INTERNATIONAL SEVEN JOURNAL
OF MULTIDISCIPLINARY
ISSN: 2764-9547

THERAPEUTIC MANAGEMENT OF TOURETTE SYNDROME

MANEJO TERAPÊUTICO DA SÍNDROME DE TOURETTE

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https://doi.org/10.56238/isevmjv5n2-018

Receipt of originals: 02/21/2026 **Acceptance for publication:** 03/21/2026

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ABSTRACT

Tourette Syndrome (TS) is a chronic neurodevelopmental disorder, more prevalent in males and typically diagnosed in early childhood, characterized by the presence of tics lasting for more than one year, often associated with other mental disorders. It is defined by the presence of involuntary motor and vocal tics (simple and complex) that can reduce quality of life. Although there is no definitive cure, treatment is based on behavioral therapy and pharmacological interventions, such as the use of aripiprazole, haloperidol, among other drugs. There is still limited consensus on the best therapeutic approach due to the various side effects, but these treatments can improve symptoms and, consequently, quality of life. This review aims to analyze contemporary guidelines for diagnosis and intervention strategies. The methodology used is a narrative literature review conducted in 2026, using the PubMed database, with the descriptors “Tourette Syndrome,” “Treatment,” and “Diagnosis.” Articles published in the last five years, available in full text, in Portuguese and English, were included, while those not addressing the topic, duplicates, or with low methodological rigor were excluded. The analysis of the articles shows that the diagnosis of TS is clinical and must be differentiated from tics of other disorders. The use of validated instruments is necessary, with the Yale Global Tic Severity Scale (YGTSS) being the most widely used to assess tic severity, as well as the Premonitory Urge for Tics Scale (PUTS). As an initial therapeutic approach, behavioral therapies are the first option, followed by pharmacological treatment. In severe and refractory TS cases unresponsive to multiple lines of treatment, Deep Brain Stimulation (DBS) is considered a therapeutic option. Based on the analysis of the articles, it is

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concluded that the diagnosis of TS is difficult and exclusionary, requiring a multidisciplinary approach, with an essentially clinical diagnosis combined with standardized instruments. Although it is a syndrome without a cure, combined therapeutic strategies can improve the quality of life of individuals with TS.

Keywords: Tourette Syndrome. Treatment. Diagnosis.

RESUMO

A Síndrome de Tourette (ST) é um distúrbio neurodesenvolvimental crônico, com maior prevalência no sexo masculino e com diagnóstico no início da infância, com presença de tiques de duração por mais de 1 ano, geralmente associado a outros Transtornos mentais. Caracteriza-se pela presença de tiques motores e vocais involuntários (simples e complexos) que podem causar diminuição da qualidade de vida. Apesar de não haver a cura definitiva, o tratamento baseia-se em terapia comportamental e intervenções farmacológicas, como o uso de aripiprazol, haloperidol entre outros fármacos, ainda com limitado consenso na melhor abordagem terapêutica, pelos diversos efeitos colaterais, mas que podem melhorar os sintomas e, consequentemente, seu padrão de vida. Esta revisão tem o objetivo de analisar as diretrizes contemporâneas para o diagnóstico e as estratégias de intervenção. A metodologia utilizada é uma revisão bibliográfica narrativa, realizada no ano de 2026, na base de dados PubMed, com os descritores “Tourette Syndrome”, “Treatment” e “Diagnosis”, foram incluídos artigos publicados nos últimos 5 anos, que estavam disponíveis na íntegra, nos idiomas português e inglês e excluídos os que não abordavam a temática, duplicados ou com baixo rigor metodológico. As análises dos artigos nos mostram que o diagnóstico do ST é clínico, e necessita ser diferenciado de tiques de outros distúrbios. É necessário a utilização de instrumentos validados, sendo a Escala Global de Gravidade de Tiques de Yale (YGTSS) a mais utilizada entre todas, para avaliar a gravidade dos tiques sofridos, como também a Escala de Impulsos Premonitórios para Tics (PUTS). Como abordagem terapêutica inicial, temos como primeira opção as terapias comportamentais, seguida de uso de fármacos e se tratando de ST graves e refratária a múltiplas linhas de tratamento, citamos a Estimulação Cerebral Profunda (DBS) como uma opção terapêutica. Diante da análise dos artigos, conclui-se que o diagnóstico do ST é difícil e excludente, requerendo abordagem multidisciplinar, com diagnóstico essencialmente clínico, junto com utilização de instrumentos padronizados. Apesar de ser uma síndrome sem cura, existem estratégias terapêuticas combinadas, que podem melhorar a qualidade de vida de portadores da ST.

