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**STUDY ON THE PREVALENCE OF HEPATITIS B VIRUS INFECTION IN ODISHA
STATE OF INDIA (2021-2022)**

Индиянын Одиша штатында вирустук В гепатитинин таралышын изилдөө (2021-2022)

Изучение распространенности вирусного гепатита В в индийском штате Одиша (2021-2022 гг.)

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Abstract

Viruses has a more impact on a human population. Hepatitis means the inflammation of the liver; it's most commonly affected by the viruses. The hepatic viruses consist of A, B, C, D, E. The hepatic viruses A and E are spread by Faeco-oral route and B, C, D are spread by parenteral route. And recorded as the major cause of hepatitis . All types of viral hepatitis are seen in indian population. WHO recommends HB vaccination at birth to tackle the burden of hepatitis B. Among which the Odisha state in the eastern part of India is most prevalent to hepatitis b viral infection the most common reason of it is Odisha consist of the 1/3 rd of the tribal population of the India. We show the comparison between the tribes and the particularly vulnerable tribal population.

Keywords: viral hepatitis, HVB, Tribal Population, PVTGs, Serological survey.

Индиянын Одиша штатында вирустук В гепатитинин таралышын изилдөө (2021-2022) **Исследование распространенности вирусного гепатита В в индийском штате Одиша (2021-2022 гг.)**

Аннотация

Вирустар адам популяциясына көбүрөөк таасир этет. Гепатит боордун сезгенишин билдирет, көпчүлүк вирустар ага таасир этет. Вирустук гепатиттердин А, В, С, D, E түрлөрү бар. Вирустук гепатиттин А жана Е түрлөрү фекалдык - оралдык жолу менен, ал эми В, С, D вирустары парентералдык жол менен таралат жана вирустук гепатиттердин негизги себеби болуп эсептелет. Вирустук гепатиттин бардык түрлөрү Индия калкында кездешет. ДССУ вирустук гепатитти азайтуу үчүн ымыркай төрөлгөндө В гепатитине каршы эмдөөнү сунуштайт. Алардын арасында Индиянын чыгыш бөлүгүндөгү Одиша штатында вирустук гепатит В инфекциясы эң көп таралган. Одиша Индиянын уруулук калкынын 3/1 бөлүгүн түзөт. Биз уруулар менен өзгөчө аялуу уруулук калктын катмарын салыштырууну көрсөтөбүз.

Аннотация

Вирусы оказывают большее воздействие на человеческую популяцию. Гепатит означает воспаление печени; Чаще всего вирусы поражают ее. Разновидность вирусных гепатитов А, В, С, D, E. Вирусные гепатиты А и Е распространяются фекально-оральным путем, а вирусы В, С, D распространяются парентеральным путем и зарегистрированы как основная причина гепатита .Все типы вирусных гепатитов наблюдаются у индийского населения. ВОЗ рекомендует вакцинацию против гепатита В при рождении с последующим введением двух или трех доз, чтобы снизить бремя гепатита В .Среди которых штат Одиша в восточной части Индии наиболее подвержен вирусной инфекции гепатита В. Наиболее распространенной причиной этого является то, что Одиша состоит из 1/3 племенного населения из Индии. Мы показываем сравнение между племенами и особенно уязвимым племенным населением.

Ачкыч сөздөр: вирустук гепатит, ВГВ, уруулук популяция, өзгөчө алсыз уруулар, серологиялык изилдөө.

Ключевые слова: Вирусный гепатит, ВГВ, племенная популяция, ПВТГ, серологическое исследование.

Objective

The objective of the study is to estimate the prevalence of the hepatitis B, C, D in the patient who are attending the hospital depends on the antigen (surface Ag, Core Antigen) and Antibodies present in the blood and depend on the antigen and antibodies interpretation is made.

Introduction

With a prevalence of 3–4.2% of Hepatitis B surface antigen (HBsAg) and 40 million HBV carriers, India ranks in the intermediate endemic zone for the Hepatitis B virus (HBV) infection in the world. (WHO Factsheet-b- World Hepatitis Day, 2016) Odisha, an eastern state of India, has the third-highest percentage of tribal population in the country and limited information is available regarding the prevalence of HBsAg among them. The present study attempted to estimate the prevalence of HBsAg among the 35 Scheduled tribal (ST) communities and 5 Particularly Vulnerable Tribal Group (PVTG).

