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Distribution of hepatitis B virus infection in Namibia

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Background. Namibia regards hepatitis B virus (HBV) infection as a public health problem and introduced hepatitis B vaccinations for infants during 2009. However, information on HBV infection in the country remains limited, and effective public health interventions may be compromised in the absence of adequate evidence-based data. Available data from the World Health Organization (WHO) estimate that 15 - 60% of the normal population in many African countries may be positive for one or more of the HBV serological markers.
Objective. To investigate the distribution of HBV infection in Namibia, using available laboratory data for 2013.
Methods. A cross-sectional descriptive study was conducted using pre-existing electronic laboratory data on HBV infection. The data were retrieved from the central Namibia Institute of Pathology laboratory in Windhoek during January - December 2013. Tests were done on the following three main groups: (*i*) pregnant women during routine antenatal care (ANC) visits; (*ii*) patients with HIV/AIDS during antiretroviral therapy clinic visits; and (*iii*) any other individual suspected of having HBV infection.
Results. Of a total of 77 238 hepatitis B surface antigen test results retrieved countrywide, 9 087 (11.8%) were positive. Of the positive results, 246/9 087 (2.7%) were in children aged 0 - 14 years, with the sexes equally affected. HBV infections increased markedly, particularly among females, in the age group 15 - 39 years, reaching a peak in the age group 30 - 34 years. Routine screening of pregnant women for HBV during ANC visits was found to be systematically conducted in only two regions, Ohangwena and Khomas.
Conclusions. This study showed high proportions of positive results in pregnant women, patients with HIV/AIDS and individuals suspected of having HBV infection. The Ministry of Health and Social Services and stakeholders may wish to consider improving the routine and surveillance reporting systems for viral hepatitis and uptake of screening for pregnant women in all regions, and expanding HBV screening to other population groups. Population-based or similar studies are therefore required to determine the HBV prevalence and risk factors. This will assist Namibia in developing appropriate national viral hepatitis strategies as per WHO recommendations.

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Hepatitis is a potentially life-threatening viral infection that can be caused by the hepatitis A, B, C, D or E viruses.[1] Of these five types, hepatitis B virus (HBV) infection is the commonest and poses a major global health problem. It can result in chronic infection, putting people at an increased risk of death from cirrhosis and liver cancer.[1,2] The World Health Organization (WHO) estimates that 15 - 60% of the apparently healthy population in many African countries may be positive for one or more of the HBV serological markers.[1,2] Data on both the population-based and facility-based HBV burden in sub-Saharan Africa (SSA) are limited, but the rate of chronic HBV infection is estimated to be >8% in this region.[1-3] Prevention of hepatitis B includes vaccination, screening, monitoring asymptomatic positive patients (and treating them with antivirals if necessary), and follow-up care for symptomatic patients.[4,5]

Namibia, with a population of 2.3 million, currently has 14 political regions, but at the time of the study there were 13 regions, and our analysis is based on the latter figure.[5] The regions are further divided into regional constituencies, localities and villages. The regional health directorates are subdivided into 34 health districts, 34 district hospitals, 44 health centres and over 265 clinics.[5] There are four main private hospitals with numerous smaller private care facilities across the country.[5] The Namibia Institute of Pathology (NIP) is the main laboratory, and has a presence in each of the 34 health districts. All the pathology test results are captured in the central NIP database in Windhoek. The Ministry of Health and Social Services (MoHSS) antiretroviral therapy (ART) policy requires that: (*i*) all pregnant women be screened for hepatitis B at their first antenatal care (ANC) clinic visit; and (*ii*) all HIV-positive clients be screened during their first ART visit, so that HBV infection can be identified early and remedial action taken.[5] Furthermore, doctors would normally request a laboratory test for hepatitis B for people presenting with jaundice or any suspected liver disease, to rule out HBV infection.

As in many SSA countries, data on the burden of viral hepatitis in Namibia are limited.[5,6] Available HBV prevalence data are from studies conducted more than two decades ago. These include a prevalence study in a general population in Kavango region in 1983,[7] studies on the carrier state in children in Ovamboland in 1984[8] and on serological markers of HBV in Eastern Caprivi in 1991,[9] and a study of the !Kung children in Bushmanland in 1994.[10] HBV prevalence in these studies ranges from 11% to 17%. The absence of recent and updated HBV data may compromise the country's efforts to initiate an informed and appropriate national viral hepatitis strategy in 2016 - 2021 and to achieve the goal of global elimination of hepatitis B and C by 2030, as recommended by the WHO.

