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Hepatitis and HIV in Tattooed and Pierced Blood Donors: The First Report from Tondo Medical Center and its Public Health Impact

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Abstract

Blood transfusion is a critical component of patient care, yet tattoos and body piercings performed under non-sterile conditions may serve as sources of bloodborne infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). In the Philippines, donors with recent tattoos are deferred for one year, and national prevalence rates are estimated at 1.1% for HBV, 0.2% for HCV, and 0.1% for HIV, highlighting the need for targeted donor screening. This study aimed to report, for the first time in the Philippines, the screening and confirmatory results of anti-HBsAg, anti-HCV, and anti-HIV among voluntary blood donors (VBD) with tattoos and/or body piercings. A retrospective cohort design was employed using data from 11,711 donors at Tondo Medical Center, Manila, from 2014 to 2018. Variables included donor age, sex, tattoo/piercing status, and serologic screening and confirmatory results. Among donors, 22% had tattoos and/or piercings; of these, 13.3% had body piercings, 79.5% were male, and 58.5% were aged 18–30 years. Overall reactive rates were 3.1% for anti-HBsAg, 0.2% for anti-HCV, and 0.1% for anti-HIV, with the highest HBV reactivity observed among donors with both tattoos and piercings. HCV and HIV reactivity occurred exclusively among those with piercings. Confirmed positivity rates were 1.5% for HBV, 0.04% for HCV, and 0.1% for HIV; however, only 48% of initially reactive samples underwent confirmatory testing. Although inked and/or pierced donors without one-year deferral demonstrated generally low infection rates, the confirmed HIV rate exceeded the national average. Challenges in data retrieval and limited confirmatory testing capacity highlight gaps in current screening practices. Strengthened donor deferral policies, expanded confirmatory testing, and improved infrastructure are recommended to ensure safe blood donation and reduce transfusion-transmitted infections.

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Introduction

Blood transfusion is crucial in healthcare for pediatric, adult, and geriatric medical and surgical patients. It is an essential element of patient management that can spell the difference between losing or saving patients' lives, especially in addressing surgical procedures, blood-related illnesses, and emergency care following major trauma. Thus, access to blood units free from transfusion-transmitted infections (TTI) is a national concern.

Although blood donation is an integral part of the Philippine government's universal healthcare program, many Filipinos remain clueless about its purpose and benefits and do not participate in the program. At a national level, 16 to 65 years of age, at least 50 kg, afebrile, 125-135 g/L hemoglobin, physically, and mentally fit are the basic requirements to qualify as a voluntary blood donor (VBD). In addition, individuals with tattoos are deferred for one year from their last "inking" session before they can have themselves screened as potential blood donors [1].

About 16.7% of the Philippine population (7.3 million people) have chronic hepatitis B virus (HBV), more than double the average prevalence in the western Pacific region, while a small-scale study reported 1% (around 1 million people) were infected with hepatitis C virus (HCV) [2,3]. From January 1984 to October 2020, the Department of Health (DOH) human immunodeficiency virus /acquired immunodeficiency syndrome (HIV/AIDS) and anti-retroviral therapy (ART) Registry of the Philippines reported a total of 81,169 diagnosed cases with 94% being male and more than half (51%) were 25-34 years old at the time of diagnosis [4]. However, paucity of data on these TTI from blood donors or blood units still plague the Philippine health system.5 It has been hypothesized that the prevalence of these and other TTI have been underestimated due to the exclusion of members of high-risk populations such as those having tattoos. Therefore, a 2007 study suggested that simultaneous testing should replace sequential testing for HBV, HCV, and HIV because of the perceived growth of bloodborne infections in the incoming years [5].

Tattooing and body piercing have permeated society for thousands of years and are steadily increasing in popularity, accessibility, and acceptance in society [6]. Although prevalence rates may vary in different populations, research suggests an 8-24% prevalence in the population [7,8]. These practices if not performed aseptically are potential sources of TTI through recycled needles and contaminated ink and increases the risk of contracting HBV, HCV, and HIV [9]. A case in point is the HBV outbreak in Amsterdam in 1982 that was traced to an HBV-infected tattoo artist [10]. A single needlestick injury from an infected individual has a 5-30% risk for transmitting HBV, 3-7% risk for HCV, and 0.2-0.4% for HIV. Tattooing is a highly repetitive process, the lack of aseptic or sterilization procedures and the use of recycled needles exponentially increases the potential transmission of TTI [11].

