

## Higher Prevalence of HbsAg among Blood Donors at a Tertiary Care Center in Greater Gwalior: A 5years Study

Dr. Anita Arya<sup>1</sup>, Mrs. Shaheen R. Quadri<sup>2</sup>, Dr. Dharmesh Chandra Sharma<sup>1\*</sup>,  
Dr. A.S. Tomar<sup>1</sup>, Dr. Sachin Singhal<sup>3</sup>, Dr. Jyoti Bindal<sup>4</sup> and Dr. Bharat Jain<sup>5</sup>.

<sup>1</sup>Blood Bank, Pathology Department, G. R. Medical College Gwalior India

<sup>2</sup>K. S. College Of Nursing, Gwalior.

<sup>3</sup>Blood Bank, Birla Hospital, Gwalior

<sup>4</sup>Department Of Obstetrics & Gynecology, G. R. Medical College Gwalior India

<sup>5</sup>Department Of Pathology, G. R. Medical College Gwalior India

Corresponding Author: Dr. Dharmesh Chandra Sharma<sup>1</sup>

### Abstract:

**Introduction:** Hepatitis B is a major health problem in India. Estimates indicate that annually over 100,000 Indians die due to illnesses related to HBV infection. HBV is reported to be responsible for 70% of chronic hepatitis cases and 80% of cirrhosis of liver cases.

### Aims and Objectives

Present study is aimed to know the prevalence of HBV among the blood donors in greater Gwalior region.

### Materials & Methods

Present study was carried out at Blood Bank, Gajra Raja Medical College Gwalior. A total of 79162 blood units collected from Voluntary and Replacement Donors over a period of five years (1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016) were screened for HBV and other Transfusion transmitted diseases via ELISA and card test kits. The HBV data was analyzed and compared statistically by frequency distribution and percentage proportion. Chi square ( $X^2$ ) test was applied to know the significant (p value) ratio of difference statistically.

**Results:** Blood from 79162 apparently healthy donors aging 18-60 years was collected during the study period. Male to Female donor's ratio was 91.53% and 8.47% ( $p = .000001$ ) where 93.51% were Voluntary Blood donors and 6.49% were relative blood donors ( $p = .000001$ ). Out of screened donors, 2448 (3.09%) were reactive and 76714 (96.91%) were non-reactive for HBV. Prevalence of HBV in the study was 3.09% statistically significant ( $p = .000001$ ). Yearly incidence of HBV was; in 2012 (3.39%), 2013 (3.05%), 2014 (2.84%), 2015 (3.19%) and 2016 (3.01%) statistically insignificant ( $p = 0.9996$ )

**Conclusions:** A higher prevalence of HBV was reported in the study. It may be because of unsafe therapeutic injections in the rural catchment area of the Gwalior, illiteracy regarding medical health and vertical transmission from mother to baby. Health education is advised to prevent disease transmission and decrease the burden of the disease in the society.

**Keywords:** Hepatitis B Virus, Blood Donors, Transfusion Transmitted Infections

Date of Submission: 05 -12-2017

Date of acceptance: 16-12-2017

## I. Introduction

Blood transfusion is a life-saving intervention that has an essential role in patient management within health care systems [1]. Unfortunately, blood transfusion is not without risks and may lead to the transmissions of infectious agents from donor to recipient including hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), syphilis—caused by *Treponema pallidum* and malaria parasite [2] and are grouped as transfusion transmitted infections (TTI). Globally More than 780 000 people die every year due to the acute or chronic consequences of hepatitis B [3]. Based on the prevalence of hepatitis B carrier state in the general population, countries are classified as having high (8% or more), intermediate (2-7%), or low (less than 2%) HBV endemicity. India is at the intermediate endemic level of hepatitis B [3]. Hepatitis B is a major health problem in India. India with a population of more than 1.25 billion has more than 37 million HBV carriers and contributes a large proportion of this HBV burden. [4]. Estimates indicate that annually over 100,000 Indians die due to illnesses related to HBV infection. HBV is reported to be responsible for 70% of chronic hepatitis cases and 80% of cirrhosis of liver cases [5]. Higher Prevalence of HBV in Madhya Pradesh in the tribal population (15.68%) was reported by Joshi H.S. 1990. [6]. Many cases of HBV infections in adult populations were found

to be associated with blood transfusions as HBV is infective through blood and body-fluid, including vertical transmission [7].