Objective

To investigate the distribution of HBV infection in Namibia using the pre-existing NIP laboratory data for 2013, to provide an update on

and evidence-based policy guidance for HBV prevention and control in the country.

Methods

Design. This was a cross-sectional descriptive health facility-based study of all pre-existing test results for hepatitis B that were extracted from the main NIP laboratory database in Windhoek during 1 January - 31 December 2013.

Setting. The Windhoek NIP laboratory is the central point where the database of all results of specimens taken or tested in all district or health facility NIP laboratories countrywide is located and managed.

Study population. The study population included: (*i*) all pregnant women who were tested for HBV during their first ANC visit; (*ii*) all patients with HIV/AIDS who were tested for HBV during their routine ART visits; and (*iii*) any other individual suspected of having HBV infection. The three groups were inferred from information on laboratory request forms, e.g. those with HAART/CDC/ARV on their form were categorised as patients with HIV/AIDS, and those with Maternity/ANW/ANCW/ANC on their form were categorised as pregnant women or infants, depending on age and sex.

For the purposes of the study, if individual results were not explicitly recorded as ANC or HIV/AIDS-related (as described above) on the request form, they were grouped as 'tested on clinical suspicion'. The accuracy of the information recorded by the requesting clinician could not be verified. In addition, demographic and clinical information on the patients was sometimes either missing or incomplete.

Serological testing. The NIP laboratory uses the ARCHITECT hepatitis B surface antigen (HBsAg) qualitative assay (Abbott Laboratories, Sligo, Ireland) which is a chemiluminescent microparticle immunoassay for the qualitative detection of HBsAg in human serum and plasma.

Statistical analysis. Records were retrieved and cleaned by removing obvious duplications or inconsistencies. Duplications were identified through filtering for surname, sex and age. These records were then reviewed and deleted if found to be duplicates. Data were analysed using IBM SPSS Statistics, version 24 (IBM Corporation, USA).

Ethical considerations. Permission to conduct the survey was granted by the permanent secretary of the MoHSS (ref. no. 17/3/3) and the chief executive officer of the NIP laboratories (no reference number provided). After the database had been filtered for duplications, the data were de-identified to ensure confidentiality.

Results

A total of 77 238 HBsAg test results were retrieved and analysed during the study period. A total of 9 087 results (11.8%) were positive, and these were analysed by region and by selected population groups.

Kavango region showed the highest number of positive results for HBV (*n*=2 027, 16.3%), followed by Ohangwena (*n*=535, 11.2%) and Omusati (*n*=820, 16.1%) (Table 1).

The HBV-positive results from Kavango region represented 22.3% of the total positive results in the country, and the positive results from Ohangwena and Khomas represented 16.9% each. The health facilities in eight regions, starting from Otjozondjupa northwards and including those bordering Angola and Zambia, showed the highest HBsAg positivity rates in the country (Fig. 1). Kavango, Ohangwena and Khomas also had the highest number of HBV-positive results in the age group 15 - 34 years.

Of the total 9 087 positive HBV test results, 5 391 (59.3%) were for females and 3 519 (38.7%) for males (gender was missing for 177 positive results (1.9%)).

Table 1. Hepatitis B virus results by region, Namibia, 2013

Region	Total tests, *N*	Negative, *n* (%)	Positive, *n* (%)
Erongo	5 512	5 053 (91.7)	459 (8.3)
Hardap	1 694	1 540 (90.9)	154 (9.1)
Karas	1 596	1 447 (90.7)	149 (9.3)
Kavango	12 469	10 442 (83.7)	2 027 (16.3)
Khomas	17 106	15 573 (91.0)	1 533 (9.0)
Kunene	1 388	1 220 (87.9)	168 (12.1)
Ohangwena	13 713	12 178 (88.8)	1 535 (11.2)
Omaheke	1 949	1 771 (90.9)	178 (9.1)
Omusati	5 093	4 273 (83.9)	820 (16.1)
Oshana	6 003	5 225 (87.0)	778 (13.0)
Oshikoto	4 149	3 595 (86.6)	554 (13.4)
Otjozondjupa	3 136	2 795 (89.1)	341 (10.9)
Zambezi	3 430	3 039 (88.6)	391 (11.4)
Total	77 238	68 151 (88.2)	9 087 (11.8)

