

Impact of Cognitive Behavioural Intervention for Tic Disorders in Children

SHILPA HEGDE¹, HETA SHAH², CHANDRASHEKAR SHETTIGAR³, BHAGYASHEE MEHANDALE⁴



ABSTRACT

Tic disorders are one of the most prevalent neurodevelopmental disorders and if unattended, can have other psychological impact. It can present as poor academic performance, poor concentration, low confidence, anxiety, depression and many others. The present case series is about seven children diagnosed with tic disorder, as per Diagnostic and Statistical Manual (DSM) 5 criteria. These children underwent standard behavioural training module comprising of behavioural rewards, Habit Reversal Training (HRT), relaxation training, identification and management of emotions and social skills training; which was planned following case conceptualisation. Yale Global Tic Severity Scale (YGTSS) was used before starting therapy and while completing the therapy. Considering the severity of symptoms and distress caused by them, three children were started on medicine (clonidine) along with therapy. Same therapy module was provided online for those children (three) who were not able to come for direct training due to geographic distance and Coronavirus Disease 2019 (COVID-2019) pandemic restrictions. All the seven children showed favourable improvement in terms of severity and improvement in the co-morbid conditions. All of them responded to the individualised treatment protocol and showed difference in pre (mean=38) and post (mean=12) total tic severity score suggesting response to treatment. Among them, two children scored zero. The present case series demonstrates the application of behavioural therapy including varied strategies as per the individual case conceptualisation.

Keywords: Habit reversal training, Neurodevelopmental disorders, Online mode of therapy, Yale global tic severity scale

INTRODUCTION

Tic disorder is one of the prevalent neurodevelopmental motor disorder with its onset in childhood [1], and is characterised by sudden, repetitive involuntary motor movements or sound in the form of sudden twitches, shrugging shoulders, blinking eyes, various types of motor movements, humming, clearing throat, yelling words or making various types of sounds [2].

The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) [3] provides the diagnostic criteria for tic disorder. Three tic disorders included in DSM-5 are Tourette's disorder (Tourette Syndrome), persistent (also called chronic) motor or vocal tic disorder and provisional tic disorder. In Tourette syndrome, there are two or more motor tics along with atleast one vocal tic, although both need not be present at the same time, lasting for atleast one year. Whereas in persistent (chronic) motor or vocal tic disorder, person must have one or more motor tics or vocal tics but not both, and these should be occurring many times a day or on and off for more than a year. Provisionally, tic disorder can be recognised by presence of motor or vocal tic for a period less than a year. The onset of tics occurs prior to 18 years of age, with average age of onset being between four and six years [3].

Among school children, tic disorder ranges from 11-20% [1,4-6] with a male to female ratio between 2:1 to 3.5:1. Around 4-20% of school children experience tics [1]. The waxing and waning course of the tics, with severity being more during the stressful period, has been observed [7,8].

As per certain evidences, dysfunctional cortico-striatal-thalamo-cortical pathways have been considered as one of the causes to motor tics [9]. Loss of normal symmetry of caudate nucleus is noted in Magnetic Resonance Imaging (MRI) morphometric studies [10,11]. It has been noted that increased activities in sensorimotor regions i.e., primary motor cortex, putamen and decreased activity in anterior cingulate and caudate during occurrence of tics. This suggests the dysfunction of neurological circuits [12].

Presence of tics in school children brings down their confidence. It has shown to impair their concentration, leading to impaired performance in time limited tasks, incomplete class works, avoiding reading aloud and writing [13,14] and all this leads to impaired school performance [15]. Bullying and teasing by the peer group leads to impaired social skills and low confidence. All these can lead to loneliness, anxiety, depression [16], less social acceptance [17] and aggression in adolescents [18,19]. Obsessive compulsive disorder, Attention Deficit Hyperactivity Disorder (ADHD), and oppositional defiant disorder also has been noted in those having this condition [4]. Tics can present with physical symptoms like neuropathic pain or tissue damage e.g., neck and shoulder pain, headaches, stress fracture and so on [20,21].

