

Determinants of Knowledge Sharing Behaviors: Developing and Testing an Integrated Theoretical Model

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doi:10.56397/CRMS.2024.03.03

Abstract

Hyperprolactinemia is a hypothalamic-pituitary disorder caused by increased serum prolactin levels from a variety of causes. Increased secretion of prolactin (PRL) in the blood can lead to a variety of somatic disorders, including menstrual abnormalities such as scanty or absent menstruation, as well as breast engorgement and infertility. If left untreated, this condition can progress and lead to recurrent miscarriage, embryonic arrest, osteoporotic fractures, and other complications. In recent years, the combination of traditional Chinese medicine and Western medicine has been used to effectively treat hyperprolactinemia. This review aims to provide a comprehensive overview of the treatment of hyperprolactinemia using both traditional and modern medicine, to improve diagnosis and treatment options for this condition.

Keywords: hyperprolactinemia, pathogenesis, traditional medicine, modern medicine, Chinese medicine, research progress

1. Introduction

Hyperprolactinemia (HPRL) is a group of disorders that primarily affect women and are closely related to the hypothalamic-pituitary-ovarian axis. It is characterized by an increase in the secretion of prolactin (PRL) in the blood, resulting in levels that exceed the normal range ($PRL > 25 \text{ ng/mL}$). This leads to symptoms such as low menstrual flow, scanty menstruation, amenorrhea, overflow of breast milk, and infertility. The

clinical manifestations of HPRL include amenorrhea, menstrual irregularities, overflow of breast milk, infertility, hypogonadism, decreased libido, reduced sperm count, and infertility in men. Based on clinical manifestations, HPRL can be classified as "irregular menstruation", "amenorrhea", "infertility", "breast weeping", "impotence", "spermatorrhea", and other conditions (Yang J, Cui JF & Lan LZ, 2018).

Currently, Western medicine typically treats

hyperprolactinemia with a single approach, involving the administration of oral bromocriptine, while traditional Chinese medicine (TCM) can improve patient symptoms and signs in multiple ways. With the recent increase in national support for traditional medicine, the modernization process of TCM has accelerated, research has deepened, and the development of natural products has promoted the integration of traditional and modern medicine. As a result, understanding and cognition of hyperprolactinemia between traditional and modern medicine has deepened. This paper summarizes existing research on hyperprolactinemia, including its basic situation, pathogenesis, traditional medicine treatment, and modern medicine treatment, with the aim of providing a research basis for hyperprolactinemia treatment innovation, technological advancement, drug development, and promotion. The goal is to establish a foundation for further multidisciplinary research on hyperprolactinemia and to offer guidance for its diagnosis and treatment.

2. Basic Overview of Hyperprolactinemia

Prolactin is a peptide hormone synthesized and secreted by prolactin cells in the anterior pituitary gland. Its secretion is regulated by the hypothalamic-pituitary-gonadal axis, and hyperprolactinemia (HPRL) is typically caused by imbalances in the regulatory factors that control prolactin releases, such as hypothalamic prolactin-releasing factor and prolactin-releasing inhibitory hormone. These imbalances result in variable degrees of elevated prolactin levels (Wang LH, Sun XJ, Yu WJ, et al., 2020).

Our most recent HPRL guidelines suggest that HPRL is a pathological condition characterized by persistently high levels of peripheral blood prolactin caused by various factors. In women of childbearing age, a prolactin level <30ng/mL (1.36nmol/L) is considered normal, and a single measurement is recommended instead of a dynamic prolactin measurement. A prolactin level >250ng/mL may indicate the presence of a prolactinoma after ruling out the effect of drugs, while a level >500ng/mL suggests the possibility of a giant prolactinoma (Jiang Zhimei, 2019).

3. Factors in the Development of Hyperprolactinemia

3.1 Physiological Factors

Prolactin levels can be increased by various physiological conditions, including exercise,

exposure to cold, emotional stress, menstrual cycle, sexual intercourse, pregnancy, and lactation. Once these factors are eliminated, prolactin levels typically return to normal.

3.2 Pathological Factors

The most common pituitary lesion associated with hyperprolactinemia is a pituitary prolactinoma, accounting for approximately 40% of all pituitary tumors and 80% of cases of pathological hyperprolactinemia. This is followed by growth hormone tumors, adrenocorticotrophic hormone tumors, and others.

Hypothalamic tumors clinically reported include craniopharyngioma, Rathke's cyst, hypothalamic malformation tumor, germ cell tumor, glioma, and metastases from malignant tumors resulting in dopamine suppression or interruption and HPRL.

