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HEPATITIS B IMMUNIZATION AT THE UNIVERSITY COLLEGE HOSPITAL, IBADAN: AN EIGHT YEAR REVIEW OF VACCINE ADMINISTRATION RECORDS.

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Summary

Vaccination of health care workers (HCWs) against hepatitis (HBV) infection is highly necessary in Nigeria where the infection occurs in hperendemic proportions. We hereby determine the trends in the administration of HBV vaccine at the University College Hospital (UCH), Ibadan, Nigeria. The study reviewed the records for the administration of vaccine against HBV at the Staff Medical Services Department of UCH, Ibadan, Nigeria, from 1994 to 2001. A total of 1,437 subjects consisting of 686 (47.7%) males and 751 (52.3 %) females were vaccinated against HBV from 1994 to 2001. They were aged 16 to 64 years and consisted of 356 students (24.8%) and 1081 healthcare workers (HCWs) (75.2%) which comprised Doctors (30.9%), Dentists (1.9%), Paramedics (19.6%), Non-medics (14.6%) and subjects with undisclosed occupational category ((10.7%). About 11% to 100% of the subjects had annual prescreening for HBsAg sero-negativity from 1996 to 2001 but none had post vaccination assay of anti-HBs titre. All the subjects received 1st dose of 0, 1, 2 accelerated HBV vaccination schedule while on annual basis, 16.7% to 91.8% of the subjects received the 3rd dose of the vaccine. Despite the proportional participation of the different occupational groups was highest among the doctors and dentists but lowest among the paramedics, only 59.7% of all the vaccinees had three dose(s) of the vaccine during the 8 year period. In conclusion, although the HBV vaccination programme had shortcomings, it is an established practice at UCH, Ibadan and efforts should be made to improve on its prevailing standard.

Keywords: Immunization, HBV, Healthcare Workers, Nigerians, UCH, Ibadan.

Introduction

Although, hepatitis B virus (HBV) infection occurs in hyperendemic proportions in sub-Saharan Africa including Nigeria [1]; the introduction of vaccination against the infection has curtailed its chronic sequelae in countries where there have been strict and proper implementations of the immunization strategy [2]. The scheme has also been incorporated into the national immunization programme of the different countries [3]. Also, protection of at-risk groups such as the health care workers (HCWs) is particularly important in order to reduce the spread of the virus as well as the prevalence of its attendant sequalae in the community [1, 4].

The prevalence of HBV infection among Nigerian HCWs is high (38.7%) [5]. A high prevalence rate of the infection also exists among Nigerian students [6, 7]. These reports support the need to vaccinate HCWs against HBV especially with use of the recombinant DNA technology type of HBV vaccines. The Rapid Immunisation Schedule consisting of series of three intramuscular injections given at 0, 1, 2 months and administration of a booster dose of vaccine at the 12th month after the first dose will confer protection against HBV infection for further 5 to 8 years when the next booster dose will be due [8-10]. Completion rates of the vaccination has been reported to be as high as 71% for the receipt of 3 or more doses of hepatitis B vaccine among HCWs in United States between 2002 and 2003 [4].

The question arises if the programme is being pursued in accordance with the international recommendation. This has led to our study on the determination of the trends in the vaccination of HCWs against HBV at the University College Hospital, Ibadan (UCH), Nigeria.

Materials and Methods

This retrospective study reviewed the records for the administration of vaccination against HBV at the

Immunization Unit of the Staff Medical Services Department, UCH from 1994 to 2001. Data on sex, age, occupational distribution of all the vaccinees were extracted. Information on the prescreening of the vaccinee for Hepatitis B surface antigenaemia (HBsAg) and anti-bodies to Hepatitis B core antigen (anti-HBc) were also obtained. Similarly, the number of dosages of the vaccines received as well as the type of vaccines administered, were collected. The study was approved by the Joint UCH/UI Ethical Review Board prior to its execution. The data obtained were handled with strict confidence and expressed in tables and graphs. The significance of any hypothesis was investigated using appropriate statistical test at 5% probability level.