Mild or occasional tics can be managed with reassurance and counselling. If the co-morbid conditions are bothersome then they need to be treated and managed properly. Moderate tics can be managed with medication along with alternative techniques. Clonidine being the first line medicine can be started with 0.05 mg at bedtime and increased 0.05 mg every 4-7 days to a maximum of 0.3-0.4 mg/day in three to four divided doses according to the tolerability. Other medications used for treating tics are guanfacine, atypical antipsychotics like risperidone, olanzapine, ziprasidone, aripiprazole [22]. Multiple behavioural training techniques like- Habit Reversal Training (HRT), relaxation training, bio-feedback, mass negative practice, and self monitoring are used and gaining more importance in present days. Deep brain stimulation is under experimental process for severe refractory tics [22].

The present case series presents the description of tic disorders in seven children. Among them, few were started on medication and simultaneously started on behavioural modification training and remaining directly on behavioural modification therapy. Once the improvement was observed then medications were tapered and stopped and Cognitive Behavioural Therapy (CBT) was continued. In the present series, few children were provided intervention through teletherapy, due to geographic distance and travel restrictions imposed in view of the COVID-19 pandemic.

Cases	Sex	Age	Diagnosis	Treatment	Number of sessions	Pretreatment YGTSS	Post-treatment YGTSS
Case 1	Female*	7 years	Provisional Tic disorder with ADHD	Clonidine with CBT	08	47	20
Case 2	Male	10 years	Provisional Tic disorder	CBT	05	30	15
Case 3	Male	8 years	Persistent motor or vocal Tic with ADHD with nocturnal enuresis	Clonidine with CBT	04#	43	16
Case 4	Male*	8 years	Persistent motor Tic disorder with intellectual disability	CBT	06	39	0
Case 5	Male*	8 years	Provisional Tic disorder	CBT	05	32	16
Case 6	Female	8 years	Provisional Tic disorder with ADHD	Clonidine with CBT	12	43	0
Case 7	Male	4 years	Provisional Tic disorder	CBT	05	32	18

[Table/Fig-1]: Participant characteristics and intervention summaries.

*Children received online CBT; #Child dropped therapy before completion of sessions

CASE SERIES

The seven participants who visited the child development clinic dealing with all the neurodevelopmental disorders at A.J. Institute of Medical Sciences were included in the present case series [Table/Fig-1]. The primary concern was presence of some form of tics; either vocal, motor or both. These cases also presented with either other co-morbid conditions (three) or behavioural concerns (four) that led to distress and thereby impairing their functioning in day to day activities. Participants were in the age range of 4-10 years and with the gender ratio of 5:2 (male:female).

Presence of tics was assessed using: DSM-5 (American Psychiatric Association, 2013) diagnostic criteria [3] and severity was graded by YGTSS [23]. This scale was administered prior to initiating and discontinuing the therapy sessions. All had a diagnosis of tic disorders (two having diagnosis of persistent motor or vocal tic disorder with motor tics only and five having diagnosis of provisional tic disorder) based on DSM-5. Their pre-intervention scores on YGTSS ranged from 30 to 47 (highest being 50) indicating the total severity of tic disorder.

Three of the participants were on clonidine for tics and the dose was altered (increased and decreased) during the course of intervention, as per the course and severity of the symptoms. All the participants were provided with therapy by the same therapist. A standard therapy module was delivered, using individualised case conceptualisations for including several behavioural techniques-behavioural rewards, HRT, relaxation training, identification and management of emotions and social skills training. Psychoeducation about tic disorders and its nature was also provided to all participants parents.