Inflammatory and granulomatous diseases can cause repeated lesions that destroy neurons and compress the pituitary stalk, leading to an increase in prolactin-releasing factors and ultimately resulting in HPRL.

3.3 Pharmacological Factors

Drugs that can cause increased prolactin levels by enhancing hypothalamic prolactin-releasing factor stimulation or antagonizing dopamine include dopamine receptor antagonists such as phenothiazines, haloperidol, metoclopramide, and domperidone, as well as dopamine conversion inhibitors such as opioid peptides, morphine, and cocaine, dopamine depleting agents like methyl dopa and reserpine, diphenhydramine derivatives such as phenytoin and diazepam, dopamine reuptake blockers like nomifene, H₂ receptor antagonists such as cimetidine and ranitidine, monoamine oxidase inhibitors like phenelzine, antituberculosis drugs like isoniazid, and hormones like estrogens and contraceptives. Generally, prolactin levels return to normal gradually after discontinuation of these drugs (Li Y., 2019).

3.4 Other Factors

Other factors include diseases such as renal insufficiency, polycystic ovary syndrome, primary hypothyroidism, cirrhosis, chest wall disease, and tumors causing ectopic prolactin secretion (Hong W. H. & Fang Z. H., 2018).

4. Traditional Medicine Drug Treatment Research

4.1 Discriminatory Treatment

4.1.1 Liver-Depression and Spleen-Deficiency Type

After active treatment, the total effective rate was 85.71% in the treatment group and 80% in the control group, indicating that Chinese medicine can achieve good efficacy in treating this disease while avoiding the adverse effects of Western medicine. These results suggest that Chinese medicine should be further promoted as a viable treatment option for hyperprolactinemia.

4.1.2 Kidney Deficiency and Liver Depression Type

Yang Jianbing's theory suggests that this disease is primarily caused by kidney deficiency and liver depression, and thus should be treated by tonifying the kidney and draining the liver. He has formulated his own prescription that includes ingredients such as malt, Shu Di Huang, Cornu Cervi Pantotrichum, Yam, Fructus Lycii, Chai Hu, Yu Jin, and others to help lower breast milk production.

4.1.3 Spleen and Kidney Yang Deficiency Type

According to Professor Lin Hanmei, this disease is mainly caused by spleen and kidney deficiency, as well as liver qi stagnation. Therefore, the recommended treatment approach is to tonify the kidney and strengthen the spleen. Her empirical method involves using a combination of fried wheat sprout, hawthorn, Shenqu, Chinese wolfberry, Epimedium, Cuscuta, Radix Codonopsis, Atractylodes, and Poria. The formula emphasizes the use of herbs that specifically target kidney and spleen functions (Zhang BX & Lin HM., 2013).

4.2 Sutra and Experimental Prescriptions

Liu Chen (Liu Chen, 2017) conducted a study using *Angelica paeoniae* powder as an additional treatment for hyperprolactinemia. The control group received bromocriptine while the treatment group received *Angelica paeoniae* powder with added flavor. Both groups underwent a 3-month treatment course, and the patients' symptoms were observed to improve for 2 consecutive courses. The total effective rate of the test group was 73.3%, which was higher than the control group's total effective rate of 63.3%. The Sutra formula was deemed effective, with less medication and better efficacy. Professor Li Kunyin proposed that liver and kidney disorder, kidney deficiency, and liver

depression were the main causes of the disease. In treating hyperprolactinemia, he emphasized the simultaneous regulation of liver and kidney. Professor Li recommended malt, yujin, Chenpi, Chaihu, and Bai Shao as essential ingredients combined with menstrual cycle therapy, which yielded positive treatment results (Guo Yu-Dan, Zhen Yu-Hua & Li Kun-Yin, 2017).

4.3 Tui Na Therapy

Lu Jie (Lu J., 2017) utilized tui-na therapy as a treatment for hyperprolactinemia. The therapy involved thumb rubbing, palm rubbing, pressing, and other therapeutic tui-na techniques. Acupuncture points were identified based on the specific conditions of the patient, with emphasis on the kidney meridian points, spleen meridian points, and liver meridian points. The therapy was customized according to the specific acupuncture points identified. The treatment was administered once a day for 30 minutes, and each course consisted of 10 sessions. A total of 3 courses of treatment were administered, resulting in a total treatment efficiency of 96.7%. The therapy was well-received by patients.

4.4 Acupuncture Treatment

In a study conducted by Liang Chujing (Chen LJ, Cao Y, Yuan HL, et al., 2021), patients with hyperprolactinemia were treated with a breast-stopping formula and localized acupuncture points along the meridians. Different acupuncture points were identified and selected according to the patient's specific conditions, such as liver depression and qi stagnation, qi stagnation and blood stasis, liver kidney deficiency, and qi-blood deficiency. The study found a high cure rate and good clinical efficacy.