An unsafe blood transfusion is very costly both for human and economic point of view. Morbidity and mortality resulting from the transfusion of infected blood have far reaching consequences, not only for the recipients themselves but also for their families, their communities and the wider society [8, 9]. The economic cost of the failure to control the transmission of infection includes increase requirement for medical care, higher level of dependency, loss of productive labour force and placing heavy burden on already overstretched health and social services on national economy [8, 10]. As per guidelines of National AIDS control organization (NACO) of India, it is mandatory to test each and every blood unit for HIV, HCV, HbsAg, Syphilis and Malaria [11]. The diagnosis of HBV infection requires the evaluation of the patient's blood for HBsAg, hepatitis B surface antibody (HBsAb), and hepatitis B core antibody (HBcAb) [12]. Aim of this study is to estimate the sero-prevalence of HBV among the voluntary and relative donors over a period of five years at blood bank in Gwalior, Madhya Pradesh, India. The observations were compared with the other relevant studies in India and abroad.

## II. Materials & Methods

A five years retrospective study was carried out at Blood bank, Gajra Raja Medical College, Gwalior from 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016. Donors were selected by trained personnel after satisfactory completion of the donor's questionnaire, their physical examination and hemoglobin (Hb %) estimation. During the study period 79162 blood units were collected from the healthy donors aging 18 to 60 years. These donors were Voluntary Donors (VD) and Replacement Donors (RD). Replacement donors were those donors who donated blood for ailing patients and were family members, close relatives and friends of recipient. The voluntary donations were obtained from walk in donors and in voluntary blood donation camps organized by different institutions, neighboring colleges, different social and political organizations. Professional and paid donors were carefully eliminated. Written consent from the donor was also taken prior to blood donation. Three ml blood in plain vial and 2 ml blood in EDTA (ethylene diamine tetra acetic acid) vial taken from the satellite bag. The units were tested for transfusion transmitted infections.

Test for surface antigen (HbsAg) of hepatitis B virus (HBV) was carried out by Elisa 3<sup>rd</sup> generation test using the commercial kit make Meril Diagnostics and optical density was measured on Robonik Elisa reader. Card test make Recon Diagnostic was also performed wherever it is required. The blood unit was discarded as per guidelines of National AIDS control Society (NACO) i.e. Injection of hypo solutions, autoclaving followed by incineration whenever the pilot donor samples were found positive for any TTI. Hepatitis B positive donors were referred to the referral center for HBV i.e. Dr. R. K. Jain, Liver Clinic Hamidia Hospital Bhopal (Madhya Pradesh) for their treatment and follow-up.

Data has been collected, tabulated. Summrised and compared statistically by frequency distribution and percentage proportion. Chi square ( $X^2$ ) test was applied to know the significant (*p value*) ratio of difference statistically. The blood unit was discarded as per guidelines of NACO, whenever the pilot donor samples were found positive for any TTI.

## III. Results

During the study period 79162 Blood units were collected from healthy donors ageing 18 to 60 years. Out of 79162 units, 72978 (91.53%) were male and 6184 (8.47%) were female donors while ratio of voluntary versus relative donors was 93.51% (n=74335) and 6.49 % (n= 4827) respectively (figure no.1). Out of 79162 donors, 2448 (3.09%) were found reactive and 76714 (96.91%) were non reactive for HBV. The prevalence of HbsAg was 3.09% during the study period of five years which is statistically significant (p= .000001) (figure no.2). Yearly distribution of HBV prevalence was in 2012; 3.39 % ( n= 476/14001), 2013; 3.05 % (n=441/14473), 2014; 2.84 % ( n=448/15761), 2015; 3.19% (n=532/16630), 2016; 3.01% (n=551/18297), statistically significant (p=.000001) (Table No. 1 and figure No. 3). However when comparing the data of HBV prevalence of five years, no noticeable difference were found hence it was statistically non-significant (p=.9996).