The treatment module included assessment, setting treatment goals, identifying the pattern to tic, any triggering factor, working onto underlying emotion/stressor, behavioural techniques and parenting strategies. Parents were also included in the sessions for understanding and maintenance of environmental factors related to tic. Adaptations to therapy were made to accommodate the co-morbid conditions being present in few of the participants. These adaptations were individualised to each participant but included the following techniques:

1. Initial two sessions were spent on understanding the nature, intensity and frequency of tic along with, if any, pattern or environmental triggers being observed. Parents were briefed about the nature of the disorder and its prognosis. They were also educated about the frequency and nature of sessions as a part of intervention and their role.
2. Behavioural rewards in form of token, gestures, praise, acknowledgement were used for each of the target behaviour was worked upon by the child as a form of encouragement to the expected appropriate behaviour.
3. Identifying, understanding, labelling and strategies to regulate the emotion was included for participants as they were observed to have difficulty in it and hence, being manifested through varied behaviours.
4. Relaxation training and social skills training was used for ones with poor self-confidence, being nervous and having difficulty in interacting with people.

5. HRT was included to help participants develop more awareness to their tic and develop competing response to it.
6. Activities to work on their attention span and concentration, sitting tolerance and ability to listen and follow instructions were used.
7. Parents were present for all the sessions and inputs/feedback were sought from them at the start and they were briefed about the skills targeted and strategies to be used towards the end of the each session. Their concerns/queries were resolved too. Parents were invaluable resource at recognising and helping them to work through the distress and interference caused by the tic.
8. This treatment module was adapted to online mode too for few participants in view of geographical distance and travel restrictions being imposed considering the COVID-19 pandemic.
9. Sessions also targeted at helping them work through the co-morbid conditions and other behavioural concerns like deficits in social communication skills, poor self-confidence and identification and management of emotions.

All the participants were provided with the above mentioned therapy module and significant improvement was observed postsessions wherein the post intervention scores on YGTSS ranged from 0 to 20 indicating the total severity of tic disorder. The treatment response was evaluated using YGTSS. Difference of six or seven points in the total tic severity score or 35% reduction on total tic severity score denotes significant response to intervention [24].

Among the seven participants, three children had ADHD as co-morbid condition along with tics. Hence, these children were started on clonidine and the training module included behavioural modifications for the same. One among them had nocturnal enuresis which was also overcome by behavioural modifications. Among seven children three children had five sessions, one child had six sessions, one had eight and one child 12 sessions. Child who dropped therapy before completion had attended four sessions, when mother had discontinued the further therapy due to unavoidable personal reasons.

DISCUSSION

In the present case series of seven children, all of them showed improvement in the severity grading with the formulated therapy, over four months. Three children received clonidine along with cognitive behavioural training as they had ADHD as a co-morbidity. All the seven children showed difference in pre and post-total tic severity score of more than seven points. Two children among them scored 0 in the post treatment assessment, suggesting very good response. The training module considered other deficits and co-morbidities among the children in this case series, and an overall support was provided for improvement in other areas.

In all the cases, initial two sessions were required to understand the nature of the condition and in building the rapport with the children. A standard and well structured individualised therapy module of CBT helped in the better results. In a randomised control trial, Comprehensive Behavioural Intervention for Tics (CBIT) was compared with Supportive Psychotherapy and Education (PST).

Eight sessions were provided over 10 weeks. Results of the study showed 52.5% of the CBIT group were treatment responders compared to 18.5% of the PST group. It demonstrated that 30.8% reduction of severity in CBIT group based on YGTSS score compared to 18.5% in PST group [25]. Similarly, another RCT among adults with tics was conducted, where CBIT was compared with PST [26]. That study showed significant reduction with YGTSS scores in behavioural therapy group compared to the control group. The present case series as well shows significant improvement with CBT.

In the present study, three children received CBT through video conferencing. All of them showed significant improvement, as reflected in the YGTSS assessment scores. In a pilot study by Himle MB et al., three children were provided CBIT intervention via video conferencing [27]. Study results showed significant reduction in tics. In a follow-up, over 20 children were divided into two group. One group received face to face CBIT and another group received CBIT through video conferencing [28]. Both the study groups showed significant reduction in tic severity (YGTSS assessment), with mean reduction of 33% and 27% in video conferencing, and face to face, respectively.