Palavras-chave: Síndrome de Tourette. Tratamento. Diagnóstico.

RESUMEN

El Síndrome de Tourette (ST) es un trastorno neurodesarrollativo crónico, con mayor prevalencia en el sexo masculino y diagnóstico en la infancia temprana, caracterizado por la presencia de tics durante más de un año, generalmente asociado a otros trastornos mentales. Se caracteriza por la presencia de tics motores y vocales involuntarios (simples y complejos) que pueden disminuir la calidad de vida. Aunque no existe una cura definitiva, el tratamiento se basa en terapia conductual e intervenciones farmacológicas, como el uso de aripiprazol, haloperidol, entre otros fármacos. Aún existe un consenso limitado sobre el mejor enfoque terapéutico debido a los diversos efectos secundarios, pero estos tratamientos pueden mejorar los síntomas y, en consecuencia, la calidad de vida. Esta revisión tiene como objetivo analizar las directrices contemporáneas para el

diagnóstico y las estrategias de intervención. La metodología utilizada es una revisión bibliográfica narrativa, realizada en 2026, en la base de datos PubMed, utilizando los descriptores “Tourette Syndrome”, “Treatment” y “Diagnosis”. Se incluyeron artículos publicados en los últimos cinco años, disponibles en texto completo, en portugués e inglés, y se excluyeron aquellos que no abordaban la temática, duplicados o con bajo rigor metodológico. El análisis de los artículos muestra que el diagnóstico del ST es clínico y debe diferenciarse de los tics de otros trastornos. Es necesario el uso de instrumentos validados, siendo la Escala Global de Gravedad de Tics de Yale (YGTSS) la más utilizada para evaluar la gravedad de los tics, así como la Escala de Impulsos Premonitorios para Tics (PUTS). Como enfoque terapéutico inicial, las terapias conductuales son la primera opción, seguidas del uso de fármacos. En casos graves y refractarios a múltiples líneas de tratamiento, la Estimulación Cerebral Profunda (DBS) se considera una opción terapéutica. A partir del análisis de los artículos, se concluye que el diagnóstico del ST es difícil y de exclusión, requiriendo un enfoque multidisciplinario, con un diagnóstico esencialmente clínico junto con el uso de instrumentos estandarizados. Aunque es un síndrome sin cura, existen estrategias terapéuticas combinadas que pueden mejorar la calidad de vida de las personas con ST.

Palabras clave: Síndrome de Tourette. Tratamiento. Diagnóstico.

1 INTRODUCTION

Tourette's Syndrome (TS), originally cataloged by Georges Gilles de la Tourette in 1885, is a neurodevelopmental and behavioral disorder of a complex nature, clinically defined by the manifestation of chronic motor and phonic tics. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), diagnosis requires the persistence of these symptoms for at least one year, invariably starting before the age of 18 and after the exclusion of secondary causes. Although the estimated prevalence in the school-age population ranges from 0.3% to 0.9%, TS is widely recognized by the medical community as an underdiagnosed condition, often marked by an extensive time gap between the first manifestation of symptoms and clinical confirmation. Epidemiologically, there is a notable predominance of males, with a ratio of 4:1 in relation to females, who tend to present less severe conditions. The pathophysiological architecture of TS, although not yet fully elucidated, seems to reside in structural and functional alterations in the cortical circuits, in addition to a neurochemical imbalance in the dopaminergic system. Additionally, recent research points to the involvement of the Endocannabinoid System (ECS), a complex signaling system that regulates cognitive and autonomic processes, where CB1 and CB2 receptors act as potential modulators.