Odisha, a state in the eastern region of India, is a home to 62 different tribal community and 13 Particularly Vulnerable Tribal Group (PVTG). A Particularly vulnerable tribal group or PVTG previously known as a Primitive tribal group is a sub- classification of Scheduled Tribe or section of a Scheduled Tribe that is considered more vulnerable than a regular Scheduled Tribe

Hepatitis B formerly known as (Serum antigen) is an acute systemic infection with major pathology in the liver. Transmitted usually by parenteral route. It's an acute self-limiting infection, having long incubation period (4 weeks to 6 month). In approximately 5 – 15 percent of cases HBV infection fails to resolve and affected individual becomes a persistent carrier of the virus. HBV virus may cause progressive liver disease including chronic acute hepatitis and hepatocellular carcinoma. There is also close association of Hep - B and primary liver cancer and it is considered as a global threat worldwide.

Contaminated blood is the main source of infection, although the virus has been found in the body secretion such as Saliva, vaginal secretion and semen of infected person and in the health care worker

Although immunization remains the most effective way to control the spread of HBV infection, it is estimated that every year at least 27 million children worldwide do not receive the basic doses of immunizations. According to World Health Organization (WHO), one-third of the global population (two billion people) has been infected with hepatitis B virus. In 2013, other viral hepatitis accounted for 1.45 million deaths with 63% increased burden of deaths than that from 1990 of 0.89 million deaths. The prevalence of hepatitis B virus varies between 5 to 20% in the developing countries.

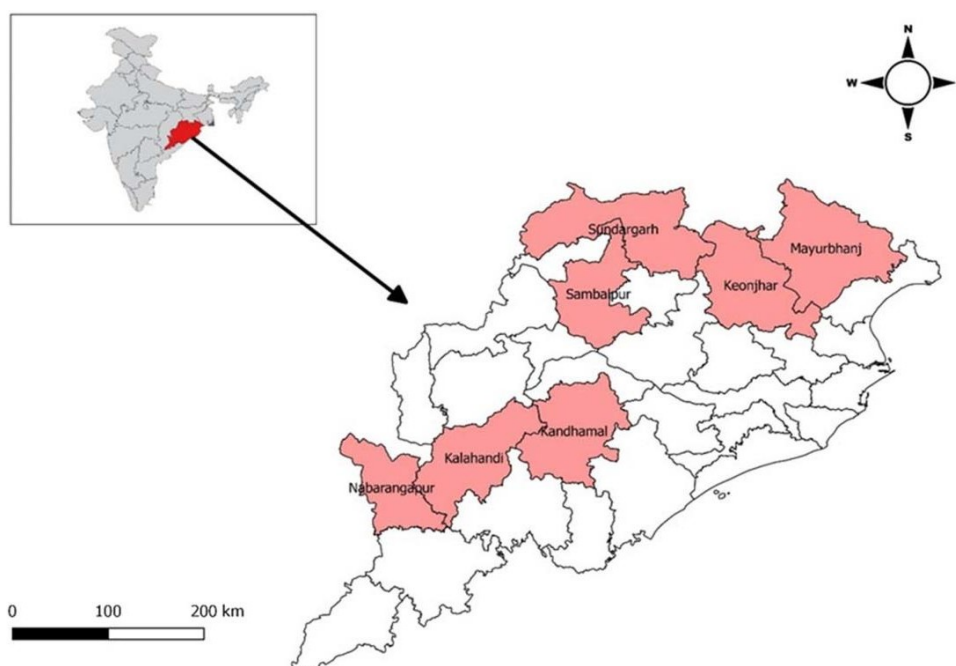
Methodology

India is more prevalent to hepatitis B, In India many states have hepatitis but Odisha is the state in the eastern part of India. Has largest Scheduled Tribes population (22.85% of ST population) with 62 Scheduled Tribes and 13 Particularly Vulnerable Tribal Groups (PVTGs). They live in the forest areas and the hilly areas which are socially and economically

margined. These tribal population are also at higher risk of facing various public health issues. A population-based, age-stratified, cross-sectional study design was adopted for the study. (<https://pubmed.ncbi.nlm.nih.gov/32318373/>)

Seven tribal predominated districts were selected for the study.