In Southeast Asia, policy responses to HBV and HCV vary in territories where commonalities in systemic, cultural, and financial concerns persist and need to be addressed. Among these common challenges to eliminating HBV and HCV infection is the limited availability of epidemiological data [12]. To date, no report could be retrieved on the prevalence of HBV, HCV, and HIV from VBD with tattoo/s and or body piercing/s in the Philippines. Thus, the present study aimed to provide the first report on the screening and confirmatory results on anti-HBsAg, Anti-HCV, and anti-HIV from these blood donor groups. The present study is highly significant in providing up-to-date reference data for revisiting relevant national policies for blood donation, enforcement of mandates directed towards the tattoo and body piercing culture and industry, and action against the spread of HBV, HCV, and HIV by the provision of safe blood units for transfusion.

Methodology

Research Design

This study employed a retrospective cohort research design to examine the prevalence of transfusion-transmissible infections (TTIs) among voluntary blood donors (VBDs) with tattoos and/or body piercings. The design was chosen to utilize existing donor records spanning October 2014 to December 2018, allowing the researchers to assess patterns of infection and confirmed positivity rates without the need for prospective data collection. Retrospective cohort studies are particularly suited for investigating associations between exposure factors (tattoos/piercings) and outcomes (HBV, HCV, and HIV reactivity) over a defined

period, while ensuring minimal disruption to hospital operations.

Participants and Sampling Technique

The population comprised all voluntary blood donors who presented to Tondo Medical Center (TMC), a tertiary government hospital in Manila, during the study period. TMC caters to approximately 38% of Manila's 2 million residents, managing high patient volumes including trauma and surgical cases, and maintaining a continuous demand for blood and blood components. From a total of 11,711 donor records, the subset of donors with tattoos and/or body piercings was identified, representing the study sample. Inclusion criteria were donors aged 18 years and above with documented tattoo or piercing status who underwent routine serologic screening for HBV, HCV, and HIV. Exclusion criteria included incomplete donor records, missing screening results, or donors deferred for reasons unrelated to tattoos/piercings. A total enumeration approach was used to include all eligible records within the study period.

Research Instrument

Data were extracted from TMC's routine blood donor registry and laboratory records. Demographic variables included age and sex, and laboratory results included:

- Hepatitis B surface antigen (HBsAg)
- Anti-hepatitis C virus (Anti-HCV)
- Anti-human immunodeficiency virus (Anti-HIV)

Screening assays utilized were:

- HBsAg: Determine™ HBsAg (Abbott, Japan); sensitivity: 100%, specificity: 99.87%
- Anti-HCV: SD Bioline HCV (Standard Diagnostics, Korea); sensitivity: 99.4%, specificity: 99.7%
- Anti-HIV: Alere Determine™ HIV-1/2 (Abbott, Japan); sensitivity: 100%, specificity: 99.9%

Reactive samples were referred to the Research Institute for Tropical Medicine (RITM) for confirmatory testing:

- HBsAg: ELISA, Abbott Architect i2000SR
- Anti-HCV: Recombinant immunoblot assay (RIBA)
- Anti-HIV: Western Blot or HIV-1 RNA PCR

All confirmatory assays report sensitivity and specificity exceeding 99%, ensuring high diagnostic accuracy. The research instrument was adopted and standardized based on institutional protocols, eliminating the need for pilot testing.

Data Gathering Procedure

Data were retrospectively collected by the researchers from TMC's blood donor registry and laboratory database. Variables were extracted into a structured electronic spreadsheet, including demographic information and results of both initial screening and confirmatory testing. The duration of data collection covered October 2014 to December 2018. All donor records were anonymized to maintain confidentiality. No interventions were conducted, as the study relied solely on pre-existing clinical and laboratory data.

Data Analysis Procedure

Descriptive statistics were used to summarize donor demographics and screening/confirmatory test outcomes. Categorical variables were expressed as frequencies and percentages. Comparative analysis (e.g., chi-square tests) was planned to assess associations between infection reactivity and variables such as sex, age group, and body modification type; however, full individual-level data were not consistently available across the study period to support inferential statistical analysis. Results are therefore presented descriptively to inform future research directions.

Ethical Considerations

This study was approved by the Institutional Review Board (IRB) of Tondo Medical Center (Approval No. IRB 023-02-19), and was conducted in accordance with the Declaration of Helsinki. Data were anonymized to ensure donor confidentiality.