Results

A total of 1,437 of the HCWs at UCH, Ibadan were involved in the study and they comprised 686 males (47.7%) and 751 females (52.3%) with a sex ratio of1:1.6. The HCWs were vaccinated against HBV from 1994 to 2001, Table 1. Their ages ranged from 16 to 64 years but the subjects were below 40 years until 1999 when those aged up to 64 years participated in the vaccination programme. The year 1999 had the highest participation while 1995 had the least. The participation in 1994 was twice that of 1995. Thereafter, it rose to a peak in 1999 and further declined progressively for the subsequent two years. The schedule for 1999 was principally carried out by the hospital consultants as an effort at immunizing all HCWs against HBV.

Table 2 shows that the subjects consisted of 1081 HCWs (75.2%) and 356 students (24.8%). Only 1283 (89.3%) of the HCWs disclosed the type of their occupation. The HCWs who received first dose of HBV vaccine included doctors comprising Physicians (14.1%), Paediatricians (2.7%), Surgeons (3.8%), Obstretricians and Gynaecologists (2%), and House Officers (8.3%); Dentists (1.9%), Paramedics (Nurses, Nursing Assistants, Laboratory Technologists, Pharmacists, Radiographers, Medical and Social Workers, Physiotherapists, Medical Record Staff, Occupational Therapists, Medical Illustration Unit Staff) (19.6%) and Non-medics (administrative, secretariat, engineering, maintenance and other hospital support staff), 14.6%.

Prescreening for HBsAg prior to vaccination was not carried out for the initial period of two years and was commenced in 1996, Table 3. Only 10.5% of the participants had prescreening in 1996. The figure rose to 70.1% in 1997 and 100% from 1999 to 2001. The exercise in 1999 involved prescreening of all workers for not only HBsAg but also anti-HBc. All the prescreened subjects were HBsAg sero-ngative before they administered HBV vaccine.

Table 1: Age and annual distribution of healthcare workers vaccinated against HBV at UCH, Ibadan, 1994-2001

Year	No	Mean Age ± SD years	No > 40 years (%)	Male	Female
1994	20	27.7± 7.2	2(10)	11	9
1995	10	28.7 ± 9.3	1(10)	7	3
1996	38	26. 0± 4.2	0(0)	27	11
1997	41	25.7± 7.7	2(4.9)	23	18
1998	88	23.2 ± 6.7	2(2.3)	34	54
1999	546	49.0 ± 14.3	244(44.7)	275	271
2000	359	25.3 ± 8.5	26(7.2)	134	225
2001	335	25.8 ± 8.5	19(5.7)	175	160

Two available types of recombinant vaccines - Genevac B (5.3%) and Engerix B (94.7%) were administered. Also, three doses of vaccines at 0, 1, and 2 or 0, 2and 6 months were scheduled per participant every year from 1994 to 2001. Although, all the participants received the first dose of the

Table 2: Departmental distribution of vaccinees and yearly pattern of the receipt of the first dose of vaccine against Hepatitis B virus

Group	Number (%)	Years							
		1994	1995	1996	1997	1998	1999	2000	2001
Doctors	443 (30.9)	17	5	35	23	26	115	148	74
Physicians	202 (14.1)	8	1	12	11	6	56	64	44
Paediatricians	39 (2.7)	4	-	3	2	2	19	5	4
Surgeons	54 (3.8)	3	-	8	4	5	24	3	7
Obstetrics & Gynaecologists	29 (2)	2	1	7	4	2	5	2	6
House Officers	119 (8.3)	-	3	5	2	11	11	74	13
Dentistry	28 (1.9)	2	2	2	-	1	6	4	11
Paramedics	282 (19.6)	-	-	-	3	5	206	47	21
Non- medicals	174 (12.1)	-	1	-	-	-	164	5	4
Students	356 (24.8)	1	2	-	15	31	36	121	150
Sub-total	1283(89.3)	20	10	37	41	63	527	325	260
No record	154 (10.7)	-	-	1(2.6)	-	25(28.4)	19(3.4)	34(9.5)	75(22.4)
Total	1437(100)	20(1.4)	10(0.7)	38(2.6)	41(2.9)	88(6.1)	546(38)	359(25)	335(23.3)

Parenthesis - percentages
Paramedics - Nurses, Nursing Assistants, Laboratory Technologists, Pharmacists, Radiographers, Medical and Social Workers, Physiotherapists, Medical Record Staff, Occupational Therapists, Medical Illustration Unit Staff
Non-medics – Administrative, Secretariat, Engineering, Maintenance and Other hospital support staff

Table 3: Percentage of healthcare workers prescreened for HBV infection and their vaccination status at UCH, Ibadan, Nigeria - 1994 to 2001.