Parental educational status and their priorities to other personal issues has role in determining regularity in taking sessions and continuing treatment till completion. Psychoeducation has an important role to play in the treatment of tics, as it provides detailed information about the condition to the children and their parents, provides correct answers to their misconceptions and their concerns [29]. In the present study, psychoeducation was provided to all the study participants and their parents. Three children received training through online module, culminating into favourable results. This suggests that well planned therapy module with the involvement of parents help in obtaining good results. Psychoeducation of the parents and including them in the therapy builds confidence among the parents in dealing with the condition. Some children might require multiple sessions, with increased frequency whereas, few might respond after few sessions. Hence, there is a need for flexibility with the number of sessions of therapy till the desired results are obtained. Overall, severity of tics in children can be effectively be brought down with CBT.

CONCLUSION(S)

In conclusion, the present case series presents the role of CBT for tics in children. Tics is one of the common problem in school children. However, planned and tailored therapy module brings good improvement in the condition. Intervention helps children learn skills to minimise the negative impact of the disorder.

REFERENCES

- [1] Cubo E, Gabriel y Galan JM, Villaverde VA, Velasco SS, Benito VD, Macarron JV et al. Prevalence of Tics in schoolchildren in central Spain: A population-based study. *Pediatr Neurol*. 2011;45(2):100-08.
- [2] Abell S, Ey J. Tics in childhood. *Clin Pediatr (Phila)*. 2009;48:790e1.
- [3] American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: American Psychiatric Publishing; 2013.
- [4] Kurlan R, Como PG, Miller B, Palumbo D, Deeley C, Andresen EM, et al. The behavioural spectrum of tic disorders: A community-based study. *Neurology*. 2002;59(3):414-20.
- [5] Linazasoro G, Van Blercom N, de Zarate CO. Prevalence of tic disorders in two schools in the Basque country: Results and methodological caveats. *Mov Disord*. 2006;21(12):2106-09.
- [6] Snider LA, Seligman LD, Ketchen BR. Tics and problem behaviours in school children: Prevalence, characterisation and associations. *Pediatrics*. 2002;110(2):331-36.
- [7] Coffey BJ, Biederman J, Geller D, Frazier J, Spencer T, Doyle R, et al. Reexamining Tic persistence and Tic-associated impairment in Tourette's Disorder: Findings from a naturalistic follow-up study. *J Nerv Ment Dis*. 2004;192(11):776-80.
- [8] Leckman JF. Phenomenology of tics and natural history of tic disorders. *Brain Dev*. 2003;25(Suppl 1):S24-28.
- [9] Murphy TK, Lewin AB, Storch EA, Stock S; American Academy of Child and Adolescent Psychiatry (AACAP) Committee on Quality Issues (CQI). Practice parameter for the assessment and treatment of children and adolescents with tic disorders. *J Am Acad Child Adolesc Psychiatry*. 2013;52(12):1341-59.
- [10] Leckman J, Bloch MH, Smith ME, Larabi D, Hampson M. Neurobiological substrates of Tourette's disorder. *J Child Adolesc Psychopharmacol*. 2010;20(4):237-47.
- [11] Rickards H. Functional neuroimaging in Tourette syndrome. *J Psychosom Res*. 2009;67(6):575-84.
- [12] Wang Z, Maia TV, Marsh R, Colibazzi T, Gerber A, Peterson BS. The neural circuits that generate tics in Tourette's syndrome. *Am J Psychiatry*. 2011;168(12):1326-37.
- [13] Packer LE. Tic-related school problems: Impact on functioning, accommodations, and interventions. *Behav Modif*. 2005;29(6):876-99.
- [14] Shady GA, Fulton WA, Chamption LM. Tourette syndrome and educational problems in Canada. *Neurosci Biobehav Rev*. 1988;12:263-65