1. Kalahandi
2. Kandhamal
3. Nabarangpur
4. Mayurbhanj
5. Keonjhar
6. Sambalpur
7. Sundargarh

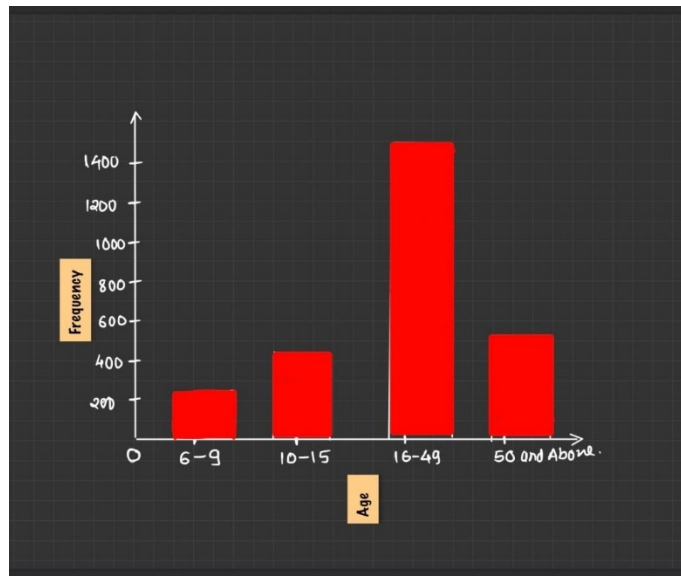


Sampling Framework

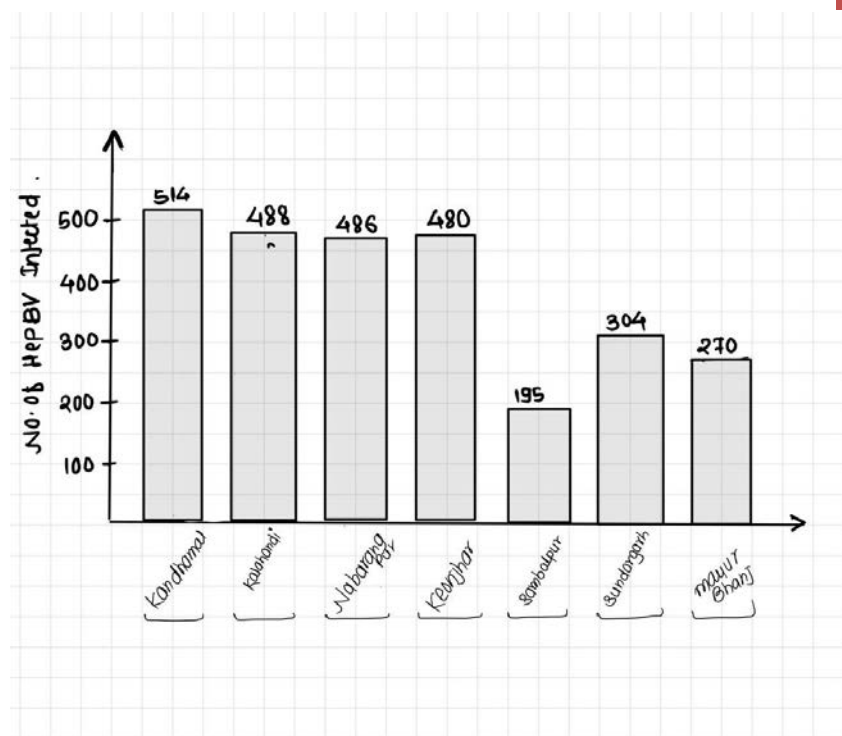
A multi-stage random sampling method was used in each district. Villages within each district (clusters) were selected through probability proportionate to size method. Sample size for each district was calculated to be 395 (rounded off to 400) with an assumption of an expected prevalence of 50% (reported in previous surveys), relative precision of 16%, design effect of 2.5, and non-response rate of 10% for a 95% level of confidence. Ten clusters in each district (total 70 clusters) were selected using the PPS methodology using household population size from the census. From each cluster, at least 40 individuals (4 with age 6–9 years, 8 with age 10–17 years and 28 aged 18 years and above) were enrolled in the survey (<https://pubmed.ncbi.nlm.nih.gov/36629188/>). Enrolment of a minimum number of individuals in each age group was ensured so that the overall distribution of the sampled population will be comparable to the age structure of the population of the state. Therefore, a minimum of 40 tribal individuals from each cluster and 400 individuals from 10 clusters of each tribal predominated district were enrolled except for three districts Mayurbhanj, Sambalpur, and

Sundargarh (due to lack of sufficient volume of samples).