The phenomenology of TS is intrinsically heterogeneous, and is rarely an isolated condition; The presence of comorbidities is the rule, not the exception. Attention Deficit Hyperactivity Disorder (ADHD) coexists in about 60% of cases, closely followed by Obsessive-Compulsive Disorder (OCD), anxiety, and difficulties in emotional regulation, elements that often impact quality of life more severely than the tics themselves. In addition to visible motor symptoms, many patients report so-called premonitory impulses, aversive somatosensory sensations that precede and motivate the execution of the tic. Regarding therapeutic management, the absence of a definitive cure directs efforts towards symptomatic control. First-line interventions combine behavioral therapies, such as habit reversal, and pharmacological approaches that include alpha-2 adrenergic agonists (such as clonidine) and neuroleptics. However, variability in drug response and long-term side effects have driven the search for alternatives, including the medicinal use of Cannabis sativa and invasive neuromodulation technologies, such as Deep Brain Stimulation (DBS). In view of this scenario of gaps in knowledge and clinical variability, it is imperative to refine assessment protocols and develop therapeutic strategies that

address TS in its biopsychosocial totality, aiming to optimize clinical outcomes and the functional integration of the individual.

2 METHODOLOGY

The present study is characterized as a narrative literature review, developed to synthesize and critically analyze recent scientific evidence on the therapeutic management of Tourette's Syndrome. The bibliographic search was carried out in the PubMed database, using the descriptors "*Tourette Syndrome*", "*Treatment*" and "*Diagnosis*", which were combined using the Boolean operators AND and OR, in writing in accordance with the terminology of the Medical Subject Headings (MeSH). The inclusion criteria were articles published in the last five-year period (2020-2025), available in full and written in Portuguese or English, which directly addressed the proposed theme. Conversely, studies without direct correlation with the central theme, duplicate publications, narrative reviews with low methodological rigor, and articles not indexed in the database used were excluded. The selection of studies was conducted in two consecutive stages: initial screening of titles and abstracts, followed by technical evaluation of full texts to confirm relevance. Finally, the information extracted was organized and presented in a descriptive way.

3 RESULTS AND DISCUSSION

3.1 SYSTEMATIZED CLINICAL DIAGNOSIS AND EVALUATION

The diagnosis of TS remains fundamentally clinical, based on the DSM-5 criteria, which require the presence of motor and phonic tics for more than one year (Szejko et al., 2022). The evaluation should be comprehensive, differentiating tics from other movement disorders, such as functional tics, which have gained recent relevance due to the increase in cases mimicked in social networks (Szejko et al., 2022). Validated instruments, such as the Yale Global Tics Severity Scale (YGTSS) and the Premonitory Impulses for Tics Scale (PUTS), are essential for quantifying symptom severity and distress associated with sensory phenomena that precede tics (Ramsey and McGuire, 2024).

Both motor and vocal tics can be classified into simple and complex. Simple motor tics are characterized by rapid, repetitive movements, such as blinking. Simple vocal tics, on the other hand, are manifested by noises or isolated syllables. On the other hand,

complex tics, in the case of motor tics, are coordinated movements, in which they use several muscles, such as spinning while walking, and vocals, manifest as phrases or several sounds together (Johnson et al., 2023).