Results and Discussion

Results

Figure 1 shows a total of 11,711 voluntary blood donors (VBD) from 2014 to 2018, with a steady increase in annual donations. Among them, 77.8% (9,105) had no tattoos or piercings, 3.7% (427) had tattoos only, 13.3% (1,552) had body piercings only, and 5.4% (627) had both.

From the expected 2,606 records of donors with tattoos and/or piercings, 95.78% (2,496) were retrieved.

Of these, 79.5% (1,985) were male and 20.5% (511) female. Age distribution showed that 58.5% (1,460) were aged 18–30, 38.8% (968) were 31–50, and 2.7% (68) were ≥51 years.

As shown in Table 1 and Figure 2, 3.4% (88/2,606) of inked and/or pierced donors were reactive on screening: anti-HBsAg (83), anti-HCV (3), and anti-HIV (2). Breakdown by body modification showed:

- Tattoo only: anti-HBsAg reactivity at 4.2% (18/427)
- Piercing only: anti-HBsAg 2.4% (38/1,552); anti-HCV 0.2% (3/1,552); anti-HIV 0.1% (2/1,552)
- Both tattoo and piercing: anti-HBsAg 4.3% (27/627)

Confirmatory testing revealed:

- 1.5% (40/2,606) positive for anti-HBsAg
- 0.04% (1/2,606) for anti-HCV
- 0.1% (2/2,606) for anti-HIV

However, only 48% (42/88) of initially reactive samples underwent confirmatory testing due to limited availability at the Research Institute for Tropical Medicine between 2014–2016.

Descriptive analysis revealed notable trends in infection reactivity across different subgroups. Higher reactivity rates were observed among donors with both tattoos and piercings and among younger male donors. These patterns suggest potential associations between demographic and body modification factors and infection markers. While confirmatory testing was limited in earlier years due to logistical constraints, the available data still offer valuable insights into screening outcomes. These findings highlight key areas for enhanced surveillance and future research that may benefit from more granular donor data to support advanced statistical modeling and policy refinement.

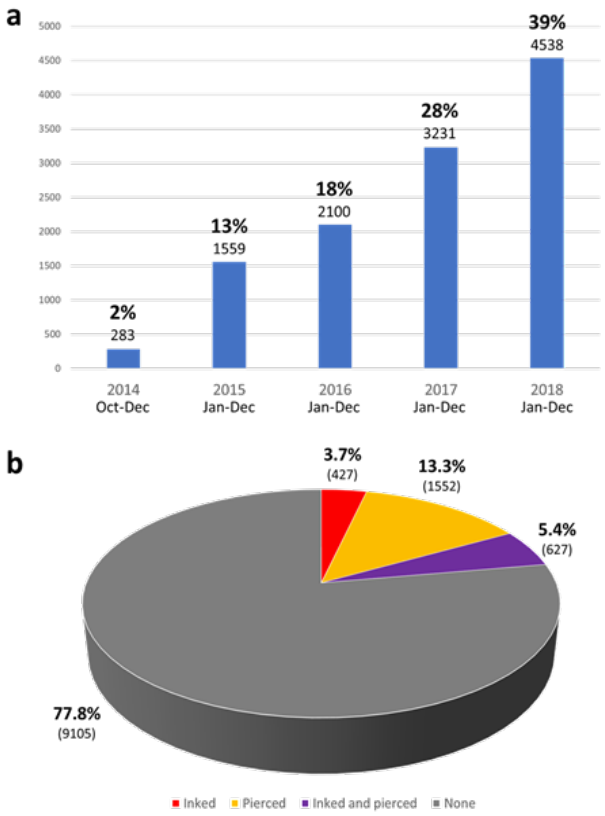

Figure 1 Distribution of voluntary blood donors in Tondo Medical Center, Manila from 2014 to 2018 (n=11711); **(a)** Yearly distribution of voluntary blood donors; **(b) distribution of** inked and/or pierced voluntary blood donors.

