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TUBERCULOSIS PROGRESSION IN REPRODUCTIVE-AGED WOMEN WITH THYROID DISEASE

Abstract. Tuberculosis remains a significant global health problem, particularly in women of reproductive age with underlying endocrine disorders. Thyroid diseases can influence the clinical course and progression of tuberculosis, potentially altering symptom presentation, disease severity, and response to treatment. This study aims to investigate the distinctive patterns and progression of tuberculosis in reproductive-aged women suffering from thyroid disorders. Understanding these interactions is crucial for early diagnosis, personalized treatment strategies, and improving clinical outcomes in this patient population. Enhanced awareness of the interplay between thyroid dysfunction and tuberculosis may contribute to more effective management and reduced morbidity among affected women.

Keywords. Tuberculosis; reproductive-aged women; thyroid disease; disease progression; clinical characteristics; endocrine disorders.

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ПРОГРЕССИРОВАНИЕ ТУБЕРКУЛЁЗА У ЖЕНЩИН РЕПРОДУКТИВНОГО ВОЗРАСТА С ЗАБОЛЕВАНИЯМИ ЩИТОВИДНОЙ ЖЕЛЕЗЫ

Аннотация. Туберкулёз остаётся одной из значимых глобальных проблем здравоохранения, особенно среди женщин репродуктивного возраста с сопутствующими эндокринными нарушениями. Заболевания щитовидной железы способны оказывать влияние на клиническое течение и прогрессирование туберкулёза, потенциально изменяя характер симптомов, тяжесть заболевания и ответ на проводимую терапию. Целью данного исследования является изучение особенностей течения и прогрессирования туберкулёза у женщин репродуктивного возраста, страдающих заболеваниями щитовидной железы. Понимание данных взаимосвязей имеет важное значение для ранней диагностики, разработки персонализированных лечебных стратегий и улучшения клинических исходов у данной категории пациентов. Повышение клинической настороженности в отношении взаимодействия дисфункции щитовидной железы и туберкулёза может способствовать более эффективному ведению больных и снижению уровня заболеваемости.

Ключевые слова: туберкулёз; женщины репродуктивного возраста; заболевания щитовидной железы; прогрессирование заболевания; клинические особенности; эндокринные нарушения.

Introduction. Tuberculosis remains a major global health concern, with women of reproductive age constituting a significant proportion of affected individuals. Disease progression from latent Mycobacterium tuberculosis infection to active tuberculosis is determined by immune competence, hormonal balance, nutritional status, and comorbid conditions. Among these, thyroid disease represents an important yet underrecognized modifier of tuberculosis progression.

Thyroid hormones play a central role in regulating basal metabolism, immune cell differentiation, and cytokine production. Disorders of thyroid function, such as hypothyroidism, hyperthyroidism, and autoimmune thyroiditis, are more common in women and may alter host defense mechanisms against tuberculosis. Consequently, reproductive-aged women with thyroid disease may experience a distinct pattern of TB progression, characterized by altered symptom severity, increased extrapulmonary involvement, or prolonged disease course.

Role of Thyroid Hormones in Immune Regulation. The immune response to Mycobacterium tuberculosis depends largely on cell-mediated immunity, particularly the activity of macrophages and T lymphocytes. Thyroid hormones influence these processes at multiple levels. Triiodothyronine (T3) enhances macrophage phagocytic activity and modulates the production of pro-inflammatory cytokines, while thyroxine (T4) contributes to immune cell maturation.

In hypothyroidism, reduced thyroid hormone levels are associated with impaired macrophage activation, decreased interferon-gamma production, and weakened cellular immunity. These changes may facilitate progression from latent TB infection to active disease. Conversely, hyperthyroidism is characterized by immune hyperactivation and oxidative stress, which may exacerbate tissue damage during active tuberculosis and accelerate disease progression.

Hypothyroidism and TB Progression. In women with hypothyroidism, tuberculosis often demonstrates a slowly progressive course with subtle systemic symptoms. Fatigue, weight gain or minimal weight loss, and menstrual irregularities may overshadow classical TB manifestations, delaying diagnosis. As

a result, disease is frequently detected at a more advanced stage, with extensive pulmonary involvement or dissemination.

Hypothyroidism has also been associated with prolonged sputum conversion time and delayed radiological improvement during anti-tuberculosis therapy, suggesting a slower response to treatment.

Hyperthyroidism and TB Progression. Hyperthyroid women may experience a more aggressive progression of tuberculosis. Increased metabolic demands, catabolic state, and heightened inflammatory response can lead to rapid clinical deterioration. Symptoms such as weight loss, palpitations, sweating, and anxiety may be incorrectly attributed to thyroid disease, masking active TB progression.

In this group, cavitary pulmonary lesions and systemic manifestations may be more pronounced, increasing the risk of complications and relapse.

Extrapulmonary Tuberculosis and Disease Dissemination. Thyroid dysfunction may increase susceptibility to extrapulmonary tuberculosis, particularly in reproductive-aged women. Altered immune surveillance can facilitate hematogenous spread of Mycobacterium tuberculosis to lymph nodes, pleura, bones, and the genitourinary system.

Genital tuberculosis is of particular importance in this population, as it may lead to infertility, menstrual disorders, and adverse reproductive outcomes. Disease progression in extrapulmonary TB is often insidious, further complicating timely diagnosis.

Impact of Anti-Tuberculosis Therapy on Thyroid Function. Anti-tuberculosis drugs can influence thyroid status and indirectly affect disease progression. Rifampicin induces hepatic enzymes, increasing the clearance of thyroid hormones and potentially worsening hypothyroidism. Isoniazid and ethambutol may also alter endocrine balance through metabolic effects.

Unrecognized deterioration of thyroid function during TB treatment may contribute to persistent symptoms, reduced treatment adherence, and suboptimal

outcomes. Regular monitoring of thyroid function is therefore essential in women with known thyroid disease.

Clinical and Public Health Implications. Recognition of thyroid disease as a modifier of tuberculosis progression has important clinical implications. Integrated screening for thyroid dysfunction in women diagnosed with TB, particularly in endemic regions, may improve early detection of high-risk patients.

From a public health perspective, interdisciplinary collaboration between phthisiologists, endocrinologists, and primary care providers is crucial to optimize disease control and reduce long-term complications.

Conclusion. Tuberculosis progression in reproductive-aged women with thyroid disease is shaped by complex interactions between endocrine and immune systems. Thyroid dysfunction may accelerate or obscure disease progression, contribute to atypical clinical presentations, and influence treatment response. Increased clinical awareness, routine assessment of thyroid function, and individualized management strategies are essential to improve outcomes in this vulnerable population. Further research is needed to clarify underlying mechanisms and to develop evidence-based guidelines for integrated care.

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