Age group wise donor's distribution and HBV positivity among different age groups was shown in table No. 2 and it's data distribution is statistically significant (P=.000002 & .000001 respectively) .

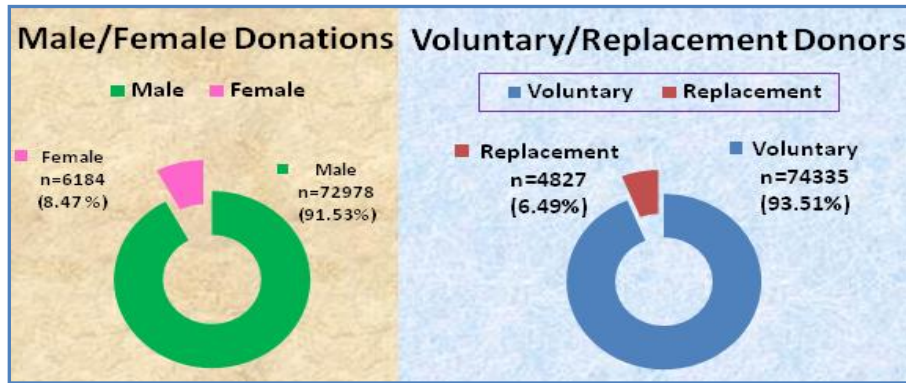


Figure No 1: Male/ Female and Voluntary/ Replacement Donor ratio in the study

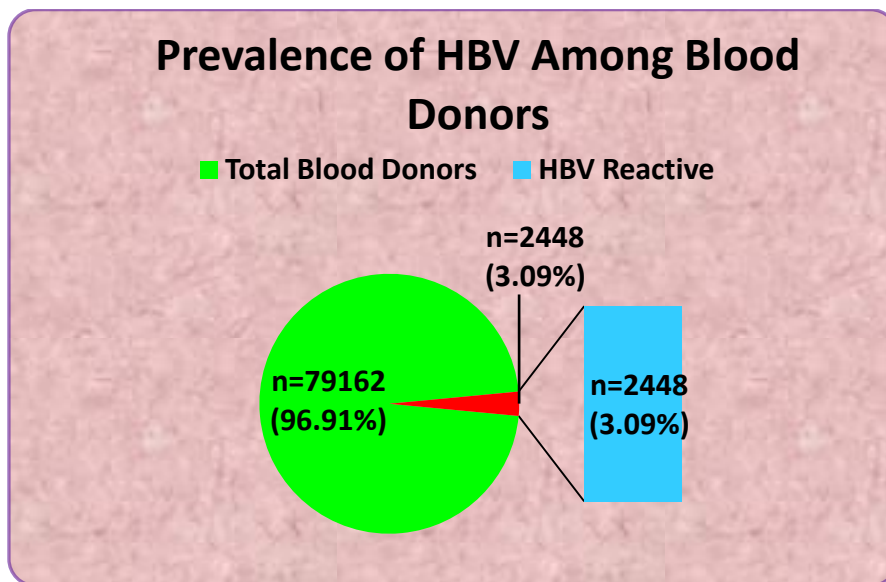


Figure No 2: Prevalence of HBV during the study period

Table No 1: Yearly prevalence of HBV in the study

| Year  | Total Donations | HBV Reactive | HBV Prevalence | P value      |
|-------|-----------------|--------------|----------------|--------------|
| 2012  | 14001           | 476          | 3.39           | $P=0.000001$ |
| 2013  | 14473           | 441          | 3.05           | $P=0.000001$ |
| 2014  | 15761           | 448          | 2.84           | $P=0.000001$ |
| 2015  | 16630           | 532          | 3.19           | $P=0.000001$ |
| 2016  | 18297           | 551          | 3.01           | $P=0.000001$ |
| Total | 79162           | 2448         | 3.09           | $P=0.000001$ |