Table 1: Summary of Reactive Screening and Positive Confirmatory Results of Inked and/or Pierced Voluntary Blood Donors

Inked and/or pierced voluntary blood donors (n=2606)	HBsAg				Anti-HCV				Anti-HIV			
	Screening		Confirmatory		Screening		Confirmatory		Screening		Confirmatory	
	R+	%	P+	%	R+	%	P+	%	R+	%	P+	%
Inked (n=427)	18	4.2	7	1.6	0	0	0	0	0	0	0	0
Pierced (n=1552)	38	2.4	18	1.2	3	0.2	1	0.1	2	0.13	1	0.1
Inked and pierced (n=627)	2	4.3	15	2.4	0	0	0	0	0	0	0	0
TOTAL	83	3.2	40	1.5	3	0.1	1	0.04	2	0.08	1	0.04

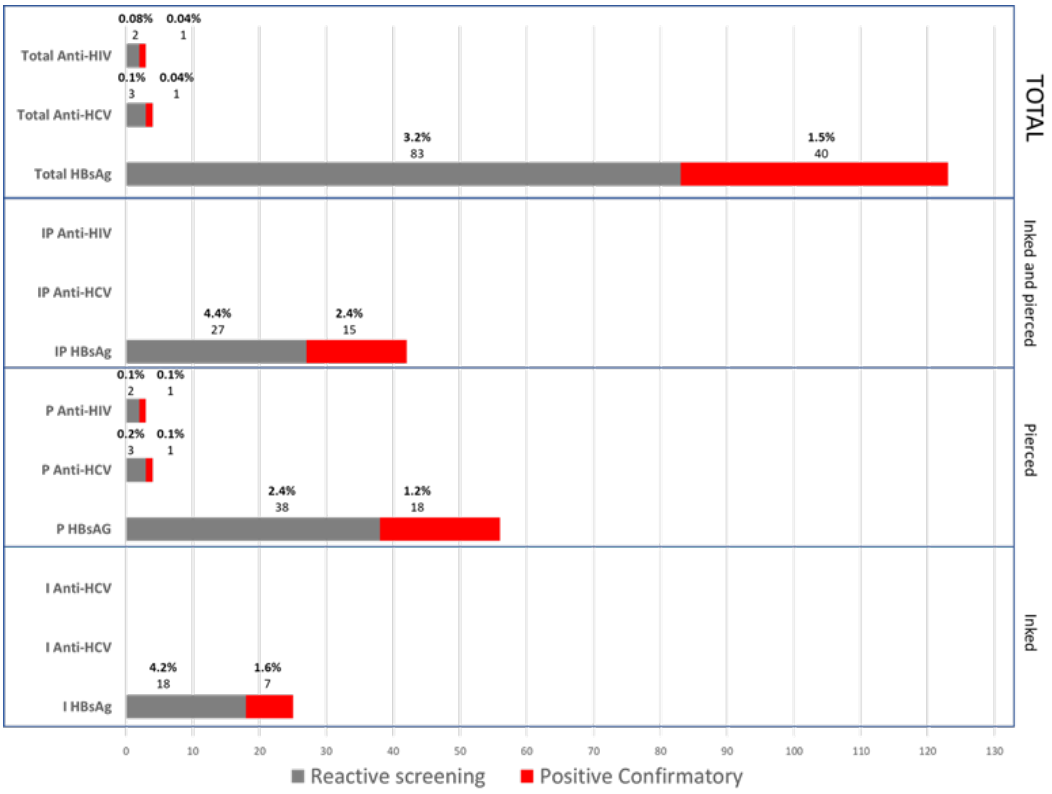

Figure 2 Graph of reactive screening and positive confirmatory results of inked and/or pierced voluntary blood donors (n=2606). Only 48% (42/88) of the reactive blood samples were subjected to confirmatory testing. **I** Inked; **P** Pierced; **IP** Inked and pierced.

Discussion

The steady increase of VBD at TMC from 2015 (1559) to 2018 (4538) (only 3 months data was retrieved for 2014) (Figure 1a) was perhaps due to the modified implementation of the donor recruitment and selection procedure by the Department of Health Manual on Blood Donor Selection and Counselling. The policy required individuals with tattoo/s and/or body piercing/s to be deferred for one year after their last inking/piercing

session. Unfortunately, this discourages potential blood donors, most of which never come back. This has a big impact on the blood donation program of TMC because many of the potential blood donors coming from Tondo, Malabon, Navotas, Caloocan, and Valenzuela areas have tattoo/s and/or body piercing/s. This is evidenced by the VBD profile of being inked and/or pierced as comprising 22% of the total VBD population (Figure 1b). Therefore, the Department of Pathology and Laboratory Blood Bank staff have proposed to accept inked and/or pierced VBD, subject to complete medical history, thorough physical examination, and simultaneous screening for HBV, HCV, and HIV. Also, the present study is part of this initiative for outcomes and impact evaluation of the said modified protocol.

