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GLOBAL BURDEN OF HEPATITIS B, SEROPREVALENCE OF SEROLOGICAL MARKERS OF HEPATITIS B VIRUS AND ASSOCIATED FACTORS IN HEALTH CARE WORKERS: A REVIEW

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B ჰეპატიტის გლობალური ტვირთი და B ჰეპატიტის ვირუსის სეროლოგიური მარკერების გავრცელებასთან ასოცირებული ფაქტორები სამედიცინო პერსონალში: მიმოხილვა

¹თბილისის სახ. სამედიცინო უნივერსიტეტი, ²დაავადებათა კონტროლისა და საზოგადოებრივი ჯანმრთელობის ეროვნული ცენტრი, ³კლინიკა „რედი“, ⁴საქართველოს ეროვნული უნივერსიტეტი

რეზიუმე

სტატია ეხება საზოგადოებრივი ჯანმრთელობის ერთ-ერთ აქტუალურ საკითხს - B ჰეპატიტის ვირუსული ინფექციით ავადობასა და B ჰეპატიტის ვირუსის სეროლოგიური მარკერების გავრცელებას სამედიცინო პერსონალში. გამოკვეთილია ინფექციის მაღალ ენდემურობასთან ასოცირებული რისკ ფაქტორები, რომელთა შეფასება-მართვა ახალი სტრატეგიის შემუშავებას მოითხოვს.

Introduction: The hepatitis B virus (HBV) infection is a global public health concern that affects about 2 billion people, causes 1 million people deaths [1,4] and 1.2 million new infections yearly [2]. Improved data from 187 countries show that the estimated number of deaths from viral hepatitis increased from 1.1 million deaths in 2019 to 1.3 million in 2022. Hepatitis B caused 83% of these deaths [3]. Roughly 30% of the world's population show serological evidence of current or past infection. [5]. There is regional variation in the viral hepatitis burden and response [6]. The WHO African Region accounts for 63% of new hepatitis B infections. The Western Pacific Region accounts for 47% of hepatitis B deaths, and treatment coverage remains low [3]. The WHO estimates that Asia is the continent with the highest rate of HBsAg carriers in the world, with an overall prevalence in the adult population of over 8%. The low number of epidemiological studies on HBV infection performed in eastern Europe does not allow conclusive statements to be made on the spread of HBV infection, however prevalence of the infection was reported very low (0.6%) in the entire European region [7,23]. Hepatitis B virus (HBV) infection has shown an intermediate or high endemicity level in low-income countries over the last five decades [7]. Hepatitis B virus (HBV) is a blood-borne pathogen and out of 60 or more microbial agents responsible for blood-borne transmissible infectious biological agents HBV is one of the infectious most frequently transmitted to HCWs globally [8], being at greater risk due to their occupation risk [4]. Approximately 3 million healthcare workers per year receive an injury with an occupational instrument, with around 2000000 exposures to hepatitis B virus (HBV) [8,9]. Although an effective HBV vaccine has been available since the early eighties, and despite the worldwide application of universal vaccination programs started in the early nineties, HBV still remains a prominent agent of morbidity and mortality [9]. According to high heterogeneity across regions regarding HBV routes of transmission, risk factors of infection, interventions for prevention and immunization among HCWs as well as clinical practice, the global epidemiology of HBV infection in HCWs need to be described. Understanding the seroprevalence, immunization rate, and risk factors for HBV infection in HCWs can provide useful information for decision-making and context-specific interventions to curtail the burden of disease of HBV infection [4].

Goal and Objectives: The study strived to determine the worldwide burden of HBV infection and seroprevalence of HBV serological markers among HCWs in the healthcare institutions.

Methods: Literature review was performed. Articles were searched in PubMed, Google Scholar and ScienceDirect, Hepatitis B Abstract Library, between 2005-2024. The search words were: Hepatitis B,

incidence, seroprevalence, serological markers, healthcare workers, healthcare personal. In total 153 articles were selected, of those 48 meet all the selection criteria.

Results and Discussion: HBV, being a blood-borne pathogen, represents a significant occupational risk among healthcare workers (HCWs). HCWs are one of the most vulnerable groups to HBV infection during their routine work, which exposes them to a variety of accidents, e.g., needle stick injuries, exposure to blood and fluids of HBV-infected patients, etc. [3,4,6,9-11,13-20]. The frequencies of infection in HCWs are up to 4-times greater than in individuals who do not work in hospitals [9,10]. Among the 35 million HCWs working globally, approximately 3 million each year have occupational exposure to HBV infection, leading to up to 66 thousand HBV infections (261 deaths) [10,12]. However, these groups are under-diagnosed in many parts of the world, especially in low-income countries [4]. A recent systematic review and meta-analysis showed that healthcare workers (HCWs) are at an intermediate level (2%-8%) of hepatitis B virus (HBV) infection worldwide. The pooled seroprevalences of current HBsAg, current HBeAg, and acute HBV infection among HCWs were 2.3% [95% confidence interval (CI): 1.9-2.7], 0.2% (95%CI: 0.0-1.7), and 5.3% (95%CI: 1.4-11.2), respectively. The pooled seroprevalences of total immunity against HBV and immunity acquired by natural HBV infection in HCWs were 56.6% (95%CI: 48.7-63.4) and 9.2% (95%CI: 6.8-11.8), respectively. HBV infection was more prevalent in HCWs in low-income countries, particularly in Africa [4]. The rates of HBsAg and anti-HBc positivity in healthcare workers reported in several studies published in the last three decades range from 0.1% to 8.1% and from 6.2% to 73.4%, respectively, depending on the age of the subjects investigated, the spread of HBV infection in their country of origin and on the prevention strategies used by the healthcare workers. Though the current prevalence of HBV in HCWs is not known in many countries, it likely mirrors that of the general population [13,16,17,20]. Some studies have shown that the rate of HBV infection could be 2–4 times higher among HCWs than in the general population [15,18,20], however, due to the asymptomatic course of viral hepatitis, some infected HCWs may be unaware of their serological status [21]. In settings with high Hepatitis B surface antigen seroprevalence in the general population (defined as $\geq 2\%$ or $\geq 5\%$ HBsAg seroprevalence), WHO recommends that all adults have access to and be offered HBsAg.[3]. Senoo-Dogbey Vivian Efua et al. suggested to estimate the frequency and burden of HBV infection and its associated factors among HCWs, as the occupational group with the highest infection risk [13]. There is a significant gender variation in infectivity with virus as well as illness with HB infection: males had a significantly higher risk of contracting HBV than women (OR 1.92; 95% CI: 1.12–3.27; $p=0.016$) [17], prevalence was highest in males 10.2% (95% CI, 4.8-18.5) [19]. Age distribution showed that HCWs of ≥ 40 years old were at higher risk for acquiring HBV infection than those in the < 20 –29-year-old groups (OR 3.98; 95% CI: $p < 0.001$) and 30–39 (OR 3.02; 95% CI: 1.40–6.48; $p=0.009$) [17]. The World Health Organization estimates that 37% of Hepatitis B Virus (HBV) infections among Health Care Workers (HCWs) are due to percutaneous occupational exposure to blood and body fluids followed by per-mucous and non-intact skin exposure [8,13]. The risk of acquisition of this infection in an unvaccinated individual after a single exposure is estimated 32–67% when blood is positive for both hepatitis B surface antigen (HBsAg) and envelope antigen (HBeAg) and 6% - when HBeAg is negative [21]. By job category, the intervention group had significantly a higher risk of acquiring HBV infection compared to others (OR 3.39; 95% CI: 1.58–7.26; $p=0.001$). Having been working for ≥ 10 years was associated with a higher risk for acquisition of HBV infection [17,20,21,23]. Among occupational factors, needlestick injury contributed a higher risk for the acquisition of HBV infection [13,14,17,19,20]. In addition, lack of training in infection control, not using protective equipment, working at the province of high HBV incidence in the general population (OR = 2.69) were each predictor of participant's HBV infection [20,21]. Of note, underreporting of these risk exposures is found to be widespread, which represents a missed chance for initiating implementation of prevention strategies, such as hepatitis B immune globulin and HBV vaccine [22]. As for the professional categories, the majority of cases were reported among hospital staff; almost every second case was detected among nurses [21]. The highest proportion of anti-HBc positive HCWs was observed at an emergency, internal and surgical medicine departments and midwives (5/36; 13.9%) and nurses (30/214; 14.0%) were professions most having positive anti-HBc screening results followed by physicians 3/23 (13.0%) [20]. Serologic studies performed in the past revealed a 22%–31% risk of developing clinical infection and a 37–

62% risk of developing serologic evidence of HBV infection upon exposure to the blood of a source patient with positive hepatitis B surface antigen (HBsAg) and positive hepatitis B E antigen (HBeAg) [16,18]. Werner B G and Grady G F showed that the incidence of hepatitis B was 19% (44 of 234) in recipients of HBeAg-positive sera but was only 2.5% (three of 121) in recipients of sera positive for anti-HBe, and nil (none of 35) in recipients of sera negative for HBeAg and anti-HBe. The known relation of HBeAg and infectivity was quantified by radioimmunoassay as a risk ratio of 10:1 (HBeAg-positive to HBeAg-negative) for this type of exposure. The sensitivity of the radioimmunoassay also showed that a large proportion (55%) of donor sera not producing hepatitis were positive for HBeAg; therefore, even the most flagrant needlestick exposures to HBsAg-positive sera often must involve subthreshold amounts of infective material [16].

Conclusion: Despite the advances, made during the past three decades in vaccines, infection prevention, and PEP, hepatitis B continues to be a serious problem for HCP in many countries globally. Quantifying the burden of several serological markers of HBV infection in HCWs will enable the development of new strategies to better manage HBV infection in HCWs and achieve the World Health Organization goal of eliminating hepatitis B infection by 2030.

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SUMMARY

The article deals with one of the current issues of public health - the morbidity of hepatitis B virus infection and the spread of serological markers of hepatitis B virus among medical personnel. Risk factors associated with high endemicity of infection have been identified, the assessment and management of which requires the development of a new strategy.

Keywords: Hepatitis B, Serological Markers, Health Care Workers

