

Seroconversion related to Human T-Cell Lymphotropic Virus (HTLV) in a blood bank: a bibliometric study

Soroconversão relacionada ao Vírus Linfotrópico de Células T Humanas (HTLV) em banco de sangue: um estudo bibliométrico

Seroconversión relacionada con el Virus Linfotrópico de Células T Humana (HTLV) en banco de sangre: un estudio bibliométrico

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Allan Carlos da Silva Tiago

ORCID: <https://orcid.org/0000-0002-0041-4161>
Universidade do Estado do Pará, Brazil
E-mail: pharma.allan@gmail.com

Luana Joana Barreto Cabral

ORDID: <https://orcid.org/0000-0002-1060-9317>
Universidade do Estado do Pará, Brazil
E-mail: luanajbcabral@gmail.com

Jacqueline da Silva Quintal

ORCID: <https://orcid.org/0000-0001-6595-7696>
Universidade do Estado do Pará, Brazil
E-mail: jacquelinequin@hotmail.com

Juliane de Lima Cruz

ORDID: <https://orcid.org/0000-0002-8757-970X>
Universidade do Estado do Pará, Brazil
E-mail: Julianelimacruz@gmail.com

Jean Espindola Pinheiro

ORDID: <https://orcid.org/0000-0003-0609-0927>
Universidade do Estado do Pará, Brazil
E-mail: jeanepindolap@gmail.com

Rubnilson Caldas Valois

ORCID: <https://orcid.org/0000-0001-9120-7741>
Universidade do Estado do Pará, Brazil
E-mail: rubnilsonvalois@ig.com.br

Abstract

The first human retrovirus isolated was the Human Cell Lymphotropic Virus (HTLV), belonging to the Retroviridae family, which infects TCD4+/TCD8+ cells. In a blood bank, seroconversion of donors by this virus is investigated by blood surveillance and some studies have shown that, despite the reduction of transfusion-transmitted diseases, the rate of seroconversion has increased. *Aim:* To define the portfolio of articles on HTLV seroconversion in blood banks. *Methodology:* This documentary-based study is based on bibliometric methodology, which uses quantitative scientific analysis methods. Data collection for this article was carried out in October and November 2021, in the Web of Science database, a platform that provides a wide range of scientific data for many academic disciplines. *Results And Discussions:* A low incidence of seroconversion to HTLV, either type 1 or 2, was found in blood banks. The authors described that the seroconversion rate is not high due to the methods used as barriers to transfusion safety, which are the clinical, serological, and immunological screening, methodologies used and standardized in all blood banks. *Conclusion:* This study allows us to help the scientific community with a documentary portfolio on the subject through mathematical and statistical aspects, the bibliometric indexes.

Keywords: Bibliometrics; Seroconversion; Lymphotropic virus; Blood bank, Prevalence.

Resumo

O primeiro retrovírus humano isolado foi o Vírus Linfotrópico da Célula Humana (HTLV), pertencente à família *Retroviridae*, o qual age infectando as células TCD4+/TCD8+ do organismo. Em um banco de sangue, a soroconversão dos doadores por esse vírus é investigada pela hemovigilância e alguns estudos têm demonstrado que, apesar da redução de doenças transmitidas por transfusão, o índice de soroconversão tem crescido. *Objetivo:* Definir o portfólio de artigos referentes ao tema sobre soroconversão do HTLV em banco de sangue. *Metodologia:* O referido estudo de base documental, baseia-se na metodologia bibliométrica, que possui métodos de análises científicas quantitativas. A coleta de dados para elaboração do artigo foi realizada no período de outubro e novembro de 2021, na base de dados *Web of*

Science, plataforma que fornece uma abrangência de dados científicos para muitas disciplinas acadêmicas. *Resultados E Discussões*: Constatou-se uma baixa incidência de soroconversão para HTLV, seja do tipo 1 ou 2, em banco de sangue. Os autores descreveram que o índice de soroconversão não é elevado devido aos métodos usados como barreiras para segurança transfusional, sendo eles a triagem clínica, sorológica e imunológica, metodologias essas utilizadas e padronizadas em todos os bancos de sangue. *Conclusão*: O presente estudo nos permite auxiliar a comunidade científica com um portfólio documental obre a temática através de aspectos matemáticos e estatísticos, os índices bibliométricos. **Palavras-chave**: Bibliometria; Soroconversão; Vírus linfotrópico; Banco de Sangue, Prevalência.