Lab diagnosis: HBsAg (a marker of chronic infection) screening, liver function test, SGOT, SGPT, ALP, total bilirubin, direct bilirubin, and albumin.



(On the basis on the survey done on 2021-2022)



(Graph between No. of hepatitis B patient and district 2021-2022)

Variables	Frequency	Proportion (%)	HBsAg positive n (%)	Prevalence (95% CI)	HBV DNA (mean±SD) (IU/mL)
Age					
6–9	279	10.2	5 (1.79)	0.66–4.37	8.33±8.24
10–15	450	16.4	11 (2.44)	1.29–4.46	19.24±21.19
16–49	1,497	54.7	44 (2.94)	2.17–3.96	17.44±18.79
50 and above	511	18.7	10 (1.96)	0.99–3.69	8.09±8.56
Gender					
Male	1,176	43.0	26 (2.21)	1.48–3.27	16.17±17.10
Female	1,561	57.0	44 (2.82)	2.08–3.80	17.74±18.93
Districts					
Kalahandi	514	18.8	24 (4.67)	3.08–6.97	18.17±19.19
Kandhamal	488	17.8	23 (4.71)	3.07–7.09	10.08±10.69
Nabarangpur	486	17.8	3 (0.62)	0.16–1.95	2.08±2.48
Keonjhar	480	17.5	9 (1.88)	0.92–3.66	17.64±18.42
Mayurbhanj	270	9.9	2 (0.74)	0.13–2.94	–
Sambalpur	195	7.1	1 (0.51)	0.03–3.26	–
Sundargarh	304	11.1	8 (2.63)	1.23–5.32	15.96±16.77
Ethnicity					
Scheduled tribes	2,409	88.0	39 (1.62)	1.17–2.23	17.70±18.96
PVTG	328	12.0	31 (9.45)	6.61–13.27	16.70±17.89

(on the survey done in 2021-2022)

Result

Total of 2,737 sera specimens collected from tribal population aged 6 years and above were tested for HBsAg. This included 279 (10.2%) sera from children aged 6–9 years, 450 (16.4%) from participants aged 10–15 years, 1,497 (54.7%) from participants aged 16–49 years, and 511 (18.7%) participants aged 50 years and above. About 1,176 (42.9%) of the sera tested were from male (Table 1). The district-wise and tribe-wise distribution of participants is provided in graphs respectively. Of the 2,737 sera tested, 70 (2.56%; 95%CI: 2.01–3.24) were positive for HBsAg. The PVTGs had a significantly higher prevalence of HBsAg than other STs. HBsAg positivity was recorded as 1.79% (n=5); 2.44% (n=16); 2.94% (n=44); and 1.96% (n=10) in the age group of 6–9 years, 10–15 years, 16–49 years, and above 50 years, respectively. The HBsAg positivity was detected as 14.18 and 6.06% among the PVTGs, Kutia Khond, and Paudi Bhuyan tribes. Among the Scheduled tribes, the prevalence of HBsAg was highest among Rajuar (6.25%) followed by Gond (6.0%), Kol (4.26%), Gondo (4%), Khond (3.6%), Bhuyan (3.13%), and Savar (2.36%).

Among the 70 HBsAg positive individuals, 30 (42.9%) were found positive for HBV DNA. The viral load among HBsAg positives ranged between 0.10×10^2 – 6.84×10^8 IU/mL (Supplementary Table S1). The viral load among the HBsAg positives in the age group of 6–9 years was 0.10×10^2 – 7.47×10^3 IU/mL. Among the Kutia Khond PVTGs, 8 out of 20 HBsAg positive (40%) showed the presence of HBV DNA with viral load of 0.4×10^2 – 1.34×10^5 IU/mL. Six out of 10 (60%) HBsAg positive Paudi Bhuyan PVTGs showed the presence of HBV DNA with viral load of 0.17×10^2 – 4.29×10^7 IU/mL. Both the PVTGs were first time surveyed for HBsAg prevalence and showed high viral load indicating a high potential to transmit the virus.

Tribes	Districts present	Population covered	HBsAg positive n (%)
Scheduled tribe			
Bhatara	Nabarangpur	22	0
Bhatra	Nabarangpur	340	3 (0.88)
Bhuiya	Keonjhar, Sundergarh, Mayurbhanj, Sambalpur	36	0
Bhuyan	Keonjhar, Sundergarh, Mayurbhanj, Sambalpur	64	2(3.13)
Gond	Kalahandi, Nabarangpur	100	6 (6.00)
Gondo	Keonjhar, Sambalpur, Kalahandi	50	2 (4.00)
Juang	Keonjhar	64	0
Khond	Kandhamal, Kalahandi	333	12 (3.60)
Kisan	Sundergarh, Sambalpur	152	0
Kol	Keonjhar, Mayurbhanj	47	2 (4.26)
Kolha	Mayurbhanj, Keonjhar	47	0
Kond	Kandhamal, Kalahandi	176	1 (0.57)
Kora	Keonjhar	21	0
Munda	Sundergarh, Sambalpur, Keonjhar	128	1 (0.78)
Oraon	Sundergarh, Sambalpur, Keonjhar	65	0
Rajuar	Mayurbhanj	16	1 (6.25)
Santal	Mayurbhanj, Keonjhar	34	0
Saora	Kalahandi	25	0
Savar	Kalahandi	297	7 (2.36)
Sounti_Bhumia	Keonjhar, Mayurbhanj	29	0
Others (Bathudi, Bhumij, Binjhal, Dadua, Didayi, Gadaba, Ghara, Kawar, Kharia, Kharwar, Korua, Koya, Madia, Mundari, Paroja, etc.)	Keonjhar, Sundergarh, Mayurbhanj, Sambalpur, Kalahandi, Kandhamal, Nabarangpur	366	2 (0.55)
PVTGs			
Dongria_Kondh	Kalahandi	1	1 (100.00)
Kutia_Khond	Kalahandi, Kandhamal	141	20 (14.18)
Lanjia_Saora	Kalahandi	1	0
Paudi_Bhuyan	Sundargarh, Keonjhar	165	10 (6.06)
Saora	Kalahandi	17	0

All the HBsAg positive individual had normal SGPT and 11 individuals had abnormal SGOT (Supplementary Table S1). Among these 11 individuals, 6 had the HBV DNA. Eighteen individuals with HBsAg had abnormal ALP and 8 among them had the presence of HBV DNA. Among all the HBsAg positive individuals, mean SGOT,

ALP, Total Bilirubin, and Albumin levels were 64.96 U/L, 255.67 U/L, 0.75 mg/dL, and 5.27 g/dL, respectively. Direct Bilirubin were normal among all the HBsAg positive individuals.

Discussion

In the analysis two of these PVTGs, **Kutia Khond (Kalahandi & Kandhamal)** and **Paudi Bhuyan (Sundargarh & Keonjhar)**, showed a higher prevalence of HBV infection, although all five PVTGs included in the study share similar socio-cultural aspects, geographical location, and relative isolation from the general population.

The present study first-time documents the prevalence of HBsAg among the major tribal population residing in the eastern state of the country. To effectively allocate resources in order to prevent, test for, and treat viral hepatitis, these updated data on HBV prevalence will be useful for assessing mortality from HBV associated cirrhosis in state level. Based on the varying prevalence of HBV in certain populations, more effort and resources must be devoted to educating the community and children on Hepatitis B and its serious complications.

study has key limitations, firstly, in the main survey, we did not include children younger than 5 years of age for logistical reasons. Secondly, we did not collect

information about hepatitis B vaccination from the participants, considering issues regarding parental recall and non-availability of vaccination cards and lastly inability to test different other markers of Hepatitis B infection due to scarcity of sample volume.

Conclusion

The study documents high rates of HBV infection in some of the particularly vulnerable tribal communities residing in Odisha, eastern India. The study findings could be considered as an interim assessment of the status of Hepatitis B infection among the tribal communities and PVTGs residing in Odisha state. About 2% of the children born after the introduction of Hepatitis B vaccine were positive for HBsAg? indicating the need to improve the coverage of three doses of Hepatitis B vaccine in India. The study also highlights the need for a statewide survey of Hepatitis B infection and risk factors, coverage and impact of the Hep B vaccination program introduced in 2010–2011 in Odisha with special reference to the ST and PVTG population of the state.

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