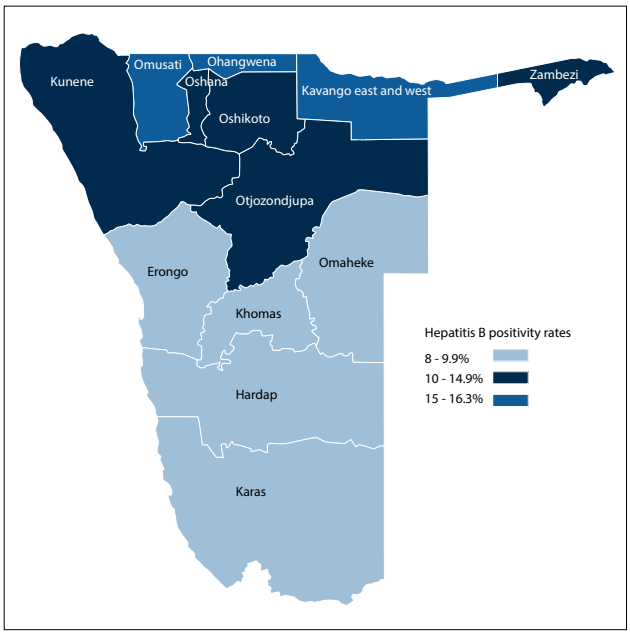

Fig. 1. Hepatitis B virus infections in Namibia by region, 2013, using pre-existing laboratory data.

Of the positive results, 246/9 087 (2.7%) were in children aged 0 - 14 years, with the sexes equally affected. Fig. 2 shows that there was a high rate of HBV-positive results in the age group 15 - 39 years (72.9%, 6 625 out of the total 9 087 positive results). Females were the most affected, with over twice as many positive results than males, peaking in the age group 30 - 34 years. From the age of 40 years, however, the number of positive HBV test results for males exceeded that for females (1 238 positive results for males v. 948 for females).

Tables 2 and 3 show further analysis of the HBV screening results for routine ANC clients and for people living with HIV/AIDS, as well as those tested on clinical suspicion for hepatitis B or unknown reasons on the laboratory request form.

The numbers and proportions of positive HBV results in the HIV-positive patients tested at ART visits, and in the pregnant women who were tested at ANC visits, were 1 819 (20.0%) and 836 (9.2%), respectively. The remaining positive HBV results ('other'), numbering 6 432 (70.8%) of the total 9 087 positive results, included the results

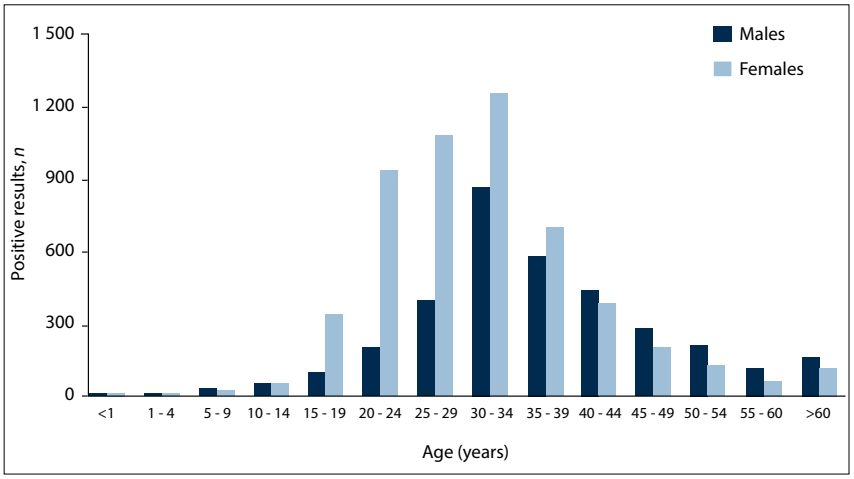

Fig. 2. Hepatitis B virus results by age and sex, using pre-existing laboratory data, Namibia, 2013 (N=9 087).

of tests requested on clinical grounds and results with missing information or inaccurate information captured on the laboratory request form.

Routine screening for HBV of pregnant women during ANC visits was found to be systematically conducted only in two regions, Ohangwena, with 415 (10.1%) positive out of 4 096 test results, and Khomas, with 350 (5.6%) positive out of 6 235 test results (Table 3). Data on HBV screening of pregnant women from the remaining 11 regions were incomplete or missing (Tables 2 and 3).

A total of 836 (7.3%) of 11 390 (positive plus negative) HBV results retrieved for pregnant women were positive. For patients with HIV/AIDS (i.e. co-infected with HBV and HIV/AIDS), the figure was 1 819 (13.6%) out of 13 456 results retrieved (Table 3).