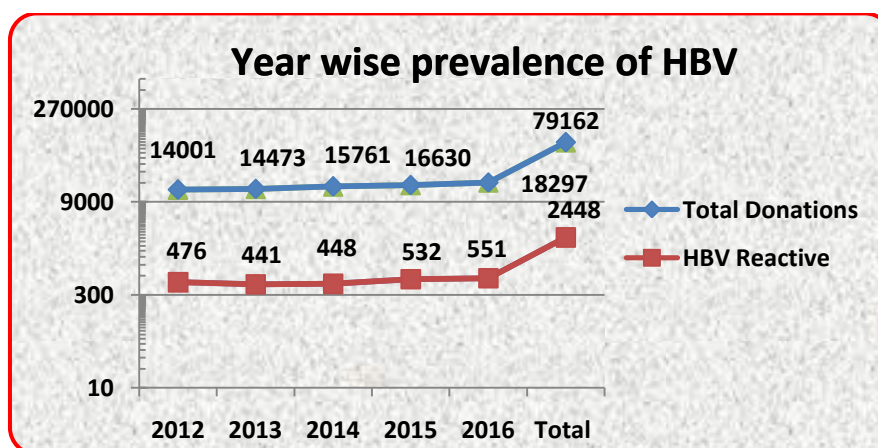


Figure No 3: Yearly prevalence of HBV in the study

**Table No. 2.** Age Group wise distribution of HBV positivity

| S.No. | Age group | Donors |                   | HBV Positive |                   |
|-------|-----------|--------|-------------------|--------------|-------------------|
|       |           | Number | %                 | Number       | %                 |
| 1.    | 18-20     | 7764   | 9.81              | 96           | 3.93              |
| 2.    | 21-30     | 16165  | 20.42             | 309          | 12.62             |
| 3.    | 31-40     | 32481  | 41.03             | 1204         | 49.18             |
| 4.    | 41-50     | 15270  | 19.29             | 793          | 32.39             |
| 5.    | 51-60     | 7482   | 9.45              | 46           | 1.88              |
| 6.    | 18-60     | 79162  | 100<br>P=0.000002 | 2448         | 100<br>P=0.000001 |

#### IV. Discussion

Transfusion of blood and blood components is a life saving measure but at the same time it is an important mode of transmission of infections to the recipient. In developing countries the prevalence of TTIs is much higher and quite far from attending a zero risk level at the present moment [13]. In our study It is obvious from the result that blood donation is male dominated; male 91.53% (n=72978) versus female 6.47% (n= 6184) further strengthen the report of our previous study Sharma et al [14]. It is because of the fact that larger populations of females in India are usually underweight and anaemic as per the donor's selection criteria and it is also due to traditional thinking of Indian society. Many studies in Africa reported a male dominance in blood donation programs (71.2% in Burkina Faso) and (90% in Ghana) [15-16]. Our results are in agreement with previous report among blood donors in India which indicated that female gender is less disposed to blood donation [17].

In the present study ratio of voluntary blood donation is 93.51% (n=74335) while in our institute in the year 2004 it was 15.2% only [18]. There's steep rise from the year 2004 (15.2%) to 2014 (90.90%) was reported in our previous study [18] while national data is still 52% [19]. Increase in voluntary donation may be attributed to the increasing public awareness and involvement of Government bodies like NACO that actively propagate voluntary blood donation in our country.

There is 1% chance of transfusion associated problems including TTI with every unit of blood [20]. Prevalence of HbsAg was 3.09% (n= 2448 HBV positive out of 79162 donors) during the study period of five years. Studies from other blood banks in India show variable prevalence of HBV such as Chandra T *et al* 2014[21] from Lucknow reported 1.59% (n=3058/192348), Arora *et al* 2010[20] from southern Haryana 1.7 % (n= 100/5849), Das BK *et al* 2011 [22] from Kolkata 1.55% (n= 58/3745), Pahuja *et al* 2007 [23] from Delhi 2.23% (n= 645/28956), and Pallavi P *et al* 2011 [24] from Mysore 1.27% (n=496/39060). Large general population-based epidemiological study by Chowdhury *et al* [25] from west Bengal reported HBV prevalence 2.9 % (n= 227/7653).