5. Modern Medical Treatment

5.1 Bromocriptine Mesylate

Bromocriptine mesylate is currently the first-line drug for the treatment of hyperprolactinemia both in China and abroad. It selectively agonizes dopamine receptors and can effectively reduce prolactin levels. Bromocriptine treatment has been shown to significantly reduce tumor size, allowing patients with amenorrhea-lactation to resume normal menstrual cycles. The treatment is generally administered over 3 months, with dosages gradually increasing. However, most patients experience gastrointestinal reactions, as well as dizziness, weakness, drowsiness, and

upright hypotension. Recent studies have also shown that placing the drug in the patient's vagina can increase pregnancy rates in patients with infertility caused by this disease, thus avoiding the first-pass effect in the liver. This method can significantly reduce the disadvantages associated with the oral method and is easily accepted by patients (Jiang Yijuan & Xie Haiyan, 2021).

5.2 Cabergoline

Cabergoline is a newer drug that can be used as an alternative to bromocriptine for the treatment of hyperprolactinemia. It is a long-acting dopamine receptor agonist with high selectivity and affinity for dopamine receptor I. Research has shown that cabergoline may be more tolerable and effective than bromocriptine in the treatment of hyperprolactinemia in women (Ma XJ, Gao SM, & Liu L., 2022). Cabergoline has the advantage of fewer side effects and less frequent dosing. It is more effective in improving amenorrhea and restoring ovulation in women. Although drowsiness and postural hypotension are still possible side effects, they are usually less severe than with bromocriptine. In case of adverse drug reactions, it is usually not necessary to stop the drug, and the adverse reactions can disappear on their own after 2 to 3 weeks of taking the drug (Zhang Xu, 2022).

5.3 Quinagolide

Quinagolide is a new class of selective dopamine D2 agonists, long-acting dopamine agonists, which can be used as an alternative to bromocriptine if the patient is not suitable for bromocriptine. It is effective in the treatment of patients with pituitary prolactinoma who are not sensitive to bromocriptine and do not want to undergo surgery, with fewer adverse effects than bromocriptine. A long-term application can inhibit PRL secretion and shrink tumors, improving clinical symptoms such as amenorrhea and overflow of breast milk. The effective daily dose is 75-105 µg (Bian Dongyan, 2021). It is a suitable alternative for patients who cannot tolerate bromocriptine.

5.4 Vitamin B6

Vitamin B 6 increases the conversion of dopamine in the hypothalamus, thereby inhibiting the secretion of prolactin (Tang Chuanmei, 2016), and is generally taken synergistically with bromocriptine.

5.5 Surgical Treatment

Surgery is a targeted treatment option for pituitary tumors. Currently, the main treatment for prolactinomas is surgery via a single nasal sinus approach. It is suitable for those who are not tolerant of drug therapy.

In cases where the pituitary tumor causes significant compression or neurological symptoms, and medication has proven to be ineffective, surgical intervention may be necessary. Prior to surgery, temporary administration of bromocriptine may be recommended to shrink the tumor and reduce intraoperative bleeding, thus increasing the efficacy of the procedure.

5.6 Radiotherapy

Radiotherapy is a treatment option mainly for pituitary prolactinomas, although its clinical use should consider the patient's individual constitution and tumor characteristics to select the appropriate modality. However, due to its slow efficacy and potential adverse effects, it is not commonly recommended (Wang Min-Yang, Yu Yuan Yuan, Yan Lin-Feng, et al., 2022).

6. Conclusion

In conclusion, with the development of science, the research on hyperprolactinemia is more in-depth and comprehensive, and the treatment methods are diversified. Chinese medicine has been shown to be highly effective in treating hyperprolactinemia, with minimal adverse effects and a lower recurrence rate compared to Western medicine. Many clinical studies have demonstrated that Chinese medicine can significantly reduce prolactin levels and improve symptoms in patients with hyperprolactinemia. The combination of Chinese and Western medicine provides a promising treatment approach for this disease, and further research is needed to fully explore the potential benefits of this approach. As the incidence of hyperprolactinemia continues to rise, it is important to consider the advantages of Chinese medicine and incorporate it into the overall treatment plan for patients.

Fund Project

National and autonomous region level college student innovation and entrepreneurship training program project fund funding project (No.: 202010599030); autonomous region level college student innovation and entrepreneurship training program project fund funding project

(No.: 202010599065).

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