Omusati region recorded the highest positivity rate of 17.0% (HIV/HBV co-infection). Rates of HBV/HIV co-infection were also high in Oshikoto (15.3%), Kavango (14.4%), Kunene (14.1%), Oshana (13.5%) and Ohangwena (13%). With the exception of Karas (6.1%), all the regions had HIV/HBV co-infection rates >10%.

The HBV positivity rate for individuals tested on clinical grounds or for other reasons was 12.3% (6 432 positive out of a total of 52 392 tests in this category) (Table 3).

Data from the annual returns of the MoHSS health information system on hepatitis B notifications to the MoHSS Health Information System (inpatients and outpatients) showed a total of only 501 cases of hepatitis B during January - December 2013 nationally, compared with 77 238 test results retrieved from the NIP laboratory database, of which 9 087 were positive, during the same reporting period.

Discussion

This study findings show that rates of HBV-positive results were very high (11.8%) in Namibia, particularly in the seven northern regions of Kavango, Omusati, Ohangwena, Oshikoto, Oshana, Kunene and Zambezi (formerly Caprivi). These findings are similar to those in a prevalence study conducted in 1983 in Kavango by Joubert *et al.*,[7] which showed an HBsAg prevalence of 13.6%. The current study showed the rate of positive results to be highest for Kavango (16.3%).

A high proportion of positive results among 0 - 14-year-olds nationally (246 (2.7%) of the total of 9 087 positive results) can be attributed to historical trends in the northern regions that include both vertical transmission of HBV and later horizontal transmission during early childhood. This is in accordance with a 1984 study of hepatitis B in children in Ovamboland, Namibia, by Botha *et al.*,[8] which showed a 13% rate of HBsAg positivity among children aged ≥6 months.[8] A study of HBsAg prevalence among the !Kung (San) children in 1994 showed a similar trend, with a figure of 7.8%.[10] We found that positive results in the age group 10 - 14 years occurred mainly in the northern regions, i.e. Kavango (19.8%),

Table 2. Hepatitis B virus-positive results as proportions of total positive results by region, Namibia, 2013

Region	Total positive results, *N*	Pregnant women, *n* (% of total positive results)	HIV-positive patients (HBV/HIV co-infection), *n* (% of total positive results)	Other (tested on clinical grounds or for unknown reasons), *n* (% of total positive results)
Erongo	459	17 (3.7)*	43 (9.4)*	399 (87.0)*
Hardap	154	†	†	154 (100)*
Karas	149	†	26 (17.5)*	123 (82.6)*
Kavango	2 027	1*	428 (21.1)	1 598 (78.8)*
Khomas	1 533	350 (22.8)	301 (19.6)	882 (57.5)
Kunene	168	†	98 (58.3)	70 (41.7)*
Ohangwena	1 535	415 (27.0)	257 (16.7)	863 (56.0)
Omaheke	178	†	60 (33.7)*	118 (66.3)*
Omusati	820	48 (5.9)*	425 (51.8)	347 (42.3)
Oshana	778	4 (0.5)*	37 (4.8)*	737 (94.7)*
Oshikoto	554	0 (0.0)*	30 (5.4)*	524 (94.6)*
Otjozondjupa	341	†	114 (33.4)	227 (66.6)*
Zambezi	391	1 (0.3)*	†	390 (99.7)*
Namibia	9 087	836 (9.2)*	1 819 (20.0)*	6 432 (70.8)*

HBV = hepatitis B virus.
*Includes results with missing information, or inaccurate information captured on the laboratory request form that could have led to overestimation of positive results.
†No HBV screening done/no test results found.

Table 3. Hepatitis B virus-positive results v. positive plus negative results, Namibia, 2013