The age 18-30 years (58.5%) comprised the highest distribution of inked and/or pierced VBD. This may imply that in the Philippines, young adults tend to wait until their legal age before having tattoo/s and/or body piercing/s. Also, there were far more inked and/or pierced males (almost 80%) than female VDB. The Philippines, presently, has an almost equal male (50.238) to female (49.462) ratio [13]. Although pain may be a determinant for females to engage less in being inked and/or pierced, and being conservative is still perceived as a virtue in the country, this aspect requires further exploration [14].

The most well-documented TTI implicating tattoos are HBV and HCV. Individuals with HBV and HCV are 5% and 80% likely, respectively, to become chronic carriers. More importantly, mortality in chronic carriers was reported at 20% due to cirrhosis and 1-2% following hepatocellular carcinoma [3]. The Philippines is considered an endemic country for HBV infection with low income as a predictor for infection [3,15,16]. A meta-analysis submitted a strong association between HBV transmission and tattoo procedure with subgroup analysis showing strongest to weakest association among high-risk groups, community, hospital, and prison samples [17]. The overall prevalence of our single-government-hospital-based screening for anti-HBsAg among inked and/or pierced VBD was at 3.2% and was highest (4.3%) among those with both tattoo/s and body piercing/s (Table 1 and Figure 2). This was well below the 2013 national survey of 16.7% (peak at 20-39 years of age) [3]. It is of interest, however, as to what portion of the 16.7% of HBV infected adults were inked and/or pierced. A 2005 local study reported a 4-fold increased risk of HBV infection in people with a history of tattoos. This is of concern along with other bloodborne infections because of the increasing popularity of tattoos among young people in the country. This requires approaches to reaching out to both professional and non-professional tattoo practitioners to never reuse needles and always use sterilized equipment and implements [3].

Several studies reported a dose-response relationship between tattooing and the risk of HCV transmission [18-20]. The risk of HCV infection increases with increased skin surface area tattooed including the number of tattoos received [17]. In the present study, only VBD with body piercing/s had reactive anti-HCV results (0.2%) (Table 1 and Figure 2). This was much lower than HCV infection among blood donors in Metro Davao (2.2%),21 Metro Manila inmates (4.6%), and intravenous drug users (70%) in the country [22,23]. Perhaps the strict and thorough medical screening employed by TMC in qualifying inked and/or pierced individuals as potential VBD without 1-year deferral have contributed to this lower rate of both anti-HBsAg and anti-HCV reactivity, but further study is recommended for its confirmation.

The Philippines has an alarming growth of HIV cases globally with a 203% increase from 2010 to 2018 [24]. The average number of newly diagnosed HIV cases per day from 2011, 2016, 2020, and 2021 have steadily increased from 6, 25, 22, and 31, respectively [25]. HIV cases in the country have been increasing because of a new drug-resistant strain. A shift from the Western subtype B to a more aggressive subtype AE has driven this dramatic increase in local HIV cases where the Department of Health reported 11,103 new cases in 2017, a 20% increase from 2016 cases [26]. Compared to 2002 to 2004 hospital-based prevalence of HIV (0.0006%),5 the anti-HIV reactivity of VBD from TMC for roughly 5 years was higher (0.1%) (Table 1 and Figure 2) and is supporting evidence of the growing HIV cases in the Philippines.

Literature shows that 7–18% of HBV infections were co-infected with HCV [27-29]. Similarly, a significant population of HIV patients was co-infected with HBV

and/or HCV [30-33]. From 2002 to 2004, screening of HBV, HCV, and HIV among hospital-based blood donors in the Philippines was at 4.2%, 0.3%, and 0.006% [5]. Only 48% of Anti-HBsAg, Anti-HCV, and anti-HIV reactive results from inked and/or pierced VBD were confirmed (Table 1 and Figure 2) following a limited supply of confirmatory tests. This is one case-in-point of the importance of the adequate allocation of financial resources and logistics in the battle against HBV, HCV, and HIV transmission.