3.2 PSYCHOSOCIAL AND BEHAVIORAL INTERVENTIONS: THE FIRST LINE

Management of Tourette's syndrome may involve behavioral therapies, drug treatment, or a combination of both. Psychosocial and behavioral interventions are considered the first line of treatment for Tourette's syndrome, and are recommended before the introduction of pharmacological therapies. Among these approaches, Comprehensive Behavioral Intervention for Tics (CBIT) stands out, which has strong scientific evidence and is recommended by important international guidelines, such as the American Academy of Neurology (Johnson et al., 2023). In this sense, studies have shown that this intervention can significantly reduce the frequency and intensity of tics in children, adolescents and adults. CBIT is mainly based on techniques from cognitive-behavioral therapy, especially habit reversal training. This method seeks to increase the individual's perception of the premonitory impulses that precede tics and teach him to use alternative motor responses to reduce or replace these behaviors. In addition, the CBIT also includes components aimed at the development of therapeutic skills, such as relaxation training and functional assessment, with a view to identifying and managing internal and external factors related to the manifestation of tics. In relaxation training, patients are instructed to use specific techniques, such as diaphragmatic breathing and progressive muscle relaxation, which contribute to stress control, a factor often associated with increased frequency and intensity of tics. Another strategy used is exposure with response prevention, which helps the patient gradually tolerate the impulses that precede tics, contributing to the reduction of their occurrence (Johnson et al., 2023; Ramsey and McGuire, 2024). Despite the proven efficacy of these approaches, not all patients respond equally to treatment, so factors such as the intensity of premonitory impulses and the presence of anxiety disorders may influence the therapeutic response. In addition, there are still questions about the best age to start these interventions and how the previous use of medications can impact their results, indicating the need for further studies in the area (Johnson et al., 2023).

3.3 PHARMACOTHERAPY AND NEW THERAPEUTIC FRONTIERS

Although behavioral therapies are effective, especially in reducing TS tics, pharmacotherapy is still widely used, especially in more severe cases, in which patients manifest more severe tics. In these cases, the pharmacology used is preferably with α2 agonists, such as clonidine and guanfacine, which are usually the first line of treatment, antipsychotics (risperidone and aripiprazole) and anticonvulsants, however, although these drugs are effective in most cases for symptomatic treatment of TS, the adverse effects remain a major disadvantage of these drugs (Johnson et al., 2023). Aripiprazole and risperidone, atypical antipsychotics, are highly effective in the treatment of tics, and aripiprazole is even one of the most prescribed drugs in Europe for this purpose. Alternatively, cannabinoid drugs and the dopaminergic D1 receptor antagonist ecopipam are being studied extensively in clinical trials regarding their safety and efficacy profiles so that they may in the future play a therapeutic role in TS (Müller-Vahl et al., 2022). Regarding cannabinoids, there are several possible options for treatment, such as cannabinoid oils, synthetic cannabinoids, and even the use of tetrahydrocannabinol (THC) as the main active. Its mechanisms of action involve interaction with CB1 and CB2 receptors, with the CB1 receptor being responsible for action in the central nervous system. Despite the abundant studies on these *Cannabis sativa-based* medicines and the promising results in the treatment of TS tics, further clinical studies are still needed, with greater standardization of cannabinoid drug components, larger and more diverse populations, and increasingly rigorous methodologies and protocols (Serag et al., 2024).

3.4 NEUROMODULATION AND REFRACTORY CASES

In patients with Tourette's syndrome (TS) who present severe and persistent symptoms despite appropriate behavioral and pharmacological treatment, classified as refractory cases, strategies based on neuromodulation have been investigated as therapeutic alternatives. Among these approaches, deep brain stimulation (DBS) stands out, a neurosurgical intervention that has been applied to individuals with severe TS. Accumulating evidence indicates that DBS may reduce the severity of tics and some associated comorbidities, although the available results are still heterogeneous and based predominantly on observational studies and relatively small sample sizes (Johnson et al., 2023).

The main targets used in DBS include the centromedian region of the thalamus and the globus pallidus internus (GPi), particularly its anteromedial and posteroventral portions. In this context, evidence indicates that stimulation of these structures can significantly reduce the severity of tics, with significant average improvements in standardized clinical scales. In addition to the reduction in motor symptoms, some patients also show improvement in associated comorbidities, such as obsessive-compulsive symptoms, however, due to the invasive nature of the procedure and the variability of the results, DBS is recommended only for carefully selected individuals with severe and refractory disease, usually in specialized centers (Müller-Vahl et al., 2022; Johnson et al., 2023).