Region	Pregnant women, *n* positive results/*N* positive + negative results (%)	HIV-positive patients, *n* positive results/*N* positive + negative results (%)	Other (tested on clinical grounds or for unknown reasons), *n* positive results/*N* positive + negative results (%)	Total, *n* positive results/*N* positive + negative results (%)
Erongo	17/265 (6.4)*	43/343 (12.5)*	399/4 904 (8.1)*	459/5 512 (8.3)*
Hardap	†	†	154/1 694 (9.0)*	154/1 694 (9.1)*
Karas	†	26/427 (6.1)*	123/1 169 (10.5)*	149/1 596 (9.3)*
Kavango	1/13 (7.7)*	428/2 971 (14.4)	1 598/9 485 (16.8)*	2 027/12 469 (16.3)*
Khomas	350/6 235 (5.6)	301/2 539 (11.9)	882/8 332 (10.6)	1 533/17 106 (9.0)
Kunene	†	98/694 (14.1)	70/694 (10.1)*	168/1 388 (12.1)*
Ohangwena	415/4 096 (10.1)	257/1 974 (13.0)	863/7 643 (11.3)	1 535/13 713 (11.2)
Omaheke	†	60/480 (12.5)*	118/1 469 (8.0)*	178/1 949 (9.1)*
Omusati	48/705 (6.8)*	425/2 501 (17.0)	347/1 887 (18.4)	820/5 093 (16.1)
Oshana	4/47 (8.5)*	37/275 (13.5)*	737/5 681 (13.0)*	778/6 003 (13.0)*
Oshikoto	0/15 (0.0)*	30/196 (15.3)*	524/3 938 (13.3)*	554/4 149 (13.3)*
Otjozondjupa	†	114/1 056 (10.8)	227/2 080 (10.9)*	341/3 136 (10.9)*
Zambezi	1/14 (7.1)*	†	390/3 416 (11.4)*	391/3 430 (11.4)*
Namibia	836/11 390 (7.3)*	1 819/13 456 (13.6)*	6 432/52 392 (12.3)*	9 087/77 238 (11.8)*

*Includes results with missing information, or inaccurate information captured on the laboratory request form that could have led to overestimation of positive results.
†No hepatitis B virus screening done/no test results found.

Omusati (19.8%) and Ohangwena (14.9%), together with Khomas (13.2%), where Namibia's capital city is situated. HBsAg rates are similar in many other sub-Saharan African countries.[11-13]

HBsAg screening of pregnant women was not done systematically in 11 out of 13 regions, and data capturing on the laboratory request forms may have been inaccurate, resulting in over-estimation of positive results in the category of tests done on clinical grounds. HBV screening of pregnant women needs to be strengthened to improve early detection and consequent prevention of vertical transmission from the infected mother to the newborn.

The HBV positivity and HBV/HIV co-infection rates of 11.8% and 13.6% in this study were based on only a small proportion of the Namibian population – mainly pregnant women, people with HIV/AIDS, and individuals with signs and symptoms suggestive of viral hepatitis. The vast majority, who are not pregnant or whose HIV status is unknown, will remain undiagnosed and in many cases continue to constitute a reservoir of infection and a threat to their household, social and sexual contacts. They are likely to be screened only when they present with clinical features of liver disease and even evidence of complications. Namibia must be commended for maintaining high HBV immunisation coverage of infants aged <1 year (83%), although there is a need to improve coverage of healthcare workers.[11,13]

Recommendations

The study findings have several implications for Namibia's public health programmes. While the data are clearly limited, there is evidence of a significant burden of HBV in the country. Further prospective studies should be planned and carried out in order to address key issues facing the Namibian MoHSS. These include expanding immunisation to other age groups, and treatment and monitoring of HBV-positive individuals who are not pregnant or are of unknown HIV status. Significant work is needed to improve the information captured at and recorded from the clinical sites. Better data collection and storage will allow for a more informed and programmatic approach to the public health control of HBV in Namibia.

Study limitations

These findings are based on health facility data only, and some duplicate test results may have been included in the analysis. Furthermore, it was not possible to identify risk factors that could be associated with sociocultural and economic variables in the population-derived samples. While the findings could be useful in estimating health facility-based HBV prevalence in specific selected groups or regions, they may not be generalisable to or a true representation of the general population. Data capturing for morbidity and mortality due to HBV infections, including liver cancer, in Namibia are generally insufficient to provide evidence-based policy/strategy guidance.

Conclusions

This study showed high proportions of positive results among pregnant women, people with HIV/AIDS, and individuals suspected of having HBV infection on clinical grounds. However, the general population, who are not pregnant or whose HIV status is unknown, are unlikely to have access to HBV screening.

The MoHSS and stakeholders may wish to consider improving the uptake of screening for pregnant women, and even expanding HBV screening to other population groups. Furthermore, the identification and management of HBV-positive women and their newborns may need to be improved to prevent or reduce vertical transmission.

Viral hepatitis seems to be under-reported by both the routine and surveillance reporting systems in Namibia. This compromises evidence-based national strategy development for attaining the WHO goal of global elimination of hepatitis B and C by the year 2030. Population-based or similar studies are therefore required to determine the prevalence of and risk factors for HBV. This will assist the country in developing appropriate national viral hepatitis strategies as per the WHO recommendations.

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Conflicts of interest. None.

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