Year	Number of HCWs vaccinated	Percentage of HCWs Prescreened	Percentage of HCWs vaccinated with different doses			P-values	
			One	Two	Three	p1	p2
1994	20	0	100	85.0	60.0	NS	NS
1995	10	0	100	90.0	60.0	NS	NS
1996	38	10.5	100	86.8	34.2	NS	0.0003
1997	41	70.1	100	95.1	56.1	NS	0.02
1998	88	92.0	100	81.8	58.0	NS	0.0004
1999	546	100.0	100	96.2	91.8	NS	NS
2000	359	100.0	100	80.2	54.9	0.003	0.0000
2001	335	100.0	100	58.2	16.7	0.0000	0.0000
Total	1437	94.1	100	81.9	59.7	0.0000	0.0000

p1 - between attendances of 1st and 2nd dose NS – Not significant p2 – between attendance of 1st and 3rd dose

vaccine with information on the scheduled dates for the two subsequent doses, the percentage attendances for the second dose were between 80.2% to 96.2% for the initial seven years and it dropped to 58.2% at the 8th year, $p<0.05$. There were no significant differences between the annual participations for the first dose and those for the second dose of vaccination except in 2000-1, $p<0.05$ while the attendances for the third dose was significantly lower than those of the 1st dose in all the years except in 1994-5 and 1999, Table 3. No vaccinee had assay of its post vaccination anti-HBs titre.

Only 1437 (35.9%) and 859 (21.5%) subjects had received one and three dose(s) of the vaccine respectively by 2001 when compared with the population of HCWs (4,001) at UCH, Ibadan in that same year. Participation in the vaccination programme was highest among the doctors and lowest among the paramedics even though the doctors and the paramedics accounted for less than a sixth and about half percentile of the 2001 population of HCWs respectively at the institution, Table 4.

Table 4: Population of the different occupational groups of healthcare workers at UCH, Ibadan, Nigeria; 2001

Occupational groups	Population of HCWs	
	Number	%
Paramedics	1938	48.4
Students	930	23.3
Doctors & Dentists	572	14.3
Non- medics	561	14.0
Total	4001	100

Discussion

Although vaccination against HBV began in 1984 first with a plasma-derived vaccine among non-immune children under the age of 5 years in the Gambian villages of Keneba and Manduar, and later a recombinant DNA-derived vaccine [11], active programme for the vaccination of HCWs against HBV commenced at UCH, Ibadan in 1994. This study showed that the programme was not only commenced but has been sustained and has evolved from few numbers of participants at onset to sixty fold by the sixth year. It showed a commendable effort being made by the hospital at controlling HBV infection primarily among the staff and secondarily in the community. This is particularly important because Nigeria is a hyperendemic zone for the infection with high proportions of the consequences of the infection present among its population [12]. The gender distribution of the participants being predominantly males in the initial three years of the programme is probably secondary to the presence of highest vaccination rate among the doctors who also are predominantly males although the cultural belief that the health of the man takes precedence over those of the other members of the family could not be ruled out despite the fact that the utilization of health facilities should be without consideration of status of any member of the family. The improvement in the gender utilization of the service is in consonance with increasing education of the females since they formed the bulk of HCWs right from foundation of the health care institution.

The general low number of participants in 1994 to 1997 could be due to poor knowledge about HBV among HCWs in 1994 as well as the non-availability of the protective vaccine. With increasing knowledge of the usefulness of the vaccine vis a vis the consequences of lack of protection, acceptability of the vaccination programme by the staff and the determination of the hospital administration to protect its staff against the virus could be responsible for the rise in the number of the participants over the study period. The downward trend in the number of the participants from 1999 to 2001 could be secondary to the coverage of greater proportion of the staff particularly in 1999 with only new entries being added thereafter although there may be low drive of the HCWs towards their being vaccinated against HBV. Furthermore, the low participation of subjects above 40 years of age could be due to the presence of more staff in the younger age groups however the knowledge that the sequalae of the infection is predominantly in the 2nd to 5th decades of life[12] among Nigerians could be the motivating force inspiring the greater participation of the younger adult population in comparison to the older adults.

