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Mini Review Article

Characterizing Approaches and Research Methods for Traditional Chinese Medicine Syndrome Differentiation and Treatment in Chronic Liver Diseases

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Abstract

TCM syndrome (a.k.a., ZHENG or Zheng-Hou) is the foundation of clinical diagnoses and treatments for chronic liver diseases (CLDs) in traditional in Chinese medicine (TCM). This Mini-Review introduces research approaches and methods for TCM syndrome differentiation and treatment, including Top-Down, Bottom-Up and Integration approaches. It then summarizes a variety of applications of these methods to help guide the development of more accurate and advanced TCM diagnosis and treatment in CLDs.

keywords: TCM syndrome differentiation and treatment; Research approaches; Methods; Chronic liver diseases

Abbreviations

TCM: traditional Chinese medicine

CLD: chronic liver diseases

AI: artificial intelligence

Introduction

Traditional Chinese medicine (TCM) syndrome (a.k.a., ZHENG or Zheng-Hou), "in essence, is a characteristic profile of all clinical manifestations that can be identified by a TCM practitioner." TCM syndrome is the differentiation of the symptoms and signs of patients, reflecting the overall pathological state including the etiology, disease location and pathogenesis of a certain stage of the body during the disease process [1]. As TCM syndrome is the external manifestation of the internal changes associated with the disease, it reflects the overall state of the body and has its own integrity, while the external symptoms and signs are constantly changing with the disease's occurrence and development, reflecting the complex characteristics of uncertainty and human-made factors.

TCM syndrome differentiation is the process of recognizing syndromes, which then guides the practitioner to determine the corresponding treatment method. Considering the limits to the rational understanding and behavior of both doctors and patients, TCM syndrome differentiation and treatment is a complex, dynamic, nonlinear system. This review aims to summarize three primary approaches to TCM syndrome in the chronic liver diseases (CLDs), including research needs in these areas, as follows:

"Top-Down" Approach Based on Holism, System Theory and Cybernetics

The human brain can make reasonable decisions through limited rationality and some information. This kind of approach is known as "control" or "expert system", it has been applied in research of TCM, called "TCM expert system" [2,3]. With the rapid development and popularization of big data, artificial intelligence (AI) and modern engineering technologies such as highly sensitive sensors, wearable equipment, drug release and intervention systems, etc., a new generation of "TCM expert system" as the

intelligent system with human-machine combinations of TCM diagnosis and treatment can be expected. This new approach will be characterized by the application of reliable means of information collection and processing, recognition of the human body's functional states, and automatic knowledge acquisition ability, combined with deep model and deep reasoning mechanisms.

"Bottom-Up" Approach Based on Reductionism And Systematic Combination

By clarifying various elements of the complex system of TCM, system integration can be carried out "from bottom to top" by using reductionist methods. These methods could include systems biology [4-6], network pharmacology [7], system pharmacology [8] and clinical TCM syndrome pharmacology [9] including high-throughput detection of omics such as genomics, transcriptomics, proteomics, metabolomics, and metagenomics, bioinformation analysis and integration, modeling, system simulation and system dynamics research.

"Integration" Approach Based on The Integration of Reductionism, Holism, and System Theory

The two approaches of "Top-down" and "Bottom-up" can also be combined, leading to a third approach of "Integration" of the methods of reductionism, holism, and system theory. The concept here is that the study of TCM syndrome differentiation and treatment should not only cover system integration and its impact on the whole system's dynamic evolution, but also investigate the relationship among each element in its impact overall. That includes searching within the complex system for "sensitive points" or "targets" which can lead the practitioner to "characteristic" or "key points", or simple rules or heuristics to clarify or change the status of the system [10]. Applications of the three categories above can lead to a rich variety of approaches and technologies, yielding promising new research methods for TCM syndrome differentiation and treatment in CLDs including.

a) TCM syndrome diagnosis and/or treatment methods based on AI-based TCM assistive diagnostic system [11], and TCM expert system in chronic hepatitis [12].