Resumen

El primer retrovirus humano aislado fue el Virus Linfotrópico de las Células Humanas (HTLV), perteneciente a la familia Retroviridae, que actúa infectando las células TCD4+/TCD8+ del organismo. En un banco de sangre, la seroconversión de los donantes por este virus es investigada por la hemovigilancia y algunos estudios han demostrado que, apesar de la reducción de las enfermedades transmitidas por transfusión, la tasa de seroconversión ha aumentado. *Objetivo*: Definir la cartera de artículos sobre la seroconversión del HTLV en los bancos de sangre. *Metodología*: Este estudio documental se basa en la metodología bibliométrica, que utiliza métodos de análisis científico cuantitativo. La recopilación de datos para este artículo se llevó a cabo en octubre y noviembre de 2021, en la base de datos Web of Science, una plataforma que proporciona una amplia gama de datos científicos para muchas disciplinas académicas. *Resultados Y Discusiones*: Se observó una baja incidencia de seroconversión al HTLV, tanto del tipo 1 como del 2, en los bancos de sangre. Los autores describieron que la tasa de seroconversión no es alta debido a los métodos utilizados como barreras para la seguridad transfusional, que son el cribado clínico, serológico e inmunológico, metodologías utilizadas y estandarizadas en todos los bancos de sangre. *Conclusión*: El presente estudio permite ayudar a la comunidad científica con un portafolio documental sobre el tema a través de aspectos matemáticos y estadísticos, los índices bibliométricos.

Palabras clave: Bibliometría; Seroconversión; Virus linfotrópico; Banco de sangre, Prevalencia.

1. Introduction

The Human Cell Lymphotropic Virus (HTLV) was the first human retrovirus isolated and has four classifications, the prevalent ones with clinical and epidemiological importance being the HTLV-I and HTLV-II types. It belongs to the Retroviridae family and infects the body's defense cells, the TCD4+/TCD8+ lymphocytes. It has three transmission routes, vertical (from mother to newborn), sexual (sex without a condom), and parenteral (sharing syringes, needles, sharps, tattoos, scarification), and can be transmitted by blood transfusion (Cook et al., 2017; Martinez et al., 2019).

Although the contamination of infectious agents by blood transfusion is possible, its occurrence has been decreasing over the years because of the mandatory screening, diagnosis, and introduction of leukocyte depletion in blood banks (Caterino-de-araujo, 2021; Hewitt et al., 2013). Allied to this, in some studies, it is shown that even with the reduction of transfusion-transmitted diseases, the rate of seroconversion has increased, due to the scope of the actions of hemovigilance, a sector that aims to improve and expand hemotherapeutic safety through the investigation of undesirable and/or unexpected effects throughout the transfusion process (Da Silva Garcia & Hennington, 2019; Iwanaga, 2020).

Seroconversion occurs when the repeat donor who had previously tested negative/unreactive, starts to present some positive/reagent result for some serological marker in his last donation (Brazil, 2016). Brazil has the largest number of HTLV cases in the world. According to the Ministry of Health 2021, almost 2 million people are infected. Within a blood bank/hemocenter, the rate of donors developing anti-HTLV-1/2 antibodies has been growing, thus increasing the HTLV seroconversion statistics. And although serological screening does not have complete sensitivity, it contributes to transfusion safety (Brazil, 2017; Brazil, 2020).

Thus, this study was based on the PICo strategy (P: population/patient; I: intervention; C: comparison/control; O: outcome/outcome), and the following question was formulated: What are the bibliometric indicators of scientific production available in databases that address the seroconversion of blood donors for HTLV? In addition, it also aimed to demonstrate the occurrence of seroconversion of blood donors for HTLV through bibliometric parameters (Brown, 2020; Palareti et al., 2016).

2. Methodology

This documentary-based study is based on the bibliometric review type, which has quantitative scientific analysis methods, based on the PICO strategy (population: blood donors; intervention: to analyze whether transfusion screening methods are effective; comparison: seroconversion and blood recipients who acquired HTLV through transfusion methods; and outcome: seroconversion and contamination through transfusion methods) (Palareti et al., 2016; Pitanga, 2020; Turato, 2005).

The active search in scientific documents/bases to conduct this bibliometric review aims to point out relevant articles covering the topic to collaborate in the advancement of scientific dissemination. Thus, the research began during the systematic review course of the multi-professional residency program in hematology and hemotherapy at the University of the State of Pará, in September. Data collection for this article was carried out in October and November 2021, in the online database Web of Science, a platform that presents a wide range of scientific data for various areas of knowledge.