In addition, non-invasive neuromodulation techniques, such as repetitive transcranial magnetic stimulation and transcranial direct current stimulation, have been investigated as possible therapeutic alternatives. These interventions, often directed at the motor cortex or supplementary motor area, aim to modulate neural activity in circuits involved in the pathophysiology of tics. Despite the growing interest in these approaches, their role in the clinical management of TS is not yet clearly established, and strategies under investigation in the therapeutic context of the disease are currently being considered (Johnson et al., 2023).

3.5 CHALLENGES IN THERAPEUTIC MANAGEMENT

The therapeutic management of Tourette's Syndrome (TS) faces multifaceted difficulties, starting with the diagnostic difficulty, since confirmation of the condition can take between 3 and 11 years, approximately that 73% of patients receive incorrect clinical diagnoses due to low clinical knowledge in society (Johnson et al., 2023; Szejko et al., 2022). The wide diversity of clinical manifestations and their fluctuating nature make it difficult to accurately assess the severity of TS (Ramsey and McGuire, 2024). In addition, the presence of comorbidities such as OCD (Obsessive-Compulsive Disorder) and ADHD (Attention Deficit Hyperactivity Disorder), which affect up to 88% of individuals who have TS, often result in a functional impairment and quality of life superior to that caused by the ICTs themselves (Johnson et al., 2023).

4 CONCLUSION

The present review shows that Tourette's Syndrome (TS) is a complex neurodevelopmental disorder, whose effective management requires an individualized and multimodal approach. Diagnosis, which is essentially clinical and based on DSM-5 criteria, remains a significant challenge in medical practice, often delayed for up to a decade due to phenotypic heterogeneity and poor recognition of symptoms by non-specialized professionals (Szejko et al., 2022; Johnson et al., 2023). The use of validated instruments, such as the Yale Global Tic Severity Scale (YGTSS), is indispensable not only for quantifying the severity of tics, but also for assessing the functional impact and the premonitory phenomena that precede them (Ramsey and McGuire, 2024).

With regard to therapeutic strategies, the understanding is consolidated that behavioral interventions, especially the Comprehensive Behavioral Intervention for Tics (CBIT), constitute the first line of treatment, with proven efficacy in reducing the frequency and intensity of tics in children and adolescents (Johnson et al., 2023). For moderate to severe cases, in which the symptoms significantly compromise the quality of life, pharmacotherapy becomes necessary. α2-adrenergic agonists (clonidine and guanfacine) remain preferred initial options, while atypical antipsychotics such as aripiprazole and risperidone demonstrate high efficacy, although their use is limited by relevant adverse effect profiles (Johnson et al., 2023; Müller-Vahl et al., 2022).

There is also the emergence of new therapeutic frontiers that seek to expand the options for patients who are refractory or intolerant to conventional medications. Cannabinoids, acting on the Endocannabinoid System via CB1 and CB2 receptors, show promising results in controlling tics, although the heterogeneity of current studies requires additional research with standardized methodologies and more robust samples (Serag et al., 2024). At the same time, neuromodulation techniques such as Deep Brain Stimulation (DBS) are viable alternatives for severe and refractory cases, with targets such as the globus pallidus interna (GPi) demonstrating benefits not only on tics, but also on associated obsessive-compulsive comorbidities (Johnson et al., 2023; Müller-Vahl et al., 2022).

Finally, this synthesis reinforces the need for a comprehensive biopsychosocial approach in the management of TS. The high prevalence of comorbidities — especially OCD and ADHD, present in up to 88% of cases — requires that the therapeutic plan transcends the isolated control of tics, addressing psychological distress and functional

difficulties that often impact quality of life more significantly than the motor symptoms themselves (Johnson et al., 2023). As future perspectives, the importance of research that improves the understanding of the pathophysiological circuits involved, develops biomarkers that aid in early diagnosis, and personalizes therapeutic interventions based on specific clinical phenotypes, consolidating increasingly effective strategies for the functional integration and well-being of patients throughout life (Robertson, 2023; Ramsey and McGuir e, 2024).

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