b) TCM syndrome identification methods based on omics technologies [13], including proteomic, transcriptomic, metabolomic and bioinformatic analysis in hepatitis B and hepatitis B-caused cirrhosis [14-17], and dynamic network biomarkers in chronic hepatitis B [18].

c) Efficacy evaluation methods of TCM individualization treatment based on molecular classification of "Disease-Syndrome" in hepatitis B-caused cirrhosis [16].

d) Evaluation methods of clinical TCM syndrome pharmacology in hepatitis B-caused cirrhosis based on genomic [16], transcriptomic [17] and metabolomic analysis [18].

e) Comprehensive analysis methods for Chinese herbal formulae with multi-compounds, multi-targets and multi-effects in the treatment of liver fibrosis [19, 20] and chronic liver disease [21] based on system or network pharmacology.

f) Methods for the composition and compatibility of Chinese herbal medicine or formulae in liver cancer [22].

g) The overall evaluation method of TCM syndrome differentiation and treatment based on biological big data mining in hepatitis B-caused cirrhosis [23], etc.

This compilation of methods provides new approaches for the further development of accurate TCM diagnosis and treatment using biological big data and TCM information. Particularly, with the rapid development of AI-assisted system as a non-invasive diagnostic test in the prediction, diagnosis and treatment of CLDs [24-26], which were used to predict liver fibrosis, cirrhosis, non-alcoholic fatty liver disease, and differentiation of benign tumors from hepatocellular carcinoma etc., it provides the valuable references for developing the TCM intelligent diagnosis and treatment methods in CLDs.

Declarations

Author contributions

SBS contributed conception and design of the review; JM wrote the first draft of the manuscript; All authors contributed to manuscript revision, read and approved the submitted version.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical Approval

Not applicable.

Consent To Participate

Not applicable.

Consent To Publication

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References

1. Su SB, Lu A, Li S, Jia W (2014) Evidence-based ZHENG: a traditional Chinese medicine syndrome. Evid Based Complement Alternat Med 2014: 246538.
2. Lam CFI, Leung KS, Heng PA, Lim CE, Wong FW, et al. (2012) Chinese Acupuncture Expert System (CAES)-a useful tool to practice and learn medical acupuncture. J Med Syst, 36(3): 1883-1890.
3. Shi PY (1995) Traditional Chinese medicine (TCM) expert system in postpartum nursing. Med info 8 Pt 2: 1032.