A very high prevalence of HBV has been reported from the tribal population. The point-prevalence of HBsAg in the Idu Mishmi tribe of Arunachal Pradesh, which has common ancestral roots with the Lhoba tribe of Tibet, was found to be 21.2% [26] . Very high levels of HBsAg positivity have also been reported in the tribes of Andaman and Nicobar Islands (Nicobarese tribe—23.3%, Shompen tribe—37.8%, Jarawa tribe—65%) [27, 28]. The prevalence of HBsAg in Baiga tribal population of Madhya Pradesh was 4.4% reported by Reddy PH *et al* [29]. Joshi *et al* [30] studied 11 different tribal populations of five districts of Madhya Pradesh and found HBsAg carrier rate of 2.99–21.54% among the various tribes. The prevalence of HBsAg was seen in 5.16% in Lambada tribes in the state of Andhra Pradesh, South India [31]. The high endemicity of HBV infection in the tribal populations has been attributed to inbreeding, poor hygienic living conditions, close person-to-person contact and certain socio-culture practices that may facilitate transmission of HBV [32]. From abroad low prevalence of HBV was reported from United State 0.4% [33] and from Bahrain is 0.58% [34] while higher prevalence among blood donors was reported from northern Ghana, African continent 11.51% [35] and Burkina Faso, West Africa (13.4%) [36].

Availability of safe blood for transfusion is a must for the recipients and community as well and it can be achieved by vigorous and cautious screening of donors / or donated blood with laboratory screening tests. Despite of the fact that safe and effective vaccine of HBV has been available since 1982; the HbsAg prevalence in India is still high. This is because of the fact that hepatitis B vaccination is not a part of our National Immunization Programme in India [23].

#### V. Conclusions

A higher prevalence of HBV was reported in the study. It may be because of unsafe therapeutic injections in the rural catchment area of the Gwalior, illiteracy regarding medical health and vertical transmission from mother to baby. Health education along with addition of hepatitis B vaccination in the National Immunization Programme is helpful to prevent disease transmission and decrease the burden of the disease in the society.

### Funding

This research did not receive any specific grant from any funding agency in the public, commercial or nonprofit organizations.

### Consent

The author(s) declare that written informed consent was obtained from the blood donors before being recruited for this research.

### Ethical Approval

All author(s) hereby declare that all procedure have been examined and approved by the appropriate ethics committee of Gajra Raja Medical College, Gwalior, India and research have therefore been performed in accordance with the ethical standards laid down in the 1964 declaration of Helsinki.

### Competing Interests

Authors have declared that no competing interests exist.