The distribution of the different proportions of the HCWs involved the programme is not unexpected as it follows previous report [4]. It shows the awareness the HCWs of their risk status for the infection [1, 6-10]. The participation of student HCWs in the programme supports the need for their immunization against HBV since they are also at high risk of contacting the infection [6, 13]. The presence of incomplete data on a significant proportion of the workers is unacceptable and it suggests an improvement is needed in the collection of data from the vaccinees. Furthermore, the coverage of the immunization programme is very low among the total population of the HCWs at UCH, Ibadan, hence there need for ensuring 100% coverage of the workers.

The completion rate of a three-dose accelerated HBV vaccine schedule among the HCWs studied, falls below the report among similar groups of subjects in the USA [4, 15]. Efforts should be made to improve compliance to the vaccination schedule since receipt of only one dose confers no protection. The receipt of two doses may offer only some protection (61.4%) [16] but it is lesser than what occurs with the receipt of three doses (80-95%) [8]. The supervision of the programme in 1999 was associated with the high participatory rate of the workers for the receipt of three doses of vaccine while the converse could be responsible for the poor compliance recorded in the other years. Hence, this study has demonstrated the positive role of a supervisory vaccination prograrmme [15] actively financed and purposely carried out by the management of a tertiary Nigerian heath institution at ensuring a high compliance rate from the vaccinees with consequent development of high protection rate against the infection.

However, a fourth dose at 6th or 12 month post 1st dose will confer higher anti-HBs titre with protection beyond 12 months (offered by 3 dose regimen) to 5-8 years when a booster dose will be required [8, 17]. It is obvious from this study that no worker had a fourth or booster dose post the 1st dose. The booster dose at 5 year is advocated for HCWs in order to

ensure their safety for patient care [8]. It is advocated that all workers should be educated on the importance of the dosing schedule as well as their compliance to completion of the vaccination programme. Furthermore, efforts should be made to immunize all the workers as this ensures their protection against the virus than when not immunized [18]. The prescreening rate of the workers for HBV prior vaccination from 0% in 1994 and 1995 to 100% in 1999 to 2001 is commendable because the assay is necessary in Nigeria, a hyper endemic area for HBV [6,13] and particularly among HCWs who have high rate of HBV [5,18,19]. However, the prescreening for HBV prior to vaccination is a good course of action which needs to be maintained as it helps to determine the status of the worker in an area of HBV hyper-endemicity and thus prevents a false protection for an already infected worker.

The prescreening for both HBsAg and anti-HBc carried out in 1999 follows acceptable norm [2, 18, 19] especially in HBV hyper-endemic areas [1]. The use of either Engerix – or Genevac –B vaccine at any of the dose of the HBV vaccination schedule observed from the study follows previous reports [8-10, 20]; hence any available recombinant DNA technology type of HBV vaccines could be administered. This will enhance compliance of the subjects to the vaccination schedule.

Inspite of the efforts made at vaccinating the HCWs against HBV, the absence of assay of anti-HBs titre after the receipt of third dose of the vaccine left the vaccination programme uncompleted since the responses of the vaccinated subjects were undetermined and thus their immuned status are uncertain.

In conclusion, vaccination of HCWs has been implemented in a Nigerian tertiary hospital and efforts should be made and sustained at overcoming the shortcomings and obstacles at ensuring a full completion rate of a four-dose accelerated HBV vaccine schedule regimen (0, 1, 2 and 12 months), 100% prescreening of workers for HBV infection, vaccination of all non-immuned and HBsAg sero-negative workers as well as proper collection of data from all vaccinees. In addition, all categories of workers should be offered facilities for another form of accelerated HBV vaccine schedule (0, 1, 3 weeks 12 months) if they have to travel away within one month of being vaccinated and post vaccination anti-HBs titre for the determination of the protection level as well as administration of booster dose.

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