TB Positive subjects.

	SEX		
	Males	Females	Total
Co-infected number of subjects	10	7	17
%	8.4	9.1	8.7
Not co-infected number of subjects	109	70	179
%	91.6	90.9	91.3
Total Number of subjects	119	77	196
%	60.7	39.3	100

Figure 1: Age related Distribution Pattern of HCV/TB among the co-infected Subjects.

Figure 2: Sex related Distribution pattern of HCV/TB among co-infected subjects.

Table 4: Sex related Distribution of HCV / TB co-infection.



	SEX		
	Males	Females	Total
Number examined	19	10	29
%	65.5	34.5	100
Number examined	100	67	167
%	59.9	40.1	100
Number examined	119	77	196
%	60.7	39.3	100

IV. DISCUSSION

A quarter of a million cases of TB were estimated to be present in Nigeria about a decade ago. The situation may have since changed as reports from different parts of the country depict an increase in the prevalence of tuberculosis. [15] found a prevalence of 5% in Maiduguri, while [16], recorded a prevalence of 7.7% in Port Harcourt. [17] also recorded a prevalence of 15% in Lagos. A prevalence rate of 9.2% was observed by [18]. A prevalence rate of 8.7% and 14.8% was observed in this study as TB smear positive co-infected with HBV and HCV respectively. More than 75% of the affected patients were between 20 – 50 years of age. This finding support the global epidemiological pattern described for the developing countries; where majority of the infected people are below 50 years of age. This is because of the high annual risk of infection with *Mycobacterium tuberculosis* [17]; [19]. The observations made based on the age groups indicated that the incidence of TB co-infections, have the highest rate of prevalence and thus has a great effects on youth development. The high risk of infection was increased by certain factors, which could be, malnutrition, illiteracy, poverty, overcrowding, poor knowledge about the disease, poor access to the DOTS clinics which was common among rural dwellers, especially those living within scattered villages (huts) and nomadic herdsmen [18]; [20]. In the present study, the results have shown that the highest rate of prevalence of TB co-infected with HBV and HCV with respect to sex, occurred most frequently among Males than Females. This could be as a result of risk factors of which males tend to be more vulnerable than females [21].

V. CONCLUSION

From the results of the studies, out of a total 1320 subjects screened for TB, 196 were sputum smear positive. Of the 196 subjects that were sputum smear positive for TB, 17(8.7%) were co-infected with HBV while 29 (14.8%) were co-infected with HCV. The rate of HBV/TB Co-infection was highest (4.2%) among the 21-30 years bracket and higher among females subjects (9.1%) than in males (8.4%). Cases of HCV/TB Co-infection occurred most frequently in the 41-50 years age group and the rate was higher among males (65.5%) than in females (34.6%). The co-infection by TB and HCV were similarly more frequent (14.8%) than with HBV (8.7%). The relative risk of infection was found to be higher in males than in females for the two hepatitis markers. The consequences of chronic liver disease put a considerable burden upon the affected communities and because there is no therapy for acute viral hepatitis, emphasis is placed on prevention through various control measures. The development of successful control measures has depended to a large extent on the growing understanding of the epidemiology and biology of these viruses and on the availability of serologic assays to identify infected and immune individuals. The present study will greatly enhance our understanding of the epidemiology of these two important diseases.

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