### References

- [1]. World Health Organization. **Screening donated blood for transfusion-transmissible infections: recommendations** World Health Organization, Geneva (2009)
- [2]. G.B. Schreiber, M.P. Busch, S.H. Kleinman, J.J. Korelitz **The risk of transfusion-transmitted viral infections. The Retrovirus Epidemiology Donor Study** *N Engl J Med*. 334 (1996), pp. 1685-1690
- [3]. World Health Organization. Hepatitis B. World Health Organization Fact Sheet No. 204 (Updated July 2015). <http://www.who.int/mediacentre/factsheets/fs204/en/>
- [4]. Puri P. Tackling the Hepatitis B Disease Burden in India. *Journal of Clinical and Experimental Hepatology* 2014;4(4):312-319.
- [5]. Rao MB. The prevalence of hepatitis B in India and its prevention with yurveda- a revisit. *Journal of New Approaches to Medicine and Health*. 2012; 19(4):22-5.
- [6]. Joshi S.H., Gorakshakar A.C., Mukherjee M. Prevalence of HBsAg carriers among some tribes of Madhya Pradesh. *Indian J Med Res*. 1990;91:340-343. [PubMed]
- [7]. Lok AS . McMahon BJ. Chronic hepatitis B. *Hepatology*, 45 (2007), pp. 507-539
- [8]. World Health Organization (WHO). Blood Safety Strategy for the African Region. Brazzaville, World Health Organization, Regional Office for Africa (WHO AFR /RC51/9 a. Rev.1) ; 2002.
- [10]. World Health Organization (WHO). Status of blood safety in the WHO African Region: Report of the 2004 Survey, WHO Regional Office for Africa, Brazzaville. 2007; 1-25:25.
- [12]. Kitchen AD, Barbara JAJ. Transfusion transmitted infections. In: Murphy MF, Pamphilon DH, editors. *Practical Transfusion Medicine*. Blackwell Science; Oxford; 2001;192-210.
- [15]. Kar, H.K. (2009) Global and National Overview of HIV/AIDS Epidemic. In: Sharma, V.K., Ed., *Sexually Transmitted Diseases and HIV/AIDS*, 2nd Edition, Viva Books Pvt. Ltd, New Delhi, 99-109
- [16]. Mast EE, Margolis HS, Fiore AE, et al., for the Advisory Committee on Immunization Practices (ACIP). A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) part 1: immunization of infants, children, and adolescents [published corrections appear in *MMWR Morb Mortal Wkly Rep*. 2006;55(6):158-159, and *MMWR Morb Mortal Wkly Rep*. 2007;56(48):1267]. *MMWR Recomm Rep*. 2005;54(RR-16):1-31.
- [17]. Fernandes H, Prema Fancy D'souza, Pushpa Maria D'souza. Prevalence of Transfusion Transmitted Infections in Voluntary and Replacement Donors *Indian J Hematol Blood Transfus*. 2010;26(3):89-91. Published online Oct 21, 2010. DOI: 10.1007/s12288-010-0044-0 PMID: PMC3002083
- [18]. Sharma DC, Jain A, Woike P, Rai S, Tripathi L, Bindal J and Gaur R. Female Contribution in Blood Donation and Alternatives: Fact & Factual. *International Blood Research & Reviews* 5(4): 1-8, 2016, Article no.IBRR.26292 DOI: 10.9734/IBRR/2016/26292
- [19]. Nébié KY, Olinger CM, Kafando E, Dahourou H, Diallo S, et al. [Lack of knowledge among blood donors in Burkina Faso (West Africa); potential obstacle to transfusion security]. *Transfus Clin Biol*. 2007;14:446-452.
- [20]. Allain JP, Sarkodie F, Boateng P, Asenso K, Kyeremateng E, et al. A pool of repeat blood donors can be generated with little expense to the blood center in sub-Saharan Africa. *Transfusion*. 2008; 48:735- 741.
- [21]. Uma S, Arun R, Arumugam P. The knowledge, attitude and practice towards blood donation among voluntary blood donors in Chennai, India. *J Clin Diagn Res*. 2013;7(6):1043-1046.
- [22]. Sharma DC, Rai S, Bharat S, Iyenger S, Gupta S, Sao S and Jain B " A 10 Years Comparative Study to Assess Trends in Seroprevalence of Transfusion Transmitted Infections among Blood Donors at Gwalior, India" *Open Journal of Blood Diseases*, 2014, 4, 24-32  
<http://dx.doi.org/10.4236/ojbd.2014.42004>
- [24]. Access to Safe blood – NACO National AIDS Control organization. Updated On: 08 Sept, 2015. Available:[http://www.naco.gov.in/NACO/National\\_AIDS\\_Control\\_Program/Services\\_f\\_or\\_Prevention/Access\\_to\\_Safe\\_blood/](http://www.naco.gov.in/NACO/National_AIDS_Control_Program/Services_f_or_Prevention/Access_to_Safe_blood/)
- [25]. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. *Indian J Pathol Microbiol*. 2010;53:308-309. doi: 10.4103/0377-4929.64295.
- [26]. Chandra T., Rizvi S.N.F., Agarwal D. Decreasing prevalence of transfusion transmitted infection in Indian scenario. *Sci World J*. 2014 Jan 27;2014:173939. [PMC free article] [PubMed]
- [27]. Das B.K., Gayen B.K., Aditya S., Chakrovorty S.K., Datta P.K., Joseph A. Seroprevalence of hepatitis B, hepatitis C and human immunodeficiency virus among healthy voluntary first-time blood donor in Kolkata. *Ann Trop Med Public Health [Serial Online]* 2011;4:86-90.
- [28]. Pahuja S., Sharma M., Baitha B., Jain M. Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors: a hospital based study. *Jpn J Infect Dis*. 2007;60:389-391.
- [29]. Pallavi P., Ganesh C.K., Jayshree K., Manjunath G.V. Seroprevalence and trends in transfusion transmitted infections among blood donors in a university hospital blood bank: a 5 year study. *Indian J Hematol Blood Transfus*. 2011;27:1-6.

