

## Pharmacological Interrelationship Analysis between *Terminalia chebula* and HIV: A Pathway Analysis

Pathum Sookaromdee<sup>1</sup>, Viroj Wiwanitkit<sup>2</sup>

<sup>1</sup>Private Academic Consultant, Bangkok Thailand

<sup>2</sup>Honorary professor, Dr DY Patil University, Pune, India

---

**ABSTRACT:** Background: It's intriguing to learn about the various ways traditional plants can be used to treat medical issues. Many studies are being undertaken to see how traditional herbal fruits can help with a variety of medical conditions, including immunodeficiency syndrome.

Methods: We employed network pharmacology to discover a biological link between the pharmacological effects of myrolan wood or Haritaki or *Terminalia chebula*, a traditional Asian medicinal fruit, and HIV pathogenesis in this study.

Results: The scientists discovered the common pathway by blocking reverse transcriptase using interrelationship analysis.

Conclusion: *Terminalia chebula* as an HIV treatment could be beneficial. More investigation into the usefulness of myrolan wood fruit in the treatment of HIV is recommended.

**KEY WORDS:** HIV, myrolan wood, fruit

---

### INTRODUCTION

It's intriguing to learn about the various ways traditional rituals might be used to treat medical issues. Many research are currently being undertaken to determine the benefits of traditional herbs for a number of medical conditions, including immunodeficiency syndrome. Infection with the human immunodeficiency virus (HIV) is still a major public health concern all over the world. Alternative HIV therapy is a hot topic in clinical research right now [1–2].

Alternative medicine is a trendy topic right now, with a lot of research going on. A variety of unusual alternative cures have been presented. The use of herbal medicine will be discussed at length. Several well-known Asian remedies, including medicinal fruits, are being studied for their potential involvement in HIV treatment. In this study, we used network pharmacology to discover a biological relationship between the pharmacological impact of myrolan wood (*Terminalia chebula*), a traditional Asian medicinal fruit [3], and the pathophysiological process of HIV, a major worldwide health concern at the moment. Using interrelationship analysis, the authors were able to demonstrate a comparable route by causing reverse transcriptase blockage. It's possible that treating HIV with *Terminalia chebula* will be useful.

### MATERIALS AND METHODS

This study is part of a larger examination into the effectiveness of traditional herbal HIV treatments. This research is focused on clinical informatics. The biological process network inquiry has come to a conclusion. The network pharmacology approach is used to explore the influence of myrolan wood, a traditional Asian herbal fruit, on the pathophysiological process of HIV, an important infection that causes immunodeficiency problem [4]. Direct database mining using standard international databases such as PubMed and SCOPUS revealed biological processes involving *Terminalia chebula* and HIV. The in silico bioinformatics technique employed in this investigation was the same as in the previous work [5].

The data for this in silico medical informatics study was gathered from a number of different databases around the world. First, standard databases were searched for published data on *Terminalia chebula*'s pharmacobiological effects and HIV's pathophysiological consequences. As international databases, PubMed ([www.pubmed.com](http://www.pubmed.com)) and Scopus ([www.scopus.com](http://www.scopus.com)) were employed ([www.scopus.com](http://www.scopus.com)). The key terms "HIV" and "*Terminalia chebula*" were used to discover papers for further research. All of the publications that come out of it look into pathogenic and pharmacological pathways. The pathological/pharmacological processes that surfaced as a result of the paper recruitment were compiled and used to undertake a more detailed examination of interrelationships.

A common patho-pharmacological pathway was originally established for interrelationship analysis. The approach is based on bioinformatics analysis, which involves discovering exact matches of pathological/pharmacology processes reported in the

## Pharmacological Interrelationship Analysis between *Terminalia chebula* and HIV: A Pathway Analysis

literature. *Terminalia chebula* and HIV's pharmacological and pathophysiological processes were evaluated, and a common pathway was discovered using a conventional method [5].

In order to uncover analogous biological pathways, the pharmacological activities of *Terminalia chebula* were compared to the pathogenic actions of HIV. HIV and *Terminalia chebula* share a node in their cross processes. The selected common node is utilized to form the final interrelationship network by attaching it to additional nodes. After the final establishment of the common pathway with common node connection, the network pathway diagram depicting the association between pathological/pharmacology processes and HIV is derived. The conclusion is based on the final network pathway diagram generated by the previously mentioned in silico network research.

### RESULTS

The findings show that reverse transcriptase is a common link between *Terminalia chebula*'s pharmacological and pathogenic processes and HIV. Figure 1 depicts the completed interrelationship network after comprehensive interrelationship network investigation.

### DISCUSSIONS

Bioinformatics clinical pharmacology network analysis can be used to assess traditional herbal regimens [6–8]. The method is based on informatics analysis, which includes path discovery, identification of common nodes, rearrangement, and finally the development of an interrelationship network. In previous research [5, 9–10], this was the standard clinical informatics analysis. In this short exploratory experiment, the authors conduct a preliminary assessment of the efficacy of myrolan wood, a well-known traditional fruit, in the treatment of HIV.

In therapeutic pharmacology, myrolan wood fruit is a well-known Asian plant. In theory, the fruits were used to improve immune function that had been harmed by cancer or chemotherapy [11]. The fruit may be used to treat a variety of illnesses. It has been thoroughly examined and validated for its efficacy in the treatment of immunodeficiency disorders. *Terminalia chebula* became a commonly utilized local medicine in a variety of contexts after it was repositioned for the treatment of immunological disorder problem. For HIV therapy, there are some trials indicating for possible usefulness of Myrolan wood [12 - 14].

Myrolan wood fruits disturb mitochondria membrane potential, according to the present informatics study, and HIV has a pathogenic route linkage at reverse transcriptase. Myrolan wood is proven for ability to block reverse transcriptase [14]. HIV viruses transform their RNA genomes into DNA using reverse transcriptase (RT), a virally encoded enzyme [15]. In retroviral replication, reverse transcription is required [15]. Myrolan wood, on the other hand, will not be a viable HIV treatment option unless scientific evidence supports it. More in vitro and in vitro research is needed to enable early in silico assessment. As a result, more in vitro and in vivo testing is required in this study, which is essentially an in silico analysis, a common bioinformatics technique. However, as previously noted, there is no evidence of the herb's specific therapeutic efficacy for HIV therapy based on data from a standard clinical trial.

Myrolan wood fruit extracts, according to a recent study, may have a medicinal impact. To support the early in silico examination, more in vitro and in vitro research is required. As a result, in this work, which is essentially an in silico analysis, a popular bioinformatics technique, more in vitro and in vivo testing is required. However, as previously stated, there is no data from a normal clinical trial to back up the herb's precise therapeutic efficacy for HIV therapy. According to the current informatics study, myrolan wood fruits can cause mitochondria membrane potential loss, and HIV has a pathogenic pathway that involves mitochondria membrane potential. Myrolan wood, on the other hand, will not be a successful traditional herb for HIV treatment until scientific data supports it. To support the early in silico examination, more in vitro and in vitro research is required. As a result, more in vitro and in vivo testing is required to arrive at a final results in this study, which is essentially an in silico analysis, which is a popular bioinformatics technique. However, no supporting evidence from a normal clinical trial exists to confirm the herb's precise therapeutic effectiveness for HIV therapy, as previously stated. The current paper is a research project on a medicinal fruit..

### CONCLUSION

Through a node at reverse transcriptase, the pathogenic process of HIV and the therapeutic process of *Terminalia chebula* are related. It demonstrates that *Terminalia chebula* possesses pharmacological qualities that could aid in HIV treatment. As a result, *Terminalia chebula* could be a promising HIV treatment. The study's results, on the other hand, are based on bioinformatics projections. In order to obtain a credible and acceptable result, further research is required due to the limitations imposed by the nature of in silico analysis. As a result, more research into *Terminalia chebula*'s application in HIV therapeutic treatment is required.

### List of abbreviations

HIV: human immunodeficiency virus

### Conflict of interest

None

### REFERENCES

1. Akram M, Tahir IM, Shah SMA, Mahmood Z, Altaf A, Ahmad K, Munir N, Daniyal M, Nasir S, Mehboob H. Antiviral potential of medicinal plants against HIV, HSV, influenza, hepatitis, and coxsackievirus: A systematic review.. *Phytother Res.* 2018 May;32(5):811-822.
2. Lorenc A, Robinson N. A review of the use of complementary and alternative medicine and HIV: issues for patient care. *AIDS Patient Care STDS.* 2013 Sep;27(9):503-10.
3. Nigam M, Mishra AP, Adhikari-Devkota A, Dirar AI, Hassan MM, Adhikari A, Belwal T, Devkota HP. Fruits of *Terminalia chebula* Retz.: A review on traditional uses, bioactive chemical constituents and pharmacological activities *Phytother Res.* 2020 Oct;34(10):2518-2533.
4. Belapurkar P, Goyal P, Tiwari-Barua P. Immunomodulatory effects of triphala and its individual constituents: a review. *Indian J Pharm Sci.* 2014 Nov-Dec;76(6):467-75.
5. Sriwijitalai W and Wiwanitkit V. Effect of ginseng against tuberculosis: A pathway interrelationship analysis. *Biomed Biotechnol Res J* 2019;3:120-125
6. Yuan H, Ma Q, Cui H, Liu G, Zhao X, Li W and Piao G. How can synergism of Traditional Medicines Benefit from Network Pharmacology? *Molecules* 2017;22(7). pii: E1135.
7. Li S and Zhang B. Traditional Chinese medicine network pharmacology: theory, methodology and application. *Chin J Nat Med* 2013;11:110-120.
8. Hao da C and Xiao PG. Network pharmacology: a Rosetta Stone for traditional Chinese medicine. *Drug Dev Res* 2014;75:299-312.
9. Yasri S and Wiwanitkit V. Protein tyrosine phosphatase, opisthorchiasis and HIV: A proteomics interrelationship. *J Vector Borne Dis* 2018;55:245.
10. Wiwanitkit V. Cancer immunomics and application of 'omics' for cancer management. *Expert Rev Clin Immunol* 2007;3:807-812.
11. Baliga MS. Triphala, Ayurvedic formulation for treating and preventing cancer: a review. *J Altern Complement Med .* 2010 Dec;16(12):1301-8.
12. Mishra NN, Kesharwani A, Agarwal A, Polachira SK, Nair R, Gupta SK. Herbal Gel Formulation Developed for Anti-Human Immunodeficiency Virus (HIV)-1 Activity Also Inhibits In Vitro HSV-2 Infection. *Viruses.* 2018 Oct 24;10(11):580
13. Ahn MJ, Kim CY, Lee JS, Kim TG, Kim SH, Lee CK, Lee BB, Shin CG, Huh H, Kim J. Inhibition of HIV-1 integrase by galloyl glucoses from *Terminalia chebula* and flavonol glycoside gallates from *Euphorbia pekinensis*. *Planta Med.* 2002 May;68(5):457-9.
14. el-Mekkawy S, Meselhy MR, Kusumoto IT, Kadota S, Hattori M, Namba T. Inhibitory effects of Egyptian folk medicines on human immunodeficiency virus (HIV) reverse transcriptase. *Chem Pharm Bull (Tokyo).* 1995 Apr;43(4):641-8.
15. Hu WS, Hughes SH. HIV-1 reverse transcription. *Cold Spring Harb Perspect Med.* 2012 Oct 1;2(10):a006882.

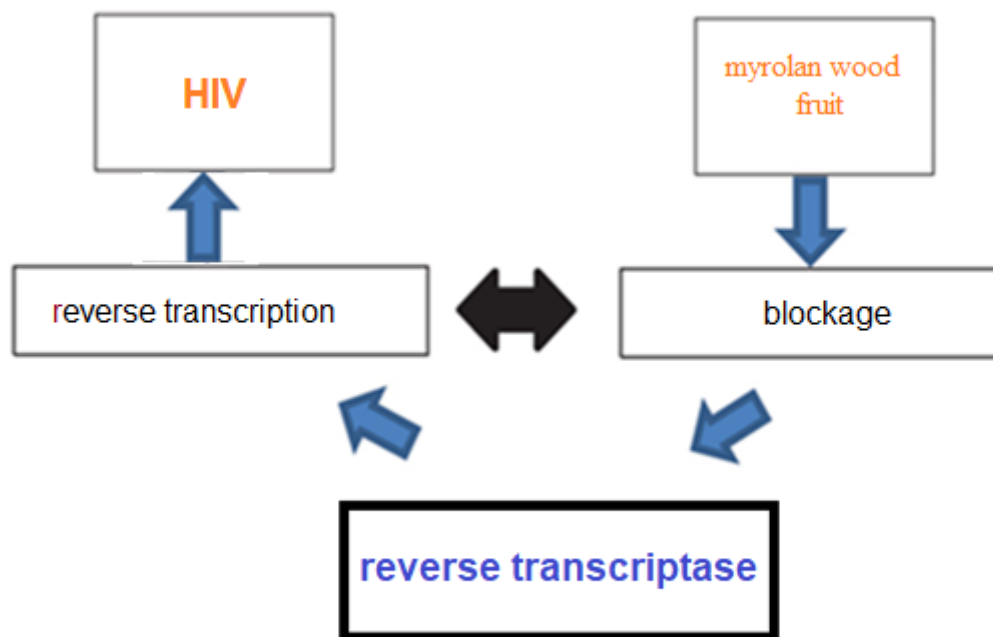


Figure 1. Interrelationship network showing the association between pharmacological process of *Terminalia chebula* and pathophysiological process of HIV at with common interrelationship at reverse transcriptase.