To search for articles, the following search keys were used: TS = (HTLV OR "human lymphotropic virus") AND TS = ("Blood Center" OR "Blood donors"), using Boolean truncation operators between the terms. We selected the most cited articles related to the theme, based on the following inclusion criteria: 1) availability of complete articles in scientific journals in the established period and 2) use of search terms in the titles or abstracts, 3) in Portuguese, English or Spanish and 4) articles with more than 100 citations. The exclusion criteria were: monographs, duplicate articles, dissertations, theses, and articles with citations below 100. After the selection, the articles were tabulated and consolidated in Microsoft Excel®.

Through this, bibliometric reviews help the scientific community through mathematical and statistical aspects, thus generating indicators in specific areas of knowledge with the help of documentary searches. They have three guiding laws: Bradford's law, which aims to demonstrate the relevance, quality, and quantity of production of journals in certain areas of concentration. Lotka's law aims to analyze the prestige of authors in a specific area of knowledge, demonstrating their production index. And Zipf's law is based on mathematics and linguistics that analyzes and quantifies how words are distributed within a given text (Guedes & Borschiver, 2005; Rodrigues & Godoy Viera, 2016).

In addition to all this, this study followed the scientific norms required for elaboration and peer review. Since this is a bibliometric review, there is no direct involvement with human beings, thus, the approval by the Ethics Committee (CEP) was waived. The authors also declare no conflicts of interest.

3. Results and Discussions

Forty-four articles were found, after the parameters established in the inclusion criteria, selecting only seven studies relevant to the theme of this research. Table 1 shows a ranking of the most cited articles according to authorship, title, year, and citations.

Table 1 - The rank of most cited articles according to the title, author, year, and citation density.

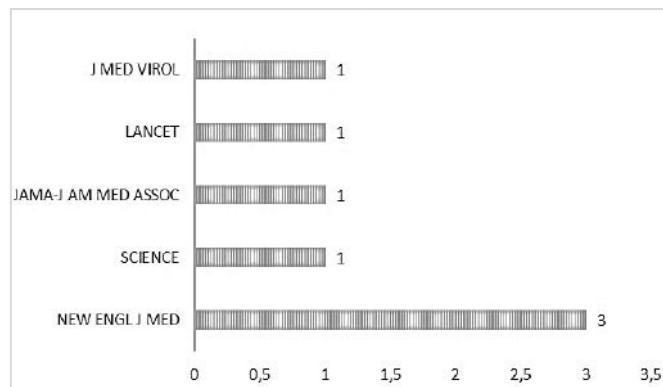
Rank	Author	Article Title	Years	Times Cited, All Databases	No. of citation (Scopus)	No. of citation (Google Scholar)	Citation Density (Cite per Year)
1	Schreiber, G. B. et al.,	The Risk Of Transfusion-Transmitted Viral Infections	1996	1685	1565	2332	80,23
2	Lee, H. H. et al.,	Relative Prevalence And Risk-Factors Of Htlv-I And Htlv-Ii Infection In United-States Blood-Donors	1991	1435	12	152	67,40
3	Zou, S.M. et al.,	Probability Of Viremia With HBV, HCV, HIV, And HTLV Among Tissue Donors In The United States	2004	751	158	225	47,83
4	Williams, A. E. et al.,	Seroprevalence And Epidemiological Correlates Of Htlv-I Infection In United-States Blood-Donors	1988	643	205	321	44,18
5	Schorr, J.B. et al.,	Prevalence Of Htlv-Iii Antibody In American Blood-Donors	1985	384	99	158	19,48
6	Satake, M. et al.,	Current Prevalence Of HTLV-1 In Japan As Determined By Screening Of Blood Donors	2012	327	122	171	10,67
7	Glynn, S.A. et al.,	Trends In Incidence And Prevalence Of Major Transfusion-Transmissible Viral Infections In US Blood Donors, 1991 To 1996	2000	229	223	386	36,33

Note: The table presents a ranking, in descending order, of total citation numbers collected from the Scopus and Google Scholar databases. No = number. Source: *Web of Science* (2021).

Given these results, it can be seen that there is a lack of productions related to the proposed theme. This possibly comes from the lack of scientific interest in the theme of the study, as presented by the low rates of citations. It was noted that the prevalence of investigations occurred between 1985 and 2012, due to the lack of knowledge about the pathology, the need to investigate the disease, and due to the non-mandatory nature of preventive actions that resulted in a high rate of contaminated transfusion infusions.

Figure 1 shows the distribution and representativeness of the publications in the journals. It was found that most of the analyzed articles were published in New Engl. J Med. This multidisciplinary journal is very relevant to the scientific society, thus showing that there is an interest in investigating this theme.

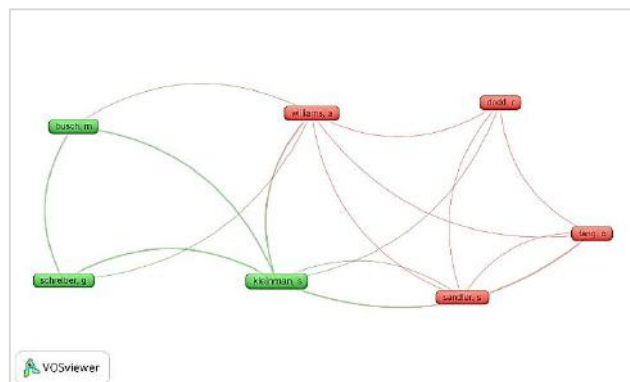
Figure 1 – Quantity of articles in the selected journals.



Source: *Web of Science* (2021).

This bibliometric review study was also able to bring knowledge regarding researchers investigating infectious agents transmitted by blood transfusion. As an example, we have the virologist Schreiber, who has been studying since 1985 the risks of contamination and describes the benefits of serological screening and its effectiveness. Also, in Figure 2 we can see the main authors cited among the scientific community related to the theme studied. In this niche of authors, Williams stands out, correlating between 1988 to 2012. Therefore, he is also a reference author when it comes to donor seroconversion.

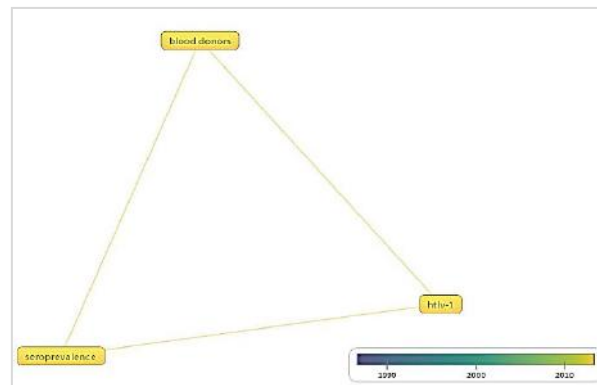
Figure 2 - Authors with the highest citation index.



Source: *Web Of Science* (2021).

It was noticed that, in two decades, the most used words for bibliographical research were: seroprevalence, blood donors, and HTLV-1. HTLV-1 is the most common, and therefore the most researched, as shown in Figure 3.

Figure 3 - Most used keywords.



Source: Web Of Science (2021)

Based on the findings resulting from the keywords, it was found that the incidence of seroconversion to HTLV, whether type 1 or 2, has a low index in blood banks. In the 80s, Williams demonstrates that the seroprevalence rate varies from 0 to 0.10% of the public, thus describing that the population that most seroconverts is from endemic regions and people who use venous drugs or have sexual contact with people who use these drugs. After a few years, Schreiber confirms the previous studies and describes that the prevalence of seroconversion to HTLV is 1 in every 641,000 donors. Lee corroborated the study of the previous authors and classified this population. Endemic regions tend to seroconvert to HTLV-1 and donors who use intravenous drugs seroconvert to HTLV-2.

The authors described that the seroconversion rate is not high due to the methods used as barriers to transfusion safety, which are the clinical, serological, and immunological screening, methodologies used in all blood banks. The importance of these tools was emphasized, assuring the recipient of any risk of infection. Another point emphasized was donor counseling, a tool used in clinical screening, which also resulted in a low number of socio-conversion in one region of the United States. Many donors have no knowledge and assume that the donation is done anyway, others are unaware of the pathology, mainly due to the low recurrence of disclosure.

4. Conclusions

The bibliometric indexes brought knowledge and improvement about seroconversion and human T-cell lymphotropic virus in blood donors and showed that the continuous and long-lasting process concerning transfusion safety has been effective. The analysis showed the benefits that serological screening has. It also showed which population and region of donors most seroconvert to HTLV in some countries around the world. Thus, it brings relevant data that will collaborate in the training of professionals involved in other blood centers and blood banks, especially in clinical screening and as informative material for donors and blood recipients. However, studies that address this issue need to be carried out continuously to make the recipient population aware that blood transfusion has strict and safe methods with continuous performance made by the hemovigilance.

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