- [30]. Chowdhury A., Arora D., Arora B., Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in the blood donors in southern Haryana. *Indian J Pathol Microbiol.* 2010;53:308–309. Chowdhury A., Santra A., Chakravorty R. Community-based epidemiology of hepatitis B virus infection in West Bengal, India: prevalence of hepatitis B e antigen-negative infection and associated viral variants. *J Gastroenterol Hepatol.* 2005;20:1712–1720. [PubMed]
- [31]. Biswas D., Borkakoty B.J., Mahanta J., Jampa L., Deouri L.C. Hyperendemic foci of hepatitis B infection in Arunachal Pradesh, India. *J Assoc Physicians India.* 2007;55:701–704. [PubMed]
- [32]. Murhekar M.V., Murhekar K.M., Sehgal S.C. Alarming prevalence of hepatitis-B infection among the Jarawas – a primitive Negrito tribe of Andaman and Nicobar Islands, India. *J Viral Hepat.* 2003;10:232–233. [PubMed]
- [33]. Murhekar M.V., Murhekar K.M., Das D., Arankalle V.A., Sehgal S.C. Prevalence of hepatitis B infection among the primitive tribes of Andaman & Nicobar Islands. *Indian J Med Res.* 2000;111:199–203.[PubMed]
- [34]. Reddy P.H., Tedder R.S. Hepatitis virus markers in the Baiga tribal population of Madhya Pradesh, India. *Trans R Soc Trop Med Hyg.* 1995;89:620. [PubMed]
- [35]. Joshi S.H., Gorakshakar A.C., Mukherjee M. Prevalence of HBsAg carriers among some tribes of Madhya Pradesh. *Indian J Med Res.* 1990;91:340–343. [PubMed]
- [36]. Chandra M., Khaja M.N., Farees N. Prevalence, risk factors and genotype distribution of HCV and HBV infection in the tribal population: a community based study in south India. *Trop Gastroenterol.* 2003;24:193–195. [PubMed]
- [37]. Murhekar M.V., Murhekar K.M., Sehgal S.C. Epidemiology of hepatitis B virus infection among the tribes of Andaman and Nicobar Islands, India. *Trans R Soc Trop Med Hyg.* 2008; 102:729–734. [PubMed]
- [38]. Kim Ray W. Epidemiology of Hepatitis B in the United States. *Hepatology.* 2009 May; 49(5 Suppl): S28–S34. doi: 10.1002/hep.22975 PMID: PMC3290915
- [39]. Essam M. Janahi. Prevalence and Risk Factors of Hepatitis B Virus Infection in Bahrain, 2000 through 2010 Ranjit Ray, Editor *PLoS One.* 2014; 9(2): e87599 Published: February 3, 2014 <https://doi.org/10.1371/journal.pone.0087599>
- [40]. Dongdem JT, Kampo S, Soyiri IN, Asebga PN, Ziem JB, and Sagoe K. Prevalence of hepatitis B virus infection among blood donors at the Tamale Teaching Hospital, Ghana (2009). *BMC Res Notes.* 2012; 5: 115. Published online 2012 Feb 22. doi: 10.1186/1756-0500-5-115 PMID: PMC3392729
- [41]. Nagalo BM, Bisseye C, Sanou M, Kienou K, Nebié YK, Kiba A, Dahourou H, Ouattara S, Nikiema JB, Moret R, Zongo JD, Simpore J. Seroprevalence and incidence of transfusion-transmitted infectious diseases among blood donors from regional blood transfusion centres in Burkina Faso, West Africa. *Trop Med Int Health.* 2012;17(2):247-53. DOI: 10.1111/j.1365-3156.2011.02902.x. Epub 2011 Oct 12.

Dr. Dharmesh Chandra Sharma. "Higher Prevalence of HbsAg among Blood Donors at a Tertiary Care Center in Greater Gwalior: A 5years Study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 16.12 (2017): 05-10