4. Dai J, Sun S, Cao H, Zheng N, Wang W, et al. (2012) Applications of new technologies and new methods in ZHENG differentiation. Evid Based Complement Alternat Med.
5. Song YN, Zhang GB, Zhang YY, Su SB (2013) Clinical application of omics technologies on ZHENG differentiation research in traditional Chinese medicine. Evid Based Complement Alternat Med 2013: 989618.
6. Cai FF, Zhou WJ, Wu R, Su SB (2018) Systems biology approaches in the study of Chinese herbal formulae. Chin Med 13: 65.
7. Zhang GB, Li QY, Chen QL, Su SB (2013) Network pharmacology: a new approach for Chinese herbal medicine research. Evid Based Complement Alternat Med 2013: 621423.
8. Ru J, Li P, Wang J, Zhou W, Li B, et al. (2014) TCMSP: a database of systems pharmacology for drug discovery from herbal medicines. J Chemin form 6(1): 13.
9. Yu YN, Liu J, Zhang L, Wang Z, Duan DD et al. (2015) Clinical Zheng-hou pharmacology: the missing link between pharmacogenomics and personalized medicine? Current Vascular Pharmacology. Curr Vasc Pharmacol 13(4): 423-32.
10. Su SB, Hu YY, Zhao LP (2011) Research approach for biological basis of Chinese medical syndromes of chronic viral hepatitis B. Zhong Guo Zhong Xi Yi Jie He Za Zhi 31(2): 252-255.
11. Zhang H, Ni W, Li J, Zhang J (2020) AI-Based Traditional Chinese Medicine Assistive Diagnostic System: Validation Study. JMIR Med Inform 8(6): e17608.
12. Zhao YK, Tsutsui T, Endo A, Minato K, Takahashi T et al. (1994) Design and development of an expert system to assist diagnosis and treatment of chronic hepatitis using traditional Chinese medicine. Med Inform (Lond) 19(1): 37-45.
13. Chen QL, Lu YY, Zhang GB, Song YN, Zhou QM, et al. (2013) Characteristic Analysis from Excessive to Deficient Syndromes in Hepatocarcinoma Underlying miRNA Array Data. Evid Based Complement Alternat Med 2013: 324636.
14. Lu YY, Chen QL, Guan Y, Guo ZZ, Zhang H, et al. (2014) Study of ZHENG differentiation in hepatitis B-caused cirrhosis: a transcriptional profiling analysis. BMC Complement Altern Med 14: 371.
15. Lu Y, Fang Z, Zeng T, Li M, Chen Q, et al. (2019) Chronic hepatitis B: dynamic change in Traditional Chinese Medicine syndrome by dynamic network biomarkers. Chin Med 14: 52.
16. Li QY, Song YN, Lu YY, Xu LM, Gao YQ, et al. (2013) Curative effects of ZHENG-based Fuzheng-Huayu tablet on hepatitis B caused cirrhosis related to CYP1A2 genetic polymorphism. Evid Based Complement Alternat Med 2013(2): 302131.
17. Chen QL, Wu FZ, WanM, Liu YM, Lu YY, et al. (2016) Transcriptional profiling and miRNA-target network analysis identifies potential biomarkers for efficacy evaluation in Fuzheng-Huayu Recipe treated hepatitis B caused liver cirrhosis. Int J Mol Sci 17(6): 883.
18. Song YN, Chen Jian, Cai FF, Lu YY, Chen QL, et al. (2018) et al. A metabolic mechanism analysis of Fuzheng-Huayu formula improving liver cirrhosis with traditional Chinese medicine syndromes. Acta Pharmacol Sin 39(6): 942-51.
19. Cai FF, Bian YQ, Wu Rong, Sun Y, Chen XL, et al. (2019) Yinchenhao decoction suppresses rat liver fibrosis involved in an apoptosis regulation mechanism based on network pharmacology and transcriptomic analysis. Biomed Pharmacother 114: 108863.
20. Li G, Zhou Y, Sze DMY, Liu C, Zhang Q, et al. (2019) Active Ingredients and Action Mechanisms of Yi-Guan-Jian Decoction in Chronic Hepatitis B Patients with Liver Fibrosis. Evid Based Complement Alternat Med 2019(2): 1-13.
21. Chen Z, Wang X, Li Y, Wang Y, Tang K, et al. (2019) Comparative Network Pharmacology Analysis of Classical TCM Prescriptions for Chronic Liver Disease. Front Pharmacol 10: 1353.
22. Hu YQ, Sun Y, Lau E, Zhao M, Su SB, et al. (2016) Advance in synergistic combination of Chinese herbal medicine research for cancer treatment, Curr Cancer Drug Targets,16(4): 346-356.
23. Yu S, Guo Z, Guan Y, Lu YY, Hao P, et al. (2012) Combining ZHENG theory and high-throughput expression data to predict new effects of Chinese herbal formulae. Evid Based Complement Alternat Med. 2012: 986427.
24. Decharatanachart P, Chaiteerakij R, Tiyarattanachai T, Treepr asertsuk S (2021) Application of AI in chronic liver diseases: a systematic review and meta-analysis. BMC Gastroenterol, 21: 10.
25. Su TH, Wu CH, Kao JH (2021) Artificial intelligence in precision medicine in hepatology. J Gastroenterol Hepatol, 36(3): 569-580.
26. Ahn JC, Connell A, Simonetto DA, Hughes C, Shah VH, et al. (2020) The application of artificial intelligence for the diagnosis and treatment of liver diseases. Hepatology, 73(6).

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