Complete data retrieval such as but not limited to age, sex, and purpose for testing among VBD, have been long-standing challenges in the country. These may be due to unreadable handwriting and a lack of declared data [5]. Other reasons that possibly contribute to these limitations include but are not limited to the focused attention of attending health professionals on the accomplishment of VBD screening forms, dedicated storage space, and the number of years of archiving relevant documents and encoding into digital platforms. Policies covering these areas require revisiting to safeguard VBD information as retrospective data provides important, if not the necessary information in the formulation of improved policies and inceptive ones that may address arising or impending concerns. Also, we suggest that information on VBD and replacement blood donors (RBD) be separated so clear information can be drawn on the adherence of healthcare institutions in employing the RBD policy. This will enable monitoring of source (VBD or RBD) and further data gathering on incoming blood units.

Additional blood banks and increased awareness drives on the importance of voluntary blood donation still require national attention. The provision of RBD for utilized blood units instead of selling blood units at cost (without the provision of RBD) has been strongly advocated by key officials from the Philippine Red Cross [1]. In addition, increased research and dissemination of findings on the influence of tattoos and/or body piercings on the national blood supply are essential in increasing the availability and sustainability of safe blood as hallmarks of an effective health system [1].

The WHO Global Health Sector Strategy on Viral Hepatitis 2016–2021 is a framework where local strategies for eradication can be built upon [34]. In all countries, strategic plans and policy goals require tangible resources and measurable actions for a sustainable response against the rising burden of HBV and HCV [9]. Although the Philippines was a pioneer in passing an AIDS law against discrimination in 1998, stigma, discrimination, and politics have been speculated as possibly strong drivers of the persistence of HIV [24]. This requires a multi-faceted approach in advocating awareness, education, training, prophylaxis, treatment, and reevaluating national policies and also requires delving into the psyche and aspects of human rights for both the infected and the general population [35]. Addressing these concerns is far more challenging than coordinating national or international prevalence surveys.

Despite common stereotypes of criminal past or risky behaviors, the tattoo has become an acceptable form of body art, individual, and cultural expression, as well as a defining aspect of the millennial generation in honoring significant aspects in their lives [36-38]. However, if practiced without employing health protocols, a wide spectrum and degree of complications might arise [9]. Senate bill no. 1126 of the first regular session of the fifteenth congress of the Republic of the Philippines was passed as an act known as “Tattoo Patrons Protection Act of 2010”. Some sections of this act include a Declaration of policy which ensures the safety of clients against health risks (Section 2), License requirement (Section 2), Duty to inform and advise patron of the health risks (Section 4), Standard procedures (Section 6), Use of non-toxic and sterile dyes (Section 7), Sterilization of needles (Section 8), and Precautions to prevent post-procedure infection (Section 9). Section 10 (Prohibited acts) states that it is unlawful for any person to perform tattoo work on any person under the influence of drugs or alcohol, pregnant or nursing women, any person with a contraindicated skin condition, and any person incapable of giving consent due to mental incapacity [39]. Revisiting and evaluating the enforcement of this act is integral in mitigating the spread of bloodborne infections and ensuring that inked and/or pierced individuals are free of TTI thereby providing a sustainable population of VBD in the country. In 2018, the Committee on Health of Cagayan de Oro City sought the

help of the DOH to address the concern of the reuse of needles in tattoo procedures [40]. Perhaps clear provisions on inspection schedules of tattoo and piercing shops conducted by authorized health protection units from the government and private sector can improve existing guidelines [17,41]. Society as a whole should be educated on the high prevalence of bloodborne infections in the country. Clear information on risks and the life-long benefits of vaccination against chronic HBV infection should be robustly communicated [41]. The wide reach of mass and social media should be exploited to its fullest in delivering easy-to-digest health information for the public. To date, unregulated back street and in-house tattooing and body piercing remain a prevalent practice, especially among the low-income and inmate populations.

To the best of our knowledge, this is the first report on the prevalence of HBV, HCV, and HIV from inked and/or pierced VBD from the Philippines.

Conclusion

VBD with tattoo/s and/or body piercings subject to strict and thorough medical screening without one-year deferral demonstrated low reactivity to Anti-HBsAg, Anti-HCV, and Anti-HIV. However, HIV screening and confirmation were above reported national prevalence. These are evidence of the propensity of HBC and HCV infection, and the growing cases of HIV in the Philippines. Difficulty in data retrieval and logistics for confirmatory testing are some of the present-day challenges requiring intervention by the national healthcare system.

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