- [15] Storch EA, Lack CW, Simons LE, Goodman WK, Murphy TK, Geffken GR. A measure of functional impairment in youth with Tourette's syndrome. *J Pediatr Psychol*. 2007;32(8):950-59.
- [16] Storch EA, Murphy TK, Chase RM, Keeley M, Goodman WK, Murray M, et al. Peer victimization in youth with Tourette's syndrome and chronic tic disorder: Relations with tic severity and internalizing symptoms. *J Psychopathol Behav Assess*. 2007;29:211-19.
- [17] Boudjouk PJ, Woods DW, Miltenberger RG, Long ES. Negative peer evaluation in adolescents: Effects of tic disorders and trichotillomania. *Child Fam Behav Ther*. 2000;22(1):17-28.
- [18] Bawden HN, Stokes A, Camfield CS, Camfield PR, Salisbury S. Peer relationship problems in children with Tourette's disorder or diabetes mellitus. *J Child Psychol Psychiatry*. 1998;39(5):663-68.
- [19] Stokes A, Bawden HN, Camfield PR, Backman JE, Dooley JM. Peer problems in Tourette's disorder. *Pediatrics*. 1991;87(6):936-42.
- [20] Fusco C, Bertani G, Caricati G, Della Giustina E. Stress fracture of the peroneal bone secondary to a complex tic. *Brain Dev*. 2006;28(1):52-54.
- [21] Riley DE, Lang AE. Pain in Gilles de la Tourette syndrome and related tic disorders. *Can J Neurol Sci*. 1989;16(4):439-41.
- [22] Qasaymeh MM, Mink JW. New Treatments for Tic Disorders. *Curr Treat Options Neurol*. 2006;8(6):465-73.
- [23] Leckman JF, Riddle MA, Hardin MT, Ort SI, Swartz KL, Stevenson J, et al. The Yale Global Tic Severity Scale: Initial testing of a clinician-rated scale of tic severity. *J Am Acad Child Adolesc Psychiatry*. 1989;28(4):566-73.
- [24] Storch EA, Murphy TK, Geffken GR, Sajid M, Allen P, Roberti JW et al. Reliability and validity of the Yale Global Tic Severity Scale. *Psychol Assess*. 2005;17(4):486-91.
- [25] Piacentini J, Woods DW, Scahill L, Wilhelm S, Peterson AL, Chang S, Walkup JT. Behaviour therapy for children with Tourette Disorder: A randomized controlled trial. *The Journal of the American Medical Association*. 2010;303:1929-37.
- [26] Wilhelm S, Peterson AL, Piacentini J, Woods DW, Deckersbach T, Sukhodolsky DG, et al. Randomized trial of behaviour therapy for adults with Tourette Syndrome. *Archives of General Psychiatry*. 2012;69:795-803.
- [27] Himle MB, Olufs E, Himle J, Tucker BTP, Woods DW. Behaviour therapy for tics via videoconference delivery: An initial pilot test in children. *Cognitive and Behavioural Practice*. 2010;17:329-37.
- [28] Himle MB, Freitag M, Walther M, Franklin SA, Ely L, Woods DW. A randomized pilot trial comparing video-conference versus face-to-face delivery of behaviour therapy for childhood tic disorders. *Behaviour Research and Therapy*. 2012;50:565-70.
- [29] Wu MS, McGuire JF. Psychoeducation about tic disorders and treatment. In JF McGuire, TK Murphy, J Piacentini, EA. Storch (Eds.), *The clinician's guide to treatment and management of youth with Tourette syndrome and tic disorder*. 2018;21-41.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Paediatrics, A.J. Institute of Medical Sciences, Mangalore, Karnataka, India.
2. Psychologist, Department of Psychology, Astitva Clinic, Mumbai, Maharashtra, India.
3. Associate Professor, Department of Paediatrics, A.J. Institute of Medical Sciences, Mangalore, Karnataka, India.
4. Psychologist, Department of Paediatrics, A.J. Institute of Medical Sciences, Mangalore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Shilpa Hegde,
#3B, Kambla Heights Apartment, Mangalore, Karnataka, India.
E-mail: drshilpahegde@ajims.edu.in

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jan H et al.]

- Plagiarism X-checker: Jul 29, 2021
- Manual Googling: Jan 27, 2022
- iThenticate Software: Feb 17, 2022 (4%)

ETYMOLOGY: Author Origin

Date of Submission: **Jul 14, 2021**
Date of Peer Review: **Sep 23, 2021**
Date of Acceptance: **Jan 28, 2022**
Date of Publishing: